STRATEGIC ENVIRONMENTAL ASSESSMENT FOR ELECTRICITY GRID INFRASTRUCTURE IN SOUTH AFRICA

APPENDIX C

Specialist Reports

STRATEGIC ENVIRONMENTAL ASSESSMENT FOR ELECTRICITY GRID INFRASTRUCTURE IN SOUTH AFRICA

Appendix C.1

Agriculture Scoping Assessment Report

Johann Lanz (Pr. Sci. Nat)
Soil Scientist

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1 SPECIALIST CV

Education

M.Sc. (Environmental Geochemistry)	University of Cape Town	1996 - June 1997
B.Sc. Agriculture (Soil Science, Chemistry)	University of Stellenbosch	1992 - 1995
BA (English, Environmental & Geographical Science)	University of Cape Town	1989 - 1991
Matric Exemption	Wynberg Boy's High School	1983

Professional work experience

I am registered as a Professional Natural Scientist (Pri.Sci.Nat.) in the field of soil science, registration number 400268/12.

Soil Science Consultant **Self employed** **2002 - present**

I run a soil science consulting business, servicing clients in both the environmental and agricultural industries. Typical consulting projects involve:

- Soil specialist study inputs to EIA's, SEA's and EMPr's. These have focused on impact assessments and rehabilitation on agricultural land, rehabilitation and re-vegetation of mining and industrially disturbed and contaminated soils, as well as more general aspects of soil resource management. Recent clients include: CSIR; Savannah Environmental; Aurecon; Red Cap Investments; MBB Consulting Engineers; Enviroworks; Sharples Environmental Services; Mainstream Renewable Power; BioTherm Energy; WKN Windcurrent; Corobrik; Western Cape Provincial Department of Environmental Affairs and Development Planning; Alcan aluminium smelter (Coega); Namaqualand Restoration Initiative; AECI; Afrimat; Tiptrans.
- Soil resource evaluations and mapping for agricultural land use planning and management. Recent clients include: Zewenwacht Wine Estate, Lourensford Fruit Comapny; Thelema Mountain Vineyards; Delaire Wine estate; Newton-Johnson Wines; Spier Estate; Colors Fruit; Kaarsten Boerdery; Amanzi Country Estate (Port Elizabeth); Rudera Wines; Flagstone Wines; Cob Creek Estate (Jeffreys Bay); Solms Delta Wines; Dornier Wines.
- I have conducted several recent research projects focused on conservation farming, soil health and carbon sequestration.
- I have project managed the development of soil nutrition software for Farmsecure Agri Science.

Soil Science Consultant **Agricultural Consultors International (Tinie du Preez)** **1998 - end 2001**

Responsible for providing all aspects of a soil science technical consulting service directly to clients in the wine, fruit and environmental industries all over South Africa, and in Chile, South America.

Contracting Soil Scientist **De Beers Namaqualand Mines** **July 1997 - Jan 1998**

Completed a contract to make recommendations on soil rehabilitation and re-vegetation of mined areas.

Publications

Lanz, J. 2012. Soil health: sustaining Stellenbosch's roots. In: M Swilling, B Sebitosi & R Loots (eds). *Sustainable Stellenbosch: opening dialogues*. Stellenbosch: SunMedia.
Lanz, J. 2010. Soil health indicators: physical and chemical. *South African Fruit Journal*, April / May 2010 issue.
Lanz, J. 2009. Soil health constraints. *South African Fruit Journal*, August / September 2009 issue.
Lanz, J. 2009. Soil carbon research. *AgriProbe*, Department of Agriculture.
Lanz, J. 2005. Special Report: Soils and wine quality. *Wineland Magazine.*

I am a reviewing scientist for the *South African Journal of Plant and Soil*.

2 SPECIALIST DECLARATION

I, Johann Lanz, as the appointed independent specialist hereby declare that I:

- act/ed as the independent specialist in this application;
- regard the information contained in this report as it relates to my specialist input/study to be true and correct;
- do not have and will not have any financial interest in the undertaking of the activity, other than remuneration for work performed;
- have and will not have any vested interest in the proposed activity proceeding;
- have disclosed any material information that have or may have the potential to influence the objectivity of any report or decisions base thereon; and
- am aware that a false declaration is an offence in terms of regulation 71 of GN No. R. 543.

Signature of the specialist:

Name of company: Johann Lanz – Soil Scientist

Professional Registration (incl number): South African Council for Natural Scientific Professions, Registration no. 400268/12

Date: 8 June 2015

3 ABBREVIATIONS AND ACRONYMS

CSIR	Council for Scientific and Industrial Research
DAFF	Department of Agriculture, Forestry and Fisheries
DEADP	Department of Environmental Affairs and Development Planning
EGI	Electricity grid infrastructure
SACNASP	South African Council for Natural Scientific Professions
SEA	Strategic Environmental Assessment

4 TERMS OF REFERENCES (TORS)

4.1 Background and Details of the Project

The National Department of Environmental Affairs (DEA) has embarked on a process of identifying ways to act swiftly, streamline and shorten the environmental authorisation process for major infrastructure build programmes in South Africa. In particular, the DEA is looking to facilitate the efficient roll out of Strategic Integrated Projects (SIPs) lead by the Presidential Infrastructure Coordinating Committee and detailed in the National Infrastructure Plan.

As part of this process, the Department of Environmental Affairs (DEA), mandated by Ministers and Members of the Executive Council (MinMec), commissioned the Council for Scientific and Industrial Research (CSIR) in January 2014 to undertake a Strategic Environmental Assessment (SEA) linked to SIP 10: Electricity Transmission and Distribution for all. The SEA is titled national Department of Environmental Affairs Electricity Grid Infrastructure Strategic Environmental Assessment. The aim of the SEA is to identify suitable routing corridors that will enable the efficient and effective expansion of key strategic transmission infrastructure designed to satisfy national transmission requirements up to the 2040 planning horizon. The CSIR is teaming up with Eskom and the South African National Biodiversity Institute (SANBI) to deliver on project outputs.

Upon gazetting of the corridors, it is envisaged that the environmental authorisation process for transmission infrastructure[1] will be streamlined in specific areas identified through the SEA process as being less sensitive to the negative impacts of electricity grid infrastructure development. This should incentivise Eskom and other potential transmission infrastructure developers to plan and develop in less sensitive areas.

The SEA process also provides a platform for coordination between the various authorities responsible for issuing authorisations, permits or consents and thereby will further contribute to a more streamlined environmental authorisation process.

The preliminary corridors (the starting point of the SEA) were identified by Eskom and are based on the results of a detailed Eskom Strategic Grid Plan Study. The Study considered a number of possible future generation and load scenarios and in so doing identified the need for five national transmission infrastructure corridors to facilitate the balancing of South Africa's electricity supply and demand needs up 2040.

The corridors are:

1. The Eastern Corridor
2. The Western Corridor
3. The Northern Corridor
4. The Central Corridor
5. The International Corridor

The SEA then undertook a corridor refinement process to determine optimal placement of the five (5) 100km wide corridors by considering key constraints (Phase I) and opportunities (Phase II) for electricity transmission level infrastructure development.

Phase I involved a wall to wall nation-wide sensitivity delineation assessment to determine areas where electricity grid infrastructure is likely to have an impact on the environment (environmental constraints) and

[1] Including associated infrastructure such as transmission substations and distribution lines.

areas where the environment is likely to have an impact on electricity grid infrastructure (engineering constraints). The full extent of South Africa was then graded and mapped for environmental and engineering sensitivity, indicating areas to be avoided (Very High sensitivity), to areas which are sensitive for various reasons (High-Medium sensitivity), to areas which demonstrate no sensitivity (Low sensitivity). The outputs of Phase I are a 'wall to wall' environmental constraints map and 'wall to wall' engineering constraints map.

Phase II involved a review of national, provincial and local government development plans as well as detailed consultation with government and industry to determine areas of future bulk demand for electricity and or transmission level infrastructure. Key strategic demand areas were identified and mapped.

The Eskom Preliminary corridors are illustrated in Figure 1 below.

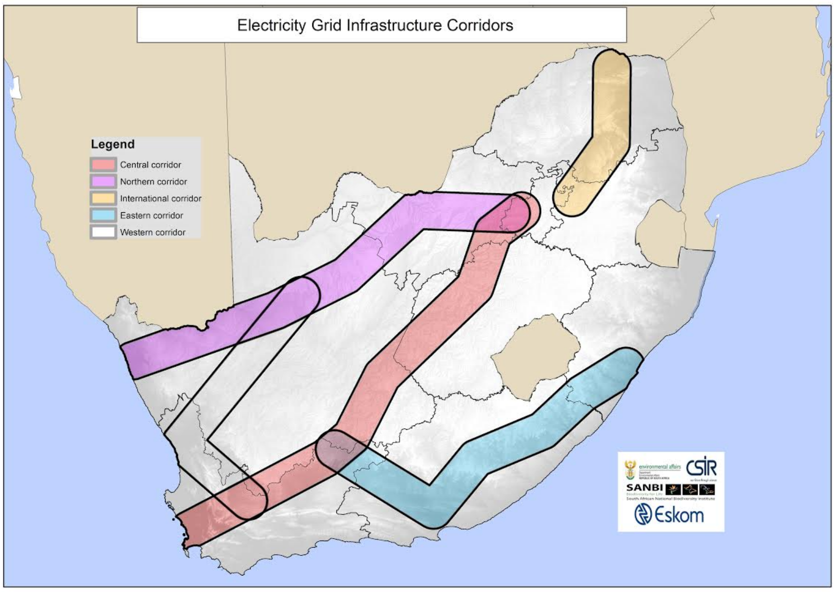

Figure 1: Eskom Preliminary Corridors

4.2 Scope of Work

The agricultural assessment will be focused primarily on the interpretation of existing data and should be based on defensible and, if available, standardised and recognised agricultural planning methodologies.

The appointed supplier will be required to review and interrogate the draft environmental constraints map with respect to features linked to agriculture. The appointed supplier will be required to identify any gaps in information. Once the appointed supplier has considered the draft environmental constraints map, the appointed supplier will be required to develop a dedicated agriculture sensitivity map for each of the corridors.

The study methodology developed as part of this project will inform future SEA-level agriculture specialist assessment methodologies.

The national Department of Agriculture, Forestry and Fisheries (DAFF) has reviewed this RfP. The supplier must undertake the assessment in close collaboration with DAFF to ensure that the outcomes of the study are accepted by this authority and will be taken into consideration for future agricultural authorisation and commenting in the assessed areas. It is recommended that the supplier meet with appropriate representatives from these departments as part of conducting this assessment.

The following data sources should as a minimum be consulted as part of the study:

- Land capability Classification for South Africa 2002;
- Refined land capability data set;
- Cultivated fields / Agricultural land use;
- Natural Resources related data (soil, climate, slope / terrain, vegetation, grazing capacity); and
- Other area specific datasets that can guide the evaluation process

The aim of the assessment is to:

1) Determine the existing agricultural resources and agricultural potential of the area within each of the proposed corridors;
2) Delineate the corridor areas according to differing levels of sensitivity. Delineation should be based on the possible negative impact of electricity grid infrastructure on existing and potential agricultural activity[2]. The risk of soil erosion should also be considered.
3) Through a review of the draft environmental constraints map together with the sourcing of additional information, develop a consolidated agriculture sensitivity map for each corridor.
4) Describe what additional information and level of assessment is required in each sensitivity category before an authorisation with respect to agriculture should be considered. This should be done separately for each corridor and/or sections of the corridor; and
5) Assess the corridors in terms of the potential impacts of electricity grid infrastructure on agriculture activities and or potential, taking cognizance of the relative sensitivity of these areas, and outline proposed management actions to enhance benefits and avoid/reduce/offset negative impacts.

It is important to note that the outputs from this study will be used to inform a planning document for electricity grid infrastructure development in the corridors. The aim of the planning document will be to inform and focus further agriculture project level assessment with respect to electricity grid infrastructure development in the corridors (i.e. serve as a scoping exercise).

The key deliverables and reporting requirements include:

a) Study methodology;

b) Data sources;

c) Assumptions, limitations, confidence estimates;

d) A description of each corridor in terms of agricultural resources and potentials.

e) Identify and report key agricultural and soil sensitivities within each of the corridors, making use of datasets made available through the draft environmental constraints map and additional information sourced by the specialist[3].

f) Develop an approach for classing each sensitivity feature according to a four- tiered sensitivity rating system i.e. Very High, High, Medium or Low[4].

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[2] In addition, delineation should be undertaken in the context of all possible electricity grid infrastructures including transmission lines, distribution lines and substations.

[3] Consideration should be given to the impact on agricultural potential, the compatibility of electricity grid infrastructure with specific intensive agricultural practices, soil erosion potential and any other sensitivities identified through the specialist assessment.

[4] Sensitivities should be graded in relation to the ability to apply mitigation measures.

g) Provide the assessment criteria and assumptions behind the determination of sensitivity ratings for each sensitivity feature;

h) Develop GIS based four-tiered consolidated sensitivity map of all sensitivity features identified through the assessment showing the location and spatial extent for each sensitivity feature and associated buffering, if any, for each of the corridors. The sensitivity rating should be illustrated according to the following coloration scheme: Dark Red/Very High, Red/High, Orange/Medium, Green/Low[5].

i) A guideline on the interpretation and implementation of the four tier map as well as permit requirements (where applicable) for each corridor. This section should also make recommendations on requirements for additional agricultural specialist studies (if any) within the different tiers of sensitivity specialist before an authorisation can be considered. Recommendations should be focused around the objective of streamlining without compromising environmental protection. This information will be incorporated into a Development Protocol that will ultimately govern development in the corridors; and

j) General comments and discussion for each corridor on the nature of key potential impacts and proposed mitigation.

5 APPROACH AND METHODOLOGY

5.1 Study methodology

The study is informed by the specialist's experience of conducting specialist, agricultural assessments for electricity grid infrastructure projects around the country.

Agricultural impact is understood, for the purposes of this study, as any impact that translates into reduced agricultural production (including forestry). This may occur by way of a degradation of the agricultural resource base or by way of a direct disturbance to agricultural activities. Electricity grid infrastructure has a relatively low impact on agriculture because, in most cases, agriculture can continue largely undisturbed below power lines and the actual footprint of impact is confined to pylon bases and substations and involves an extremely small proportion of the land surface.

The analysis of the five corridors was done by way of a desktop exercise using existing data on agricultural land use and land capability. Data sources are listed in the following section.

The rationale that was used to identify agricultural features and assign a sensitivity to each of them is explained in section 3.1.

[5] Where available, standardised and recognised sensitivity mapping methodologies should be used to determine sensitivities for each feature for each of the corridors.

5.2 Data Sources

Table 1: Data Sources for Specialist Agriculure Scoping Assessment

Data title	Source and date of publication	Data Description
Field crop boundaries	DAFF, 2013	Delineates the boundaries of all cultivated land, based on satellite and aerial imagery. Seven different categories of cultivated land are distinguished. These are pivot agriculture; horticulture/viticulture; shadenet; annual crop cultivation/planted pastures rotation; old fields; subsistence farming; small holdings.
Commercial forestry plantations	DAFF, 2014	Delineates all state owned and private commercial forestry plantations
Land cover (sugar cane farming)	DEADP, 2011	Delineates all sugar cane fields, including emerging farmers in Kwazulu-Natal.
Mapping of Agricultural Commodity Production in Limpopo	Limpopo Department of Agriculture, 2010	Distinguishes a number of different crop types using the same field crop boundaries as the field crop boundary data, but with some additional areas added.
Land cover (viticulture)	DEADP, 2014	Raster data indicating viticulture as a land cover category.
Land capability	DAFF, 2002	Categorises all land nationally into 8 different classes of agricultural land capability. The classification is based on soil, terrain and climate parameters. Soil data originates from the land type survey that was conducted from the 1970's until 2002.

It should be noted that although the land capability data is old, it is a measure of an inherently unchanging characteristic like geology, and so the age of the data does not affect its reliability. What is relevant is the accuracy of the data as a result of its resolution. The land capability data is fairly low resolution. DAFF is currently upgrading the accuracy of the land capability data set for the entire country, but this data is not yet available.

5.3 Assumptions and Limitations

Table 2: Assumptions and limitations for Specialist Agriculture Scoping Assessment

Limitation	Included in the scope of this study	Excluded from the scope of this study	Assumption
Resource availability	Only existing, published datasets used with limited desk top verification	Field verification of datasets and outcomes, and extensive local expert consultation	Reasonable accuracy of data layers used. Field verification will take place on a site by site basis linked to development proposals.
Distinguishing criteria for the potential traverse lengths of individual orchards and vineyards.	Measurement of surface area in individual orchards and vineyards.	Measurement of traverse lengths in individual orchards and vineyards.	All orchards and vineyards with an area > 16 hectares have been categorised as having a traverse length of > 400 metres.
Data accuracy	Use of existing data sets only.	Confirmation of on the ground situation in cases where data sets overlap	Areas of overlap with field crop boundaries and plantations were categorised as the former because of the greater accuracy of those data sets compared to the forestry data set.

Orchards and vineyards with a potential electricity line traverse length of greater than 400 metres are distinguished, for the purposes of this report, from those with a traverse length of less than 400 metres. This is because 400 metres is the approximate maximum span distance (the actual maximum is dependent on site specific factors). Anything greater is likely to result in a pylon having to be erected within an orchard or vineyard, leading to greater agricultural impacts. The >400 m blocks were distinguished in the GIS processing, as land parcels having a surface area of greater than 16 hectares . The logic is that it is only surface areas of greater than 16 hectares (400 x 400 metres) that do not have an option of being traversed by a length of less than 400 metres. It is always possible to traverse any smaller surface area by less than 400 metres if the direction of traverse is not fixed. If the direction is fixed the length is influenced by the shape of the land parcel. Also the larger than 16 hectares land parcels may be able to be traversed at less than 400 metres, again depending on their shape. Some land parcels that can be traversed by less than 400 metres will therefore be included in those identified as > 400 metres.

5.4 Relevant Regulatory Instruments

Table 3: Relevant regulatory instruments for Specialist Agriculture Scoping Assessment

National Instrument	Key objective
The Conservation of Agricultural Resources Act No. 43 of 1983.	Protection of natural agricultural resources including soils. The Act applies to all agricultural land (grazing and cultivated). It manages rehabilitation after disturbances to agricultural land. Any disturbance to soil conservation works such as contour banks requires permission in terms of this act.
Subdivision of Agricultural Land Act 70 of 1970.	Preservation of agriculturally viable farm portions. Consent use or change of land use (re-zoning) for developments on agricultural land need to be approved in terms of this act.
DAFF Guidelines for the evaluation and review of applications pertaining to renewable energy on agricultural land, dated September 2011.	Preservation of arable land through prohibition of the development of renewable energy facilities on cultivated and high potential agricultural land.
Draft Preservation And Development Of Agricultural Land Framework Bill	This Act will repeal Act 70 of 1970 and replace the DAFF Guidelines referred to above. The Bill seeks to improve DAFF's fulfilment of its mandate to protect agricultural land for agricultural production. One of its aims, in recognition of South Africa's very limited agricultural land resources, is to ensure that development does not lead to an inappropriate loss of land that may be valuable for agricultural production. Any use of agricultural land for non agricultural purposes will require authorisation in terms of this Act. If the Bill is enacted in its current form, one of the significant implications for electricity grid infrastructure development will be that all Eskom servitudes for power lines will require agricultural consent. Eskom is currently exempt from agricultural authorisation for power line servitudes.

6 CORRIDOR DESCRIPTIONS

Table 4: Corridor Descriptions for Specialist Agriculture Scoping Assessment

Corridor	Brief description
Western	The agricultural potential in the northern half of the corridor, in the Northern Cape, is severely constrained by limited climatic moisture availability making it unsuitable for most agriculture other than extensive sheep farming. There are only very isolated areas of cultivation in this part of the corridor. Within the Western Cape, in the southern part of the corridor, there is better moisture availability and higher potential. Land capability reaches a maximum of class III in the extreme southern part of the corridor. There is a fairly extensive land cover of dryland wheat farming in this area. Vines occur where irrigation is available, most notably on the Olifants River near Vredendal. There is fairly extensive pivot irrigation of potatoes in the Sandveld south of Lamberts Bay.
Northern	The majority of this corridor across the northern Cape is severely constrained by limited climatic moisture availability making it unsuitable for most agriculture other than extensive sheep farming, and cattle farming in the eastern part. Vines occur along the Orange River in the vicinity of Upington. There is an increase in moisture availability eastwards and in the North West Province there is extensive grain farming (maize), with increasing pivot irrigation to the east, predominantly in the vicinity of Lichtenburg and west and north east of Vryburg. Land capability reaches a maximum of class III (with a very small patch of class II) in the extreme eastern part of the corridor as it approaches Gauteng.
International	The southern part of this corridor includes good agricultural land with fairly large areas of land capability class II (west of Witbank and north east of Groblersdal) and class III. There are 2 areas of intensive pivot irrigation near Groblersdal and between Polokwane and Vivo to the north of it, and more scattered distribution of pivots from Groblersdal to the southern end of the corridor. The southern part of the corridor is a grain farming region, and the drier northern part is cattle farming. Some timber plantations and small areas of horticulture occur along the eastern boundary, north from Polokwane, where moisture availability is higher.
Central	This corridor runs from Cape Town through wheat farming in the Swartland and fruit and wine farming in the Boland, then through the Karoo which is severely constrained by climatic moisture availability making only sheep farming viable. The corridor then runs through maize farming areas in the FreeState, Noth West with increasing land capability from class III to class II into Gauteng. There is intensive pivot irrigation on the Orange River, South of Kimberley, near Welkom and more scattered pivot irrigation near Potchefstroom and in Gauteng.
Eastern	There is diverse agriculture across this corridor, with a fairly scattered distribution. The corridor runs from much drier conditions in the west (sheep and cattle farming) to moist conditions with land capability of class II and III in the eastern part of the Eastern Cape and Kwazulu-Natal. It includes areas of citrus farming, subsistence farming, sugar cane and forestry. There is relatively little pivot irrigation.

7 FEATURE SENSITIVITY MAPPING

7.1 Identification of feature sensitivity criteria

The following rationale, which assesses the significance of EGI agricultural impacts, was used to identify relevant agriculture features and assign a sensitivity to them. It is based on a three axis matrix. The first axis is a measure of the economic value of the actual or potential agricultural productivity of the land per unit area and unit time. The second axis is a measure of the proportion of agricultural land surface that is likely to be impacted by EGI development. The third axis is a function of the degree of disturbance to agricultural production. This axis increases from zero disturbance through minor alterations to agricultural activity and on to total prevention of agriculture equating to a loss of agricultural production on a particular piece of land. It also includes any alterations that a particular agricultural activity would impose on the standard electricity grid infrastructure. An example of this is the increase in cable height required to burn sugar cane crop residues. The significance of agricultural impacts therefore increases as the agricultural productivity of the land, the surface area of the land and the level of disturbance increases.

A consideration of the agricultural features that would be impacted by EGI development lead to the features listed in Table 5. These are listed in their order of sensitivity. The highest sensitivity features are centre pivot irrigated lands. Pivot irrigation, irrespective of its size, is incompatible with power lines because of the danger of an electrical short between the lines and the overhead water pipes. In terms of the matrix discussed above pivot lands are high on all three axes: high agricultural productivity; the entire pivot field is impacted; and the disturbance is high, being an exclusion of the possibility of irrigation.

Horticulture and vineyards with a potential electricity line traverse length of greater than 400 metres are distinguished, in terms of their sensitivity, from those with a traverse length of less than 400 metres. This is because a span of greater than 400 metres will result in a pylon having to be erected within an orchard or vineyard, leading to greater agricultural impacts. For horticulture and vineyards, agricultural productivity is high, but less surface area is impacted (only pylon footprint if >400m) with less disturbance – agricultural activity can continue. There is disturbance in terms of restrictions on windbreak heights underneath the power line. Lands that require windbreaks would incur a greater impact than lands that do not require windbreaks. The need for windbreaks is a function of the crop type (some crops are more sensitive to wind than others) and of the prevailing wind conditions of an area and particular site. In general all fruit orchards require windbreaks with citrus being the most sensitive and therefore requiring the most closely spaced windbreaks. Vines do not generally require windbreaks. If windbreaks are restricted around an orchard it will have the impact of lowering yield and fruit quality.

Timber plantation are lower productivity enterprises than the above, but larger areas are impacted with a greater level of disturbance in that trees are excluded from the entire servitude width below the power lines. Relative to the very high sensitivity category, timber plantations are classified as high sensitivity, because of their lower productivity. In all other agriculture, servitudes are not cleared and crops can be grown throughout the servitude width.

Land capability classes I and II have been included in the very high and high sensitivity categories respectively because, within the context of South Africa's very limited agricultural land resources, the entirety of these high potential lands should be preserved for agricultural production as far as possible. Land capability classes III should also be preserved for agricultural production where possible, but is less preservation worthy than the higher classes and so is categorised as medium sensitivity.

The agricultural impacts of EGI on all other land is very low. The actual footprint of impact is very small and agriculture can continue largely undisturbed beneath power lines. However there are some differences between different agricultural features and so for the purposes of this report certain features have been identified as medium sensitivity.

Sugar cane fields have an impact on EGI in that increased cable height is required for the burning of sugar cane crop residues, or an alternative practice of crop residue management is required in lands crossed by power lines.

In all other cultivated fields, the minimal disturbance and loss of land on pylon bases, substations and supporting infrastructure is still more significant than on uncultivated land, and so all cultivated areas have been categorised as medium sensitivity. All agricultural land not included in the categories above is classified as low sensitivity.

It was decided that soil erosion should not be included in the categorisation of agricultural sensitivity. Erosion risk was not considered to be a significant independent factor that should influence power line routing options. There are several reasons for this:

- The threat of EGI development on erosion risk is very minimal and mitigation management at the time of construction is simple to implement.
- Mitigation measures for erosion should be implemented across all EGI developments, regardless of their status according to large scale erosion risk data. Mitigation strategies are largely generic for all developments but the detailed level of required mitigation will vary from pylon to pylon and therefore cannot be usefully informed by large scale data.
- Erosion risk is primarily a function of slope steepness which is already taken into account in terms of engineering constraints.

The sensitivity rating for all agricultural features is the same across all five corridors. Buffers are not considered necessary for agricultural features.

Table 5: Date used per agricultural feature for Specialist Agriculture Scoping Assessment

Sensitivity Feature Class	Data Source + Date of Publications	Data Preparation and Processing	Sensitivity
Pivots	Field crop boundaries, DAFF, 2013. Mapping of Agricultural Commodity Production in Limpopo, Limpopo Department of Agriculture, 2010.	Union process between filed crop data and Limpopo data for International corridor only.	Very high
Horticulture >400m	Field crop boundaries, DAFF, 2013. Mapping of Agricultural Commodity Production in Limpopo, Limpopo Department of Agriculture, 2010	Union process between filed crop data and Limpopo data for International corridor only. Surface area >16 hectares.	Very high
Vines >400m	Field crop boundaries, DAFF, 2013. Land cover (viticulture), DEADP, 2014.	Union process between filed crop data and Land cover (viticulture) data. Surface area >16 hectares.	Very high
Land capability Class I	Land capability, DAFF, 2002		Very high
Horticulture <400m	Field crop boundaries, DAFF, 2013. Mapping of Agricultural Commodity Production in Limpopo, Limpopo Department of Agriculture, 2010	Union process between filed crop data and Limpopo data for International corridor only. Surface area <16 hectares.	High
Vines <400m	Field crop boundaries, DAFF, 2013. Land cover (viticulture), DEADP, 2014.	Union process between filed crop data and Land cover (viticulture) data. Surface area <16 hectares.	High
Land capability Class II	Land capability, DAFF, 2002		High
Timber plantations	Commercial forestry plantations, DAFF, 2014.	Areas of overlap with field crop boundaries and sugar cane were categorised as the latter because of the greater accuracy of those data sets compared to the forestry data set.	High

Sensitivity Feature Class	Data Source + Date of Publications	Data Preparation and Processing	Sensitivity
Sugar cane	Land cover – sugar cane farming, DEADP, 2011.		Medium
All other cultivated fields	Field crop boundaries, DAFF, 2013. Mapping of Agricultural Commodity Production in Limpopo, Limpopo Department of Agriculture, 2010	Union process between filed crop data and Limpopo data for International corridor only.	Medium
Land capability Class III	Land capability, DAFF, 2002		Medium

7.2 Maps

7.2.1 Western Corridor

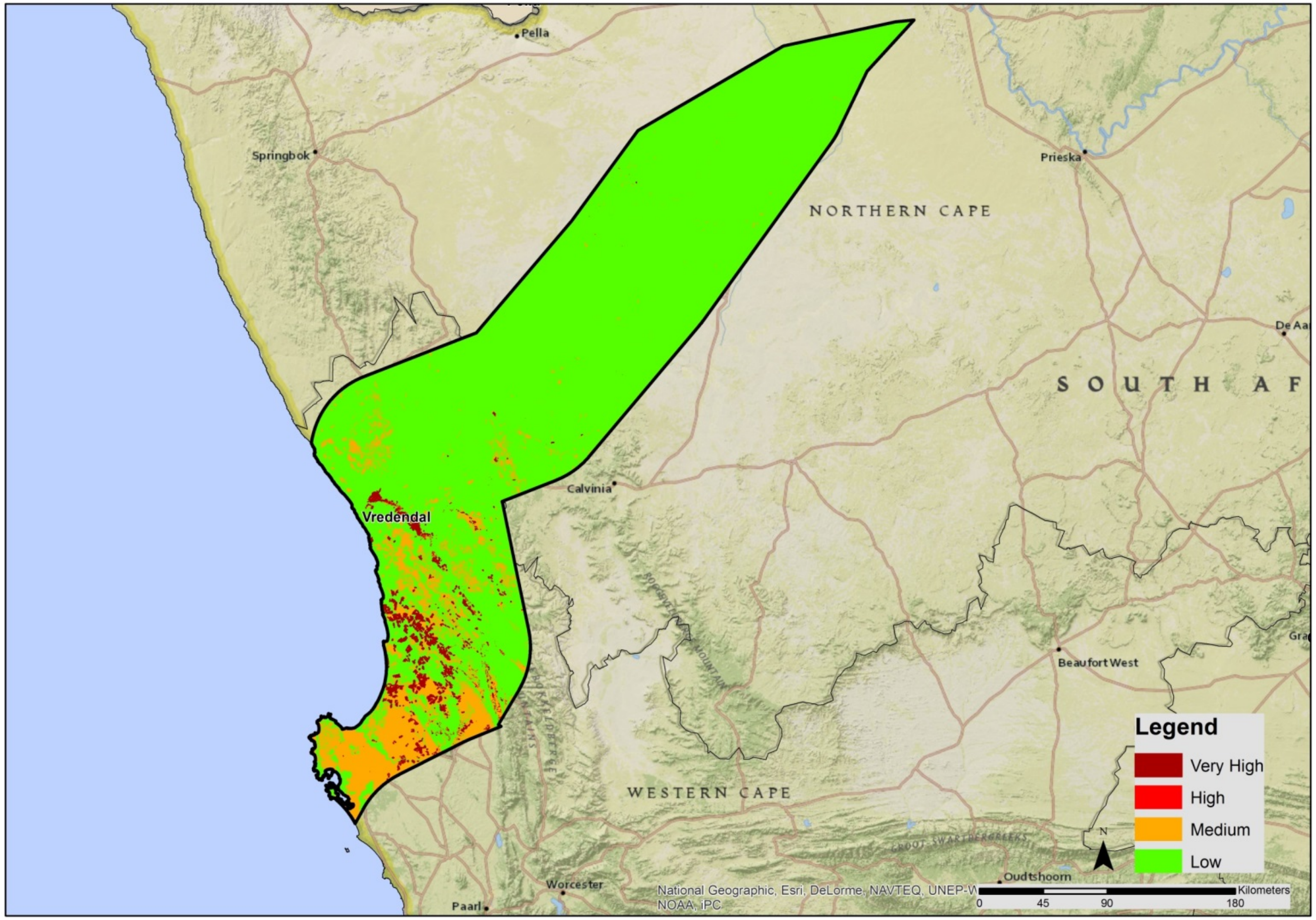

Figure 2: Agricultural sensitivity map for Electricity Grid Infrastructure Development in the Western Corridor

7.2.2 Northern Corridor

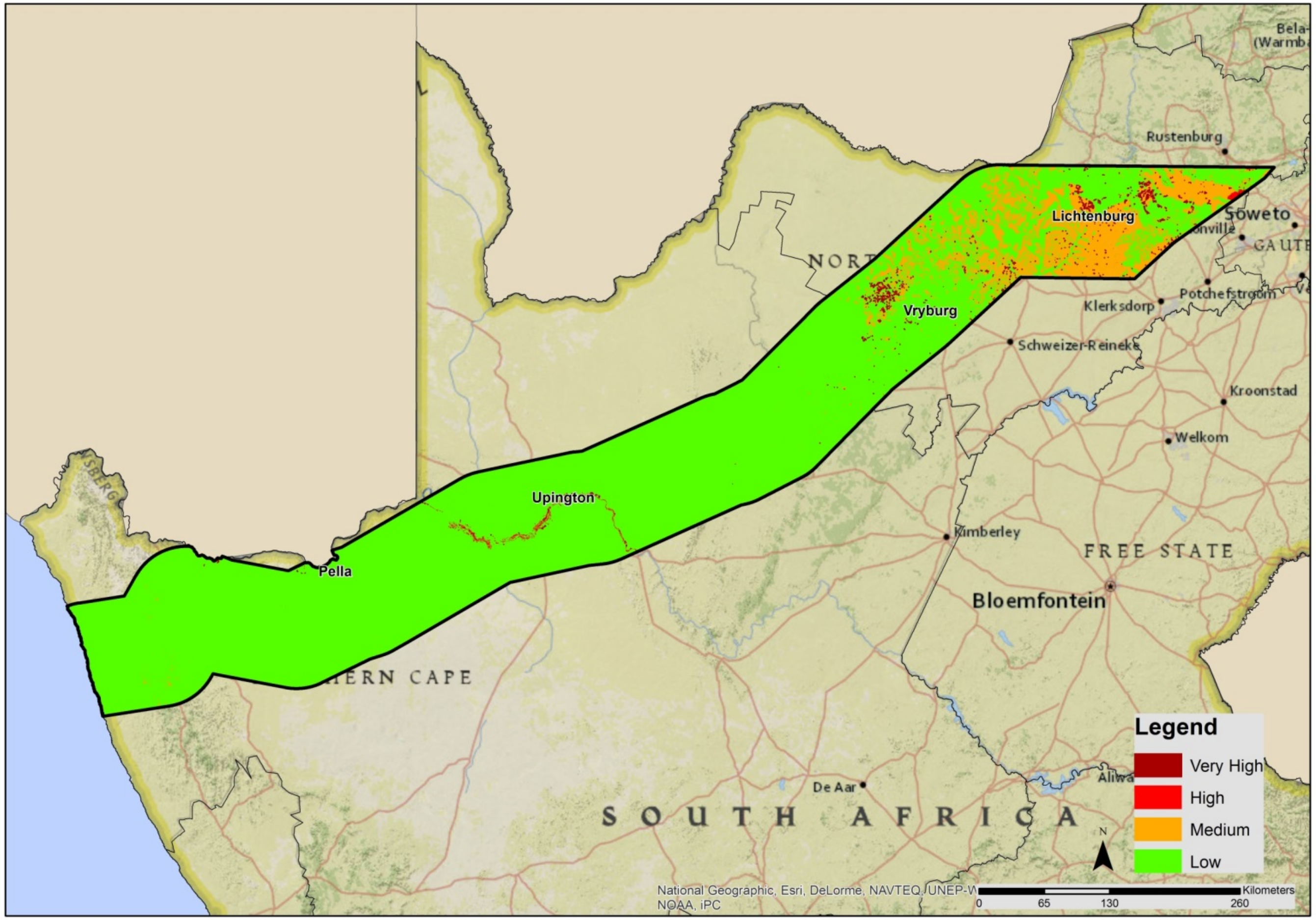

Figure 3: Agricultural sensitivity map for Electricity Grid Infrastructure Development in the Northern Corridor

7.2.3 International Corridor

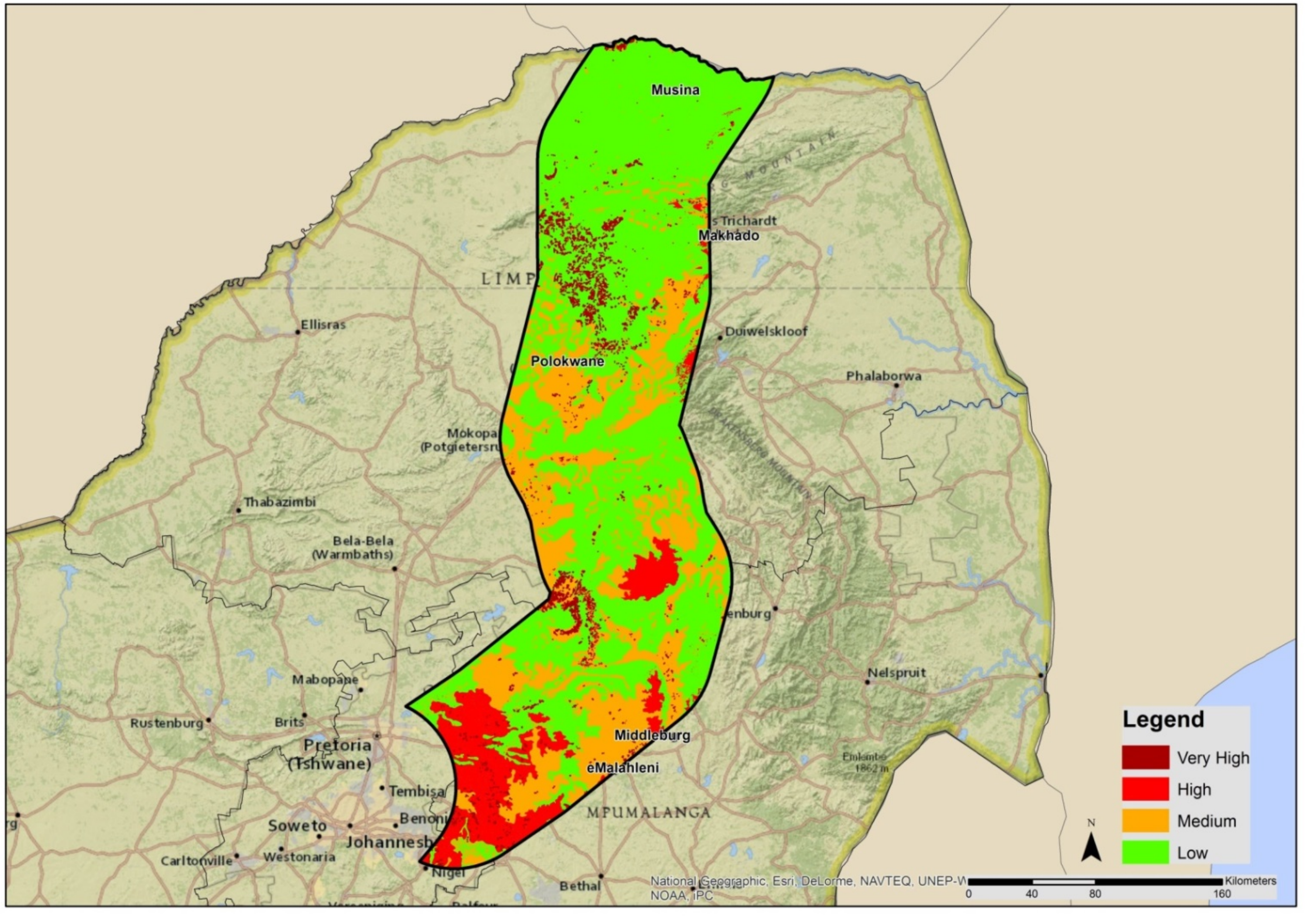

Figure 4: Agricultural sensitivity map for Electricity Grid Infrastructure Development in the International Corridor

7.2.4 Central Corridor

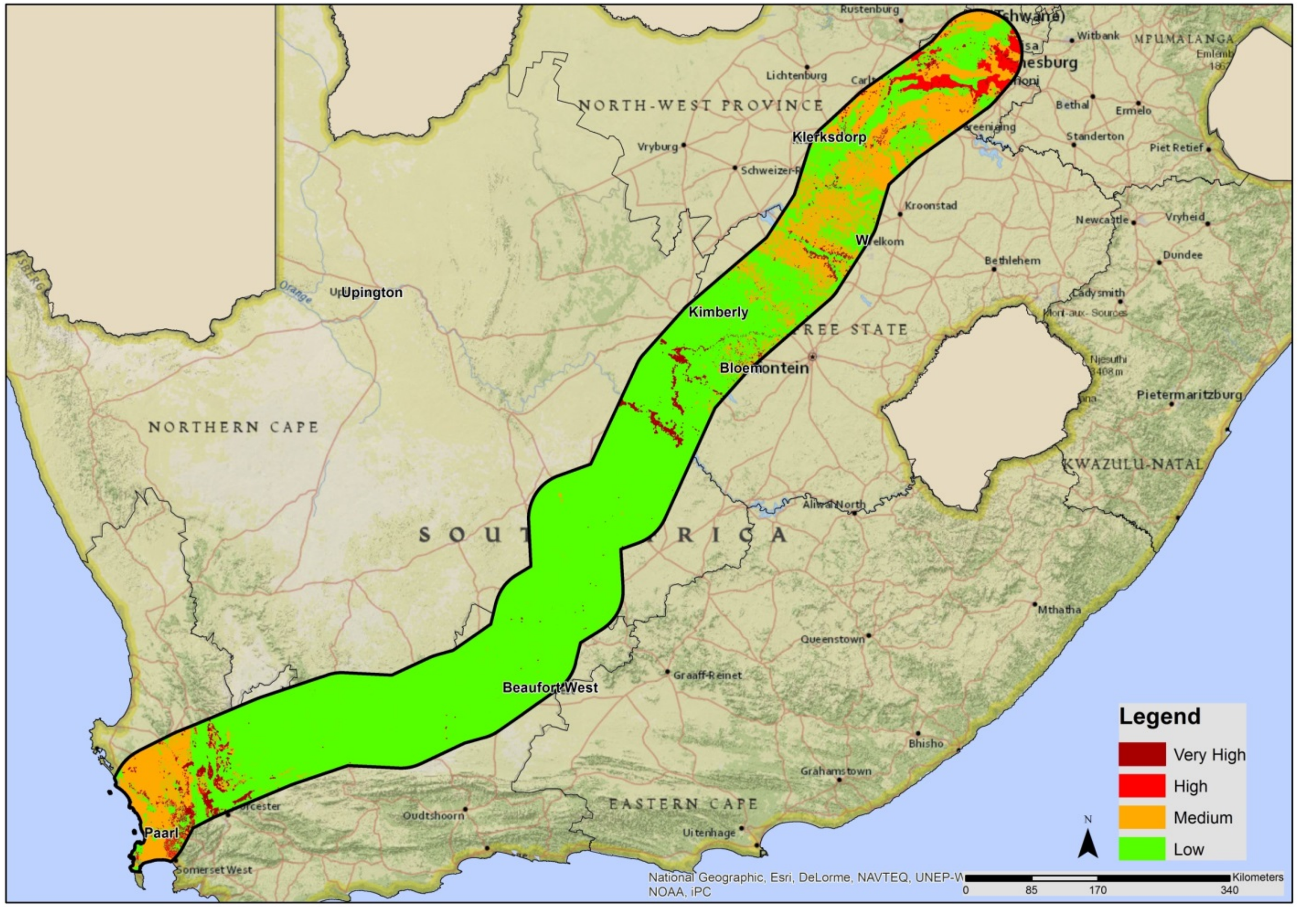

Figure 5: Agricultural sensitivity map for Electricity Grid Infrastructure Development in the Central Corridor

7.2.5 Eastern Corridor

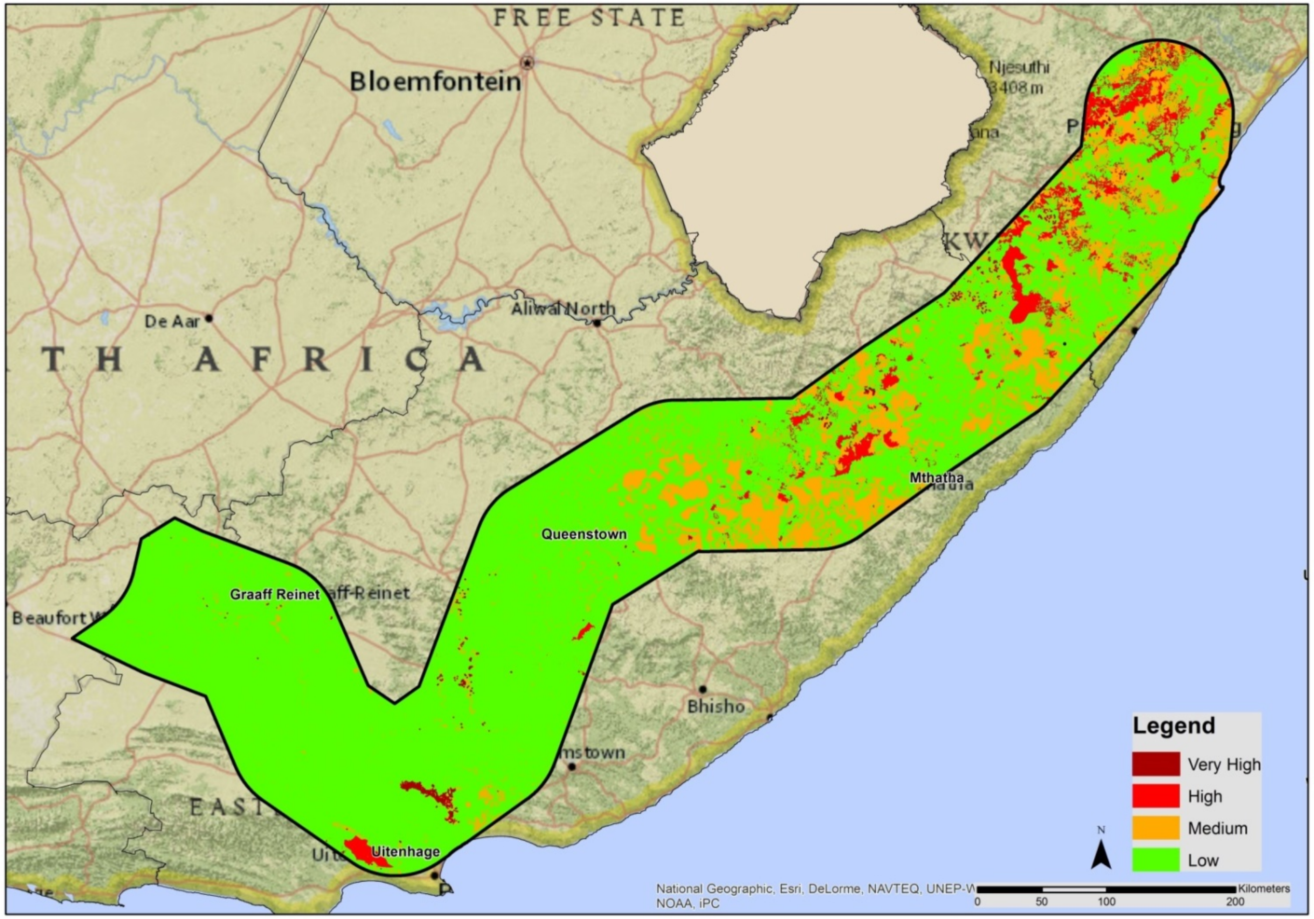

Figure 6: Agricultural sensitivity map for Electricity Grid Infrastructure Development in the Eastern Corridor

8 INTERPRETATION AND IMPLEMENTATION OF SENSITIVITY MAPS

8.1 Interpretation and implementation of the four tier map

The interpretation of the different sensitivity classes is given in Table 6.

Table 6: Interpretation of agricultural sensitivity classes for Specialist Agriculture Scoping Assessment

Sensitivity Class	Interpretation
Very High	Potentially unsuited to development because it will lead to loss of some land with existing high agricultural productivity.
High	Avoid where possible because it will lead to some disturbance and loss of existing or potential agricultural (or forestry) production.
Medium	Re-route onto lower sensitivity agricultural land (where possible and where all other factors are equal) because it will lead to very minor disturbance and loss of existing or potential agricultural production.
Low	Insignificant impact on agriculture.

8.2 Authorisation requirements

Eskom is currently exempt from agricultural consent for power line servitudes. It does however have to apply for authorisation in terms of the Subdivision of Agricultural Land Act for sub stations. The new Draft Preservation And Development Of Agricultural Land Framework Bill, as it is currently proposed, will change that and authorisation of all power line servitudes will be required in terms of the Bill. Authorisation will require ministerial approval and a fairly in depth process if it involves any cultivated land, and a slightly less vigorous process if it involves only grazing land. The registration of a servitude needs to be done per farm portion. Long power line servitudes could therefore require many separate servitudes all of which would require a separate agricultural authorisation. This is likely to significantly complicate and lengthen the time required for power line servitude approval.

8.3 Recommended project level agricultural assessments

An important aspect of this strategic environmental assessment is to allow the authorisation process for EGI developments to be more efficient and thereby to cut the long times currently required for project implementation. It is however of critical importance that improved efficiency of the system does not compromise the identification and mitigation of all significant impacts. In recognition of these two points, this study recommends a specific protocol to be followed for the assessment of agricultural impacts and for agricultural authorisation within the corridors.

The aim of this protocol is to preserve agriculturally important land for agricultural production, while streamlining the authorisation process. To achieve this, such a protocol needs to focus on what is of importance without including unnecessary detail that will potentially cloud and complicate efficient decision making around authorisation. Such a protocol needs to be clear and unequivocal, and acceptable to both the authorising authority (DAFF) and the developer (Eskom).

The authorisation process proposed in the new bill is considered to be unnecessarily complex and time consuming for efficient EGI authorisation. A simpler process can be justified because of the relatively low impact of EGI developments on agriculture, particularly within the corridors that have already been routed to avoid agriculturally important areas. Such a simpler process would not however be appropriate for other types of development that involve more significant agricultural impacts.

It is recommended that the process of agricultural authorisation for EGI developments within the five corridors is done by way of a different process to the one stipulated in the new Bill. The new bill may therefore need to make provision for such a process, particular to EGI developments. The current situation does recognise such a difference for power line servitudes, for which Eskom is exempt from agricultural authorisation in terms of the existing Act 70 of 1970.

This report recommends the following protocol. The assessment of agricultural impacts and application for agricultural authorisation should be by way of a report compiled and signed off by a SACNASP registered agricultural scientist. Such a report should focus on and clearly highlight only the following aspects:

- Up to date confirmation and mapping of all agricultural features along proposed power line routes that are classified as very high and high sensitivity in terms of this report. This could be done by utilising up to date aerial imagery, ground proofing and / or consultation with agricultural role players on the ground. It must include the footprint of all associated infrastructure such as sub stations. The distinction between horticulture / vines that require pylon placement within them and horticulture / vines that do not, must be made in terms of the actual site specifics (power line direction; maximum possible span; viability of pylon placement outside the borders of the agricultural block).
- Identify all possible alternatives that avoid very high and high sensitivity features. Assess and confirm with Eskom the viability or non-viability, or relative desirability of all these alternatives, stating clear and explicit reasons for the viability and desirability ratings that they have been assigned.
- In the case of pivots, the alternatives can include the off-set of moving the pivot. Before this can be included as an alternative, the soil and landscape suitability of the new pivot site must be assessed in detail by way of a detailed soil survey and confirmed as suitable.
- Assess whether the power line routes or associated infrastructure have any significant fragmenting effects on agricultural land parcels, and if they do, identify alternative placements. Assess and confirm with Eskom the viability or non-viability, or relative desirability of all these alternatives, stating clear and explicit reasons for the viability and desirability ratings that they have been assigned.
- The delineation of land capability classes should be done according to the latest land capability data that is available. When the new land capability data becomes available next year, it may require a re-classification of the sensitivities assigned to the different land capability classes by this study.
- The identification of medium sensitivity features can be done according to existing data sets used in this report (or updated ones when those become available).
- Identify all possible power line route alternatives that allow re-routing from medium agricultural sensitivity to low sensitivity. Assess and confirm with Eskom the viability or non-viability, or relative desirability of these alternatives, stating clear and explicit reasons for the viability and desirability ratings that they have been assigned.
- Confirm that the erosion and top soil management and the control of surrounding vegetation disturbance contained in the EMPr is appropriate and sufficiently comprehensive. This point may not be necessary if there is an approved Eskom standard procedure which adequately addresses these issues,

The above protocol focuses on and adequately covers all the aspects that are important for the preservation of agriculturally productive land within EGI developments, but is a more streamlined system than that required by the new Bill. In contrast, the new Bill requires provision and assessment of a full agro-ecosystem report.

It is also recommended that provision is made by DAFF for processing these specific Eskom EGI applications by way of a more streamlined system than the system that is proposed for all other applications in the new Bill.

9 IMPACTS AND MITIGATION

The potential negative impacts of EGI development on agriculture are listed below. The same impacts and mitigation measures are relevant across all five corridors. Opportunities to avoid and / or offset significant impacts are discussed in section 4.3.

- Loss of agricultural land use, caused by direct occupation of land by footprint of power line infrastructure This takes affected portions of land out of agricultural production;
- Loss of agricultural land use due to fragmentation of agricultural land. EGI infrastructure can lead to the division of fields and isolation of portions of them into non-viably small areas for cultivation. Such fragmentation leads to an effective additional loss of agricultural land over and above that lost to the direct footprint;
- Limitation to the existence of plantation trees, wind break trees and tall crop trees under power lines due to height restrictions. Exclusion of wind breaks has the effect of reducing the environmental suitability and therefore agricultural potential of affected land for horticultural crops.
- Disturbance to crop spraying by aircraft over land occupied by power lines.
- Soil Erosion caused by alteration of run-off characteristics due to vegetation removal and surface disturbance and compaction, particularly on access roads and construction camps. The disturbance of existing contour banks and drainage systems used for erosion control, by construction activities on or near them, can also cause erosion. Erosion causes loss and deterioration of soil resources;
- Degradation of vegetation beyond the direct footprint due to constructional disturbance, dust and vehicle trampling;
- Loss of topsoil due to poor topsoil management (burial, erosion, etc) during construction related soil profile disturbance (levelling, excavations, road surfacing etc.) and resultant decrease in that soil's capability to support plant growth;
- Disturbance to agricultural practices and management during construction;

Mitigation measures for all impacts are generic recommended mitigation measures, per impact listed above are:

- Plan the fine-scale positioning of pylons, access roads and construction camps to have minimal disturbance on agricultural activities and agricultural land. Pylons should be positioned on existing boundaries or edges of agricultural units of land wherever possible, so as not to interfere with agricultural activities within a unit;
- Same as mitigation measure 1 above;
- No mitigation possible;
- No mitigation possible;
- Implement an effective system of run-off control, where it is required, that collects and safely disseminates run-off water from all hardened surfaces and prevents potential down slope erosion. Soil surface stabilising measures must be used if necessary on all areas that are highly susceptible to erosion. Plan the fine-scale positioning of pylons, access roads and construction camps to avoid land that has contour banks. If any contour banks are disturbed, fully restore their integrity and that of the run-off system of which they are a part, after disturbance. The effectiveness of the run-off control system and the occurrence of any erosion on site or

downstream must be monitored. Corrective action must be implemented to the run-off control system in the event of any erosion occurring;

- Restrict all vehicle traffic within the footprint of disturbance and control dust during construction;
- If an activity will mechanically disturb below surface in any way, then any available topsoil should first be stripped from the entire surface to be disturbed and stockpiled for re-spreading during rehabilitation. Topsoil stockpiles must be conserved against losses through erosion by establishing vegetation cover on them. Dispose of all subsurface spoils from excavations where they will not impact on undisturbed land. During rehabilitation, the stockpiled topsoil must be evenly spread over the entire disturbed surface. Erosion must be controlled where necessary on newly topsoiled areas, which are likely to be susceptible to erosion;
- No mitigation possible.

10 GENERAL COMMENTS ON CORRIDOR SUITABILITY

Table 7: Overall corridor suitability based on Specialist Agriculture Scoping Assessment.

Corridor	Overall Suitability
Western	Generally unproblematic from an agricultural sensitivity perspective. High sensitivity irrigation in the Sandveld and Olifants River areas can easily be avoided or intersected.
Northern	Generally unproblematic from an agricultural sensitivity perspective. Agriculturally sensitive areas only occur in the extreme eastern part as it approaches Gauteng. High sensitivity irrigation is dispersed and can therefore easily be avoided or intersected.
International	There is fairly extensive high agricultural sensitivity in the southern part of the corridor close to Gauteng. Very high sensitivity irrigation is dispersed and can therefore easily be avoided or intersected.
Central	There is fairly extensive high agricultural sensitivity in the northern part of the corridor close to Gauteng, and in the southern part close to cape Town. There are intensely developed areas of pivot irrigation in the Free State, but these can still be avoided or intersected.
Eastern	There is fairly extensive high agricultural sensitivity in the northern part of the corridor close to Pietermaritzburg and east of Kokstad. These are the result of class II land capability and forestry plantations. There is minimal very high agricultural sensitivity land in this corridor

11 CONCLUSIONS AND FURTHER RECOMMENDATIONS

Agricultural impact is understood, for the purposes of this study, as any impact that translates into reduced agricultural production (including forestry). This may occur by way of a degradation of the agricultural resource base or by way of a direct disturbance to agricultural activities. Electricity grid infrastructure has a relatively low impact on agriculture, because in most cases, agriculture can continue largely undisturbed below power lines and the actual footprint of impact is confined to pylon bases and substations and involves an extremely small proportion of the land surface.

Three factors determine the significance of the agricultural impacts of EGI developments. The first is the agricultural productivity of the impacted land, the second is the proportion of available land that is impacted, and the third is the degree of disturbance that will occur. The significance of impacts increases as any or all of these factors increase.

A consideration of the agricultural features that are impacted most significantly in terms of the above lead to the identification and allocation of sensitivity ratings to all agricultural features. The resulting agricultural sensitivity is summarised in Table 8.

Table 8: Summary of agricultural sensitivity from Specialist Scoping Agriculture Assessment.

Sensitivity class	Features	Interpretation
Very high	Pivots; horticulture & vines > 400 metres; land capability class I.	Potentially unsuited to development because it will lead to loss of some land with existing high agricultural productivity.
High	Horticulture & vines < 400 metres; timber plantations; land capability class II.	Avoid where possible because it will lead to some disturbance and loss of existing or potential agricultural (or forestry) production.
Medium	Sugar cane; all other cultivated land; land capability class III.	Re-route onto lower sensitivity agricultural land (where possible and where all other factors are equal) because it will lead to very minor disturbance and loss of existing or potential agricultural production.
Low	All other land	Insignificant impact on agriculture.

Erosion risk was not considered to be a significant independent factor that should influence power line routing options and it was therefore not included in the categorisation of agricultural sensitivity.

The new Draft Preservation and Development of Agricultural Land Framework Bill proposes to significantly change the authorisation process for Eskom EGI developments. Eskom is currently exempt from agricultural consent for power line servitudes, but will not be in terms of the new Bill. This is likely to significantly complicate and lengthen the time required for power line servitude approval.

The authorisation process proposed in the new Bill is considered to be unnecessarily complex and time consuming for efficient EGI authorisation. A criticism of the new bill in this regard is that it insists on a fairly high minimum level of assessment, regardless of the risk to agricultural land. A simpler process that is more in line with effective risk assessment can be justified because of the relatively low impact of EGI developments on agriculture. The risk of significant agricultural impacts is predominantly low within the corridors because they have already been routed to avoid agriculturally important areas. Furthermore much of the corridor land is in areas of extremely low agricultural potential, such as the Karoo and Northern Cape, where there is negligible risk to agriculture from EGI developments. Where there is significant risk, the proposed protocol adequately addresses it.

This study recommends that the process of agricultural authorisation for EGI developments within the five corridors is done in terms of an exemption from the requirements stipulated in the new Bill, and according to a set protocol that is recommended in this study. The aim of this protocol is to ensure preservation of agriculturally important land for agricultural production, while streamlining the authorisation process. It is recommended that the assessment of agricultural impacts and application for agricultural authorisation should be by way of a report compiled and signed off by a SACNASP registered agricultural scientist. Such a report should focus on and clearly highlight only the essential aspects that are important for the preservation of agriculturally productive land within EGI developments rather than insist, as the Bill does, on a detailed agro-ecosystem report, much of which might be irrelevant under conditions of low agricultural sensitivity. These essential aspects making up the recommended protocol are identified and listed in this study.

It is also recommended that provision is made by DAFF for processing these specific Eskom EGI applications by way of a more streamlined administrative system than the system for all other applications proposed in the new Bill.

STRATEGIC ENVIRONMENTAL ASSESSMENT FOR ELECTRICITY GRID INFRASTRUCTURE IN SOUTH AFRICA

Appendix C.2

Avifauna Scoping Assessment Report

Chris van Rooyen & Albert Froneman
Chris van Rooyen Consulting

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TABLES

FIGURES

CSIR our future through science | environmental affairs Department: Environmental Affairs REPUBLIC OF SOUTH AFRICA | Eskom | SANBI Biodiversity for Life South African National Biodiversity Institute

1 SPECIALIST CV

Curriculum Vitae: Chris van Rooyen

Name	:	Chris van Rooyen
Profession/Specialisation	:	Avifaunal Specialist
Highest Qualification	:	LLB
Nationality	:	South African
Years of experience	:	19 years

Key Qualifications

Chris van Rooyen has nineteen years' experience in the assessment of avifaunal interactions with industrial infrastructure. He was employed by the Endangered Wildlife Trust as head of the Eskom-EWT Strategic Partnership from 1996 to 2007, which has received international acclaim as a model of co-operative management between industry and natural resource conservation. He is an acknowledged global expert in this field and has consulted in South Africa, Namibia, Botswana, Lesotho, New Zealand, Texas, New Mexico and Florida. He also has extensive project management experience and he has received several management awards from Eskom for his work in the Eskom-EWT Strategic Partnership. He is the author and/or co-author of 17 conference papers, co-author of two book chapters, several research reports and the current best practice guidelines for avifaunal monitoring at wind farm sites. He has completed more than 100 power line assessments; and has to date been employed as specialist avifaunal consultant on more than 30 renewable energy generation projects. He has also conducted numerous risk assessments on existing power lines infrastructure. He also works outside the electricity industry and he has done a wide range of bird impact assessment studies associated with various residential and industrial developments.

Relevant Experience

Bird Impact Assessment Studies for the following overhead line projects:

1. Chobe 33kV Distribution line
2. Athene - Umfolozi 400kV
3. Beta-Delphi 400kV
4. Cape Strengthening Scheme 765kV
5. Flurian-Louis-Trichardt 132kV
6. Ghanzi 132kV (Botswana)
7. Ikaros 400kV
8. Matimba-Witkop 400kV
9. Naboomspruit 132kV
10. Tabor-Flurian 132kV
11. Windhoek - Walvisbaai 220 kV (Namibia)
12. Witkop-Overyssel 132kV
13. Breyten 88kV
14. Adis-Phoebus 400kV
15. Dhuva-Janus 400kV
16. Perseus-Mercury 400kV
17. Gravelotte 132kV
18. Ikaros 400 kV
19. Khanye 132kV (Botswana)
20. Moropule – Thamaga 220 kV (Botswana)
21. Parys 132kV
22. Simplon –Everest 132kV
23. Tutuka-Alpha 400kV
24. Simplon-Der Brochen 132kV
25. Big Tree 132kV
26. Mercury-Ferrum-Garona 400kV
27. Zeus-Perseus 765kV
28. Matimba B Integration Project
29. Caprivi 350kV DC (Namibia)

30. Gerus-Mururani Gate 350kV DC (Namibia)
31. Mmamabula 220kV (Botswana)
32. Steenberg-Der Brochen 132kV
33. Venetia-Paradise T 132kV
34. Burgersfort 132kV
35. Majuba-Umfolozi 765kV
36. Delta 765kV Substation
37. Braamhoek 22kV
38. Steelpoort Merensky 400kV
39. Mmamabula Delta 400kV
40. Delta Epsilon 765kV
41. Gerus-Zambezi 350kV DC Interconnector: Review of proposed avian mitigation measures for the Okavango and Kwando River crossings
42. Giyani 22kV Distribution line
43. Liqhobong-Kao 132/11kV distribution power line, Lesotho
44. 132kV Leslie – Wildebeest distribution line
45. A proposed new 50 kV Spoornet feeder line between Sishen and Saldanha
46. Cairns 132kv substation extension and associated power lines
47. Pimlico 132kv substation extension and associated power lines
48. Gyani 22kV
49. Matafin 132kV
50. Nkomazi_Fig Tree 132kV
51. Pebble Rock 132kV
52. Reddersburg 132kV
53. Thaba Combine 132kV
54. Nkomati 132kV
55. Louis Trichardt – Musina 132kV
56. Endicot 44kV
57. Apollo Lepini 400kV
58. Tarlton-Spring Farms 132kV
59. Kuschke 132kV substation
60. Bendstore 66kV Substation and associated lines
61. Kuiseb 400kV (Namibia)
62. Gyani-Malamulele 132kV
63. Watershed 132kV
64. Bakone 132kV substation
65. Eerstegoud 132kV LILO lines
66. Kumba Iron Ore: SWEP - Relocation of Infrastructure
67. Kudu Gas Power Station: Associated power lines
68. Steenberg Booysendal 132kV
69. Toulon Pumps 33kV
70. Thabatshipi 132kV
71. Witkop-Silica 132kV
72. Bakubung 132kV
73. Nelsriver 132kV
74. Rethabiseng 132kV
75. Tilburg 132kV
76. GaKgapane 66kV
77. Knobel Gilead 132kV
78. Bochum Knobel 132kV
79. Madibeng 132kV
80. Witbank Railway Line and associated infrastructure
81. Spencer NDP phase 2 (5 lines)
82. Akanani 132kV
83. Hermes-Dominion Reefs 132kV
84. Cape Pensinsula Strengthening Project 400kV
85. Magalakwena 132kV
86. Benficosa 132kV
87. Dithabaneng 132kV
88. Taunus Diepkloof 132kV
89. Taunus Doornkop 132kV
90. Tweedracht 132kV

91. Jane Furse 132kV
92. Majeje Sub 132kV
93. Tabor Louis Trichardt 132kV
94. Riversong 88kV
95. Mamatsekele 132kV
96. Kabokweni 132kV
97. MDPP 400kV Botswana
98. Marble Hall NDP 132kV
99. Bokmakiere 132kV Substation and LILO lines
100. Styldrift 132kV
101. Taunus – Diepkloof 132kV
102. Bighorn NDP 132kV
103. Waterkloof 88kV
104. Camden – Theta 765kV
105. Dhuva – Minerva 400kV Diversion
106. Lesedi –Grootpan 132kV
107. Waterberg NDP
108. Bulgerivier – Dorset 132kV
109. Bulgerivier – Toulon 132kV
110. Nokeng-Fluorspar 132kV
111. Mantsole 132kV
112. Tshilamba 132kV
113. Thabamoopo - Tshebela – Nhlovuko 132kV
114. Arthurseat 132kV
115. Borutho 132kV MTS
116. Volspruit - Potgietersrus 132kV
117. Neotel Optic Fibre Cable Installation Project: Western Cape

Professional affiliations

I work under the supervision of and in association with Albert Froneman (SACNASP Zoological Science Registration number 400177/09) as stipulated by the Natural Scientific Professions Act 27 of 2003.

Curriculum Vitae: Albert Froneman

Name	:	Albert Froneman
Profession/Specialisation	:	Avifaunal Specialist
Highest Qualification	:	MSc Conservation Biology
Nationality	:	South African
Years of experience	:	15 years

Key Qualifications

Albert Froneman (Pr.Sci.Nat) has more than 15 years' experience in the management of avifaunal interactions with industrial infrastructure. He holds a M.Sc. degree in Conservation Biology from the University of Cape Town. He managed the Airports Company South Africa (ACSA) – Endangered Wildlife Trust Strategic Partnership from 1999 to 2008 which has been internationally recognized for its achievements in addressing airport wildlife hazards in an environmentally sensitive manner at ACSA's airports across South Africa. Albert is recognized worldwide as an expert in the field of bird hazard management on airports and has worked in South Africa, Swaziland, Botswana, Namibia, Kenya, Israel, and the USA. He has served as the vice chairman of the International Bird Strike Committee and has presented various papers at international conferences and workshops. At present he is consulting to ACSA with wildlife hazard management on all their airports. He also an accomplished specialist ornithological consultant outside the aviation industry and has completed a wide range of bird impact assessment studies. He has co-authored numerous avifaunal specialist studies and pre-construction monitoring reports for proposed renewable energy developments across South Africa. He also has vast experience in using Geographic Information Systems to analyse and interpret avifaunal data spatially and derive meaningful conclusions. Since 2009 Albert has been a registered Professional Natural Scientist (reg. nr

400177/09) with The South African Council for Natural Scientific Professions, specialising in Zoological Science.

Relevant experience:

Bird Impact Assessment studies and / or GIS analysis done for the following projects:

1. Aviation Bird Hazard Assessment Study for the proposed Madiba Bay Leisure Park adjacent to Port Elizabeth Airport.
2. Extension of Runway and Provision of Parallel Taxiway at Sir Seretse Khama Airport, Botswana Bird / Wildlife Hazard Management Specialist Study
3. Maun Airport Improvements Bird / Wildlife Hazard Management Specialist Study
4. Bird Impact Assesment Study - Bird Helicopter Interaction – The Bitou River, Western Cape Province South Africa
5. Proposed La Mercy Airport – Bird Aircraft interaction specialists study using bird detection radar to assess swallow flocking behaviour
6. KwaZulu Natal Power Line Vulture Mitigation Project – GIS analysis
7. Perseus-Zeus Power line EIA – GIS Analysis
8. Southern Region Pro-active GIS Blue Crane Collision Project.
9. Specialist advisor ~ Implementation of a bird detection radar system and development of an airport wildlife hazard management and operational environmental management plan for the King Shaka International Airport
10. Matsapha International Airport – bird hazard assessment study with management recommendations
11. Evaluation of aviation bird strike risk at candidate solid waste disposal sites in the Ekurhuleni Metropolitan Municipality
12. Gateway Airport Authority Limited – Gateway International Airport, Polokwane: Bird hazard assessment; Compile a bird hazard management plan for the airport
13. Bird Specialist Study - Evaluation of aviation bird strike risk at the Mwakirunge Landfill site near Mombasa Kenya
14. Bird Impact Assessment Study - Proposed Weltevreden Open Cast Coal Mine Belfast, Mpumalanga
15. Avian biodiversity assessment for the Mafube Colliery Coal mine near Middelburg Mpumalanga
16. Avifaunal Specialist Study - SRVM Volspruit Mining project – Mokopane Limpopo Province
17. Avifaunal Impact Assessment Study (with specific reference to African Grass Owls and other Red List species) Stone Rivers Arch
18. Airport bird and wildlife hazard management plan and training to Swaziland Civil Aviation Authority (SWACAA) for Matsapha and Sikhupe International Airports
19. Avifaunal Impact Scoping & EIA Study - Renosterberg Wind Farm and Solar PV site
20. Bird Impact Assessment Study - Proposed 60 year Ash Disposal Facility near to the Kusile Power Station
21. Avifaunal pre-feasibility assessment for the proposed Montrose dam, Mpumalanga
22. Bird Impact Assessment Study – Proposed ESKOM Phantom Substation near Knysna, Western Cape
23. Habitat sensitivity map for Denham’s Bustard, Blue Crane and White-bellied Korhaan in the Kouga Municipal area of the Eastern Cape Province
24. Swaziland Civil Aviation Authority – Sikhuphe International Airport – Bird hazard management assessment
25. Avifaunal monitoring – extension of Specialist Study - SRVM Volspruit Mining project – Mokopane Limpopo Province
26. Avifaunal Specialist Study – Rooikat Hydro Electric Dam – Hope Town, Northern Cape
27. The Stewards Pan Reclamation Project – Bird Impact Assessment study
28. Airports Company South Africa – Avifaunal Specialist Consultant – Airport Bird and Wildlife Hazard Mitigation

Renewable Energy Facilities – Preconstruction avifaunal monitoring projects in association with Chris van Rooyen Consulting

1. Jeffrey's Bay Wind Farm – 12 month preconstruction avifaunal monitoring project
2. Oysterbay Wind Energy Project – 12 month preconstruction avifaunal monitoring project
3. Ubuntu Wind Energy Project near Jeffrey's Bay – 12 month preconstruction avifaunal monitoring project
4. Bana-ba-Pifu Wind Energy Project near Humansdorp – 12 month preconstruction avifaunal monitoring project
5. Excelsior Wind Energy Project near Caledon – 12 month preconstruction avifaunal monitoring project
6. Laingsburg Spitskopvlakte Wind Energy Project – 12 month preconstruction avifaunal monitoring

project
7. Loeriesfontein Wind Energy Project Phase 1, 2 & 3 – 12 month preconstruction avifaunal monitoring project
8. Noupoort Wind Energy Project – 12 month preconstruction avifaunal monitoring project
9. Vleesbaai Wind Energy Project – 12 month preconstruction avifaunal monitoring project
10. Port Nolloth Wind Energy Project – 12 month preconstruction avifaunal monitoring project
11. Langhoogte Caledon Wind Energy Project – 12 month preconstruction avifaunal monitoring project
12. Lunsklip – Stilbaai Wind Energy Project – 12 month preconstruction avifaunal monitoring project
13. Indwe Wind Energy Project – 12 month preconstruction avifaunal monitoring project
14. Zeeland St Helena bay Wind Energy Project – 12 month preconstruction avifaunal monitoring project
15. Wolseley Wind Energy Project – 12 month preconstruction avifaunal monitoring project
16. Renosterberg Wind Energy Project – 12 month preconstruction avifaunal monitoring project
17. De Aar – North (Mulilo) Wind Energy Project – 12 month preconstruction avifaunal monitoring project (2014)
18. De Aar – South (Mulilo) Wind Energy Project – 12 month bird monitoring
19. Namies – Aggenys Wind Energy Project – 12 month bird monitoring
20. Pofadder - Wind Energy Project – 12 month bird monitoring
21. Dwarsrug Loeriesfontein - Wind Energy Project – 12 month bird monitoring
22. Waaihoek – Utrecht Wind Energy Project – 12 month bird monitoring
23. Amathole – Butterworth Utrecht Wind Energy Project – 12 month bird monitoring & EIA specialist study
24. De Aar and Droogfontein Solar PV Pre- and Post-construction avifaunal monitoring

Geographic Information System analysis & maps

1. ESKOM Power line Makgalakwena EIA – GIS specialist & map production
2. ESKOM Power line Benficosa EIA – GIS specialist & map production
3. ESKOM Power line Riversong EIA – GIS specialist & map production
4. ESKOM Power line Waterberg NDP EIA – GIS specialist & map production
5. ESKOM Power line Bulge Toulon EIA – GIS specialist & map production
6. ESKOM Power line Bulge DORSET EIA – GIS specialist & map production
7. ESKOM Power lines Marblehall EIA – GIS specialist & map production
8. ESKOM Power line Grootpan Lesedi EIA – GIS specialist & map production
9. ESKOM Power line Tanga EIA – GIS specialist & map production
10. ESKOM Power line Bokmakierie EIA – GIS specialist & map production
11. ESKOM Power line Rietfontein EIA – GIS specialist & map production
12. Power line Anglo Coal EIA – GIS specialist & map production
13. ESKOM Power line Camcoll Jericho EIA – GIS specialist & map production
14. Hartbeespoort Residential Development – GIS specialist & map production
15. ESKOM Power line Mantsole EIA – GIS specialist & map production
16. ESKOM Power line Nokeng Flourspar EIA – GIS specialist & map production
17. ESKOM Power line Greenview EIA – GIS specialist & map production
18. Derdepoort Residential Development – GIS specialist & map production
19. ESKOM Power line Boynton EIA – GIS specialist & map production
20. ESKOM Power line United EIA – GIS specialist & map production
21. ESKOM Power line Gutshwa & Malelane EIA – GIS specialist & map production
22. ESKOM Power line Origstad EIA – GIS specialist & map production
23. Zilkaatsnek Development Public Participation –map production
24. Belfast – Paarde Power line - GIS specialist & map production
25. Solar Park Solar Park Integration Project Bird Impact Assessment Study – avifaunal GIS analysis.
26. Kappa-Omega-Aurora 765kV Bird Impact Assessment Report – Avifaunal GIS analysis.
27. Gamma – Kappa 2nd 765kV – Bird Impact Assessment Report – Avifaunal GIS analysis.
28. ESKOM Power line Kudu-Dorstfontein Amendment EIA – GIS specialist & map production.
29. Proposed Heilbron filling station EIA – GIS specialist & map production
30. ESKOM Lebatlhane EIA – GIS specialist & map production
31. ESKOM Pienaars River CNC EIA – GIS specialist & map production
32. ESKOM Lemara Phiring Ohrigstad EIA – GIS specialist & map production
33. ESKOM Pelly-Warmbad EIA – GIS specialist & map production
34. ESKOM Rosco-Bracken EIA – GIS specialist & map production
35. ESKOM Ermelo-Uitkoms EIA – GIS specialist & map production
36. ESKOM Wisani bridge EIA – GIS specialist & map production
37. City of Tswane – New bulkfeeder pipeline projects x3 Map production
38. ESKOM Lebohang Substation and 132kV Distribution Power Line Project Amendment GIS specialist &

map production

39. ESKOM Geluk Rural Power line GIS & Mapping
40. Eskom Kimberley Strengthening Phase 4 Project GIS & Mapping
41. ESKOM Kwaggafontein - Amandla Amendment Project GIS & Mapping
42. ESKOM Lephalale CNC – GIS Specialist & Mapping
43. ESKOM Marken CNC – GIS Specialist & Mapping
44. ESKOM Lethabong substation and power lines – GIS Specialist & Mapping
45. ESKOM Magopela- Pitsong 132kV line and new substation – GIS Specialist & Mapping

Professional affiliations

South African Council for Natural Scientific Professions (SACNASP) registered Professional Natural Scientist (reg. nr 400177/09) – specialist field: Zoological Science. Registered since 2009

2 SPECIALIST DECLARATION

We, Chris van Rooyen and Albert Froneman, as the appointed independent specialists hereby declare that we:

- act/ed as the independent specialists in this application;
- regard the information contained in this report as it relates to our specialist input/study to be true and correct;
- do not have and will not have any financial interest in the undertaking of the activity, other than remuneration for work performed;
- have and will not have any vested interest in the proposed activity proceeding;
- have disclosed any material information that have or may have the potential to influence the objectivity of any report or decisions base thereon; and
- are aware that a false declaration is an offence in terms of regulation 71 of GN No. R. 543.

Signature of the specialists:

Name of company: Chris van Rooyen Consulting

Professional Registration (incl number): Chris van Rooyen works under the supervision of and in association with Albert Froneman (SACNASP Zoological Science Registration number 400177/09) as stipulated by the Natural Scientific Professions Act 27 of 2003.

Date: 26 July 2015

3 ABBREVIATIONS AND ACRONYMS

DEA	Department of Environmental Affairs
BA	Basic Assessment
BLSA	Birdlife South Africa
CSIR	Council for Scientific and Industrial Research
EIA	Environmental Impact Assessment
EWT	Endangered Wildlife Trust
LEDET	Limpopo Department of Economic Development, Environment and Tourism.
NEMA	National Environmental Management Act 107 of 1998
QDGC	Quarter Degree Grid Cell
SEA	Strategic Environmental Assessment
SABAP1	Southern African Bird Atlas 1
SABAP2	Southern African Bird Atlas 2
SANBI	South African National Biodiversity Institute
EKZN Wildlife	Ezemvelo KZN Wildlife

4 TERMS OF REFERENCES (TORS)

4.1 Background and Details of the Project

The National Department of Environmental Affairs (DEA) has embarked on a process of identifying ways to act swiftly, streamline and shorten the environmental authorisation process for major infrastructure build programmes in South Africa. In particular, the DEA is looking to facilitate the efficient roll out of Strategic Integrated Projects (SIPs) lead by the Presidential Infrastructure Coordinating Committee and detailed in the National Infrastructure Plan.

As part of this process, the Department of Environmental Affairs (DEA), mandated by Ministers and Members of the Executive Council (MinMec), commissioned the Council for Scientific and Industrial Research (CSIR) in January 2014 to undertake a Strategic Environmental Assessment (SEA) linked to SIP 10: Electricity Transmission and Distribution for all. The SEA is titled national Department of Environmental Affairs Electricity Grid Infrastructure Strategic Environmental Assessment. The aim of the SEA is to identify suitable routing corridors that will enable the efficient and effective expansion of key strategic transmission infrastructure designed to satisfy national transmission requirements up to the 2040 planning horizon. The CSIR is teaming up with Eskom and the South African National Biodiversity Institute (SANBI) to deliver on project outputs.

Upon gazetting of the corridors, it is envisaged that the environmental authorisation process for transmission infrastructure[1] will be streamlined in specific areas identified through the SEA process as being less sensitive to the negative impacts of electricity grid infrastructure development. This should incentivise Eskom and other potential transmission infrastructure developers to plan and develop in less sensitive areas.

The SEA process also provides a platform for coordination between the various authorities responsible for issuing authorisations, permits or consents and thereby will further contribute to a more streamlined environmental authorisation process.

The preliminary corridors (the starting point of the SEA) were identified by Eskom and are based on the results of a detailed Eskom Strategic Grid Plan Study. The Study considered a number of possible future generation and load scenarios and in so doing identified the need for five national transmission infrastructure corridors to facilitate the balancing of South Africa's electricity supply and demand needs up 2040.

The corridors are:

1. The Eastern Corridor
2. The Western Corridor
3. The Northern Corridor
4. The Central Corridor
5. The International Corridor

The SEA then undertook a corridor refinement process to determine optimal placement of the five (5) 100km wide corridors by considering key constraints (Phase I) and opportunities (Phase II) for electricity transmission level infrastructure development.

Phase I involved a wall to wall nation-wide sensitivity delineation assessment to determine areas where electricity grid infrastructure is likely to have an impact on the environment (environmental constraints)

[1] Including associated infrastructure such as transmission substations and distribution lines.

and areas where the environment is likely to have an impact on electricity grid infrastructure (engineering constraints). The full extent of South Africa was then graded and mapped for environmental and engineering sensitivity, indicating areas to be avoided (Very High sensitivity), to areas which are sensitive for various reasons (High-Medium sensitivity), to areas which demonstrate no sensitivity (Low sensitivity). The outputs of Phase I are a 'wall to wall' environmental constraints map and 'wall to wall' engineering constraints map.

Phase II involved a review of national, provincial and local government development plans as well as detailed consultation with government and industry to determine areas of future bulk demand for electricity and or transmission level infrastructure. Key strategic demand areas were identified and mapped.

The Eskom Preliminary corridors are illustrated in Figure 1 below.

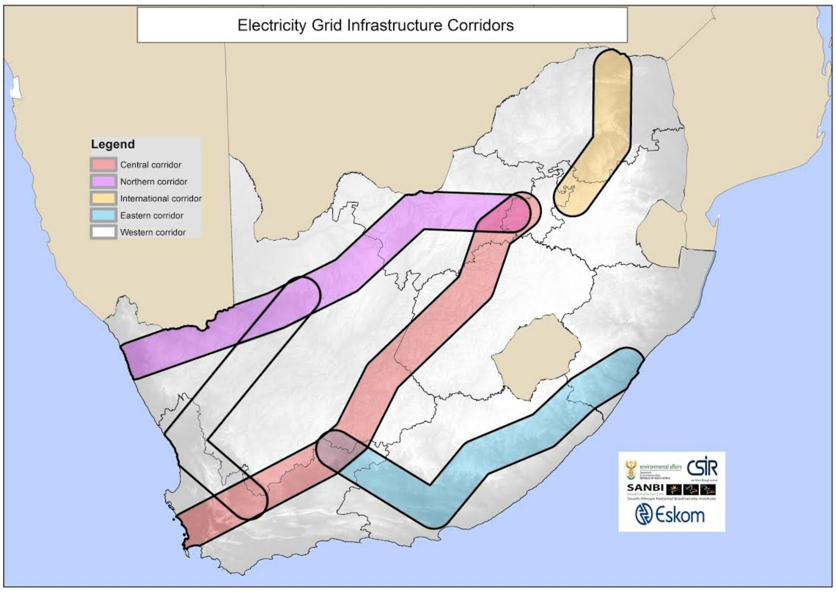

Figure 1: Eskom Preliminary Corridors

4.2 Scope of Work

The appointed supplier will be required to review and interrogate the draft environmental constraints map with respect to features linked to avifauna. The appointed supplier will be required to identify any gaps in information linked to avifauna and avifaunal sensitive areas with respect to transmission infrastructure. Once the appointed supplier has considered the draft environmental constraints map, the map should be adapted/ enhanced with reference to the findings of the specialist assessment.

The bid assessment should be focused primarily on the interpretation of existing data and based on defensible and, if available, standardised and recognised methodologies. The study methodology developed as part of this project will inform future SEA-level avifaunal specialist assessment methodologies.

This RfP has been reviewed by Birdlife SA. The supplier must undertake the assessment in close collaboration with Birdlife SA to ensure that the outcomes of the study are accepted by this agency and will be taken into consideration for future bird authorisation and commenting in these areas. It is recommended that the supplier meet with appropriate representatives from these departments as part of conducting this assessment.

The assessment should be based on a review of existing literature and bird datasets (for example the Southern African Bird Atlas data, The Eskom Red Data Book of Birds of South Africa, Coordinated Waterbird Counts, Coordinated Avifaunal Roadcounts, the Birds in Reserves project and Important Bird Areas, and the power line - bird mortality incident database of the
Eskom/Endangered Wildlife Trust Strategic Partnership. Avifaunal data collected from previous assessments (available EIA reports will be provided) and baseline monitoring (where publically available) in the surrounding areas should also be considered, as well as distance from formally protected areas, areas of biodiversity stewardship and Important Bird and Biodiversity Areas (IBAs). A brief reconnaissance visit to any of the corridor areas can also be undertaken.

The aim of the assessment is to:

- Describe the habitats in each corridor in terms of the bird species likely to be present in the proposed corridors and the relative sensitivity of these habitats and species to the impacts of electricity grid infrastructure;
- Through a review of the draft environmental constraints map together with the sourcing additional information develop a consolidated sensitivity map of all sensitivity features identified for each corridor;
- Describe what additional information and level of assessment is required in each sensitivity category (and where appropriate for habitats within each sensitivity class) before an authorisation with respect to avifauna should be considered. This should be done separately for each corridor and/or sections of the corridor; and
- Assess corridor in terms of the potential impacts of electricity grid infrastructure and their habitats, taking cognizance of the relative sensitivity of these habitats, and outline proposed management actions to enhance benefits and avoid/reduce/offset negative impacts.

It is important to note that the outputs from this study will be used to inform a planning document for electricity grid infrastructure development in the corridors. The aim of the planning document will be to inform and focus further avifaunal project level assessment with respect to electricity grid infrastructure development in the corridors (i.e. serve as a scoping exercise).

The key deliverables and reporting requirements include:

- Study methodology;
- Data sources;
- Assumptions, limitations, confidence estimates;
- A description of each corridor area in terms species and habitats present;
- A list of bird species that are sensitive to electricity grid infrastructure that have been observed and/or are likely to occur in each corridor;
- A shortlist of priority bird species (electricity grid infrastructure) that should be the focus of further assessment in each corridor;
- A description of any likely movement corridors or flyways used by collision-prone priority species;
- A description of the likely effects electricity grid infrastructure will have on priority species and their habitats in each corridor. This should include an assessment of the relative value (in terms of breeding, nesting, roosting and foraging) of the area and should include an outline of the confidence in these predictions;

- Identify and report key avifaunal sensitivities (features) within each of the corridors, making use of datasets made available through the draft environmental constraints map and additional information sourced by the specialist[2].
- Classing each sensitivity feature according to a four-tiered sensitivity rating system i.e. Very High, High, Medium or Low. Sensitivities should be coded in relation to the ability to apply mitigation measures;
- Provide the assessment criteria and assumptions used to determine sensitivity ratings for each sensitivity feature;
- Develop GIS four-tiered consolidated sensitivity map of all sensitivity features showing the location and spatial extent for each sensitivity feature and associated buffering, if any, in each of the corridors. The sensitivity rating should be illustrated according to the following coloration scheme: Dark Red/Very High, Red/High, Orange/Medium, Green/Low[3];
- A guideline on the interpretation and implementation of the four tier maps as well as permit requirements (where applicable) for each corridor. This section should also make recommendations on requirements for additional avifaunal specialist studies (if any) within the different tiers of sensitivity specialist before an authorisation can be considered. Recommendations should be focused around the objective of streamlining without compromising environmental protection. This information will be incorporated into a Development Protocol that will ultimately govern development in the corridors; and
- General comments and discussion for each corridor on the nature of key potential impacts and proposed mitigation.

5 APPROACH AND METHODOLOGY

5.1 Background

The most prominent direct negative impact on birds by electricity infrastructure in South Africa are mortality through electrocution and collisions (Ledger and Annegarn 1981[4]; Ledger 1983[5]; Ledger 1984[6]; Hobbs and Ledger 1986a[7]; Hobbs and Ledger 1986b[8]; Ledger, Hobbs and Smith, 1992[9]; Verdoorn 1996[10]; Kruger and Van Rooyen 1998[11]; Van Rooyen 1998[12]; Kruger 1999[13]; Van Rooyen 1999[14]; Van Rooyen 2000[15]; Van Rooyen 2007[16]; Lehman et al 2007[17]; Jenkins et al 2010[18]; Shaw 2013[19]).

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[2]The sensitivity delineation should be undertaken in the context of all electricity grid infrastructures including transmission lines, distribution lines and substations.

[3]Where available, standardised and recognised sensitivity mapping methodologies should be used to determine sensitivities for each feature for each of the corridors.

[4] Ledger, J.A. & Annegarn H.J. 1981. Electrocution Hazards to the Cape Vulture (Gyps coprotheres) in South Africa. Biological Conservation 20:15-24.

[5] Ledger, J. 1983. Guidelines for Dealing with Bird Problems of Transmission Lines and Towers. Eskom Test and Research Division. (Technical Note TRR/N83/005).

[6] Ledger, J.A. 1984. Engineering Solutions to the Problem of Vulture Electrocutions on Electricity Towers. The Certificated Engineer, 57:92-95.

[7] Hobbs, J.C.A. & Ledger J.A. 1986a. The Environmental Impact of Linear Developments; Power lines and Avifauna. Proceedings of the Third International Conference on Environmental Quality and Ecosystem Stability. Israel, June 1986.

[8] Hobbs, J.C.A. & Ledger J.A. 1986b. Power lines, Birdlife and the Golden Mean. Fauna and Flora, 44:23-27.

[9] Ledger, J.A., J.C.A. Hobbs & Smith T.V. 1992. Avian Interactions with Utility Structures: Southern African Experiences. Proceedings of the International Workshop on Avian Interactions with Utility Structures. Miami (Florida), Sept. 13-15, 1992. Electric Power Research Institute.

[10] Verdoorn, G.H. 1996. Mortality of Cape Griffons *Gyps coprotheres* and African Whitebacked Vultures *Pseudogyps africanus* on 88kV and 132kV power lines in Western Transvaal, South Africa, and mitigation measures to prevent future problems. Proceedings of the 2nd International Conference on Raptors: Urbino (Italy), Oct. 2-5, 1996.

[11] Kruger, R. & Van Rooyen, C.S. 1998. Evaluating the risk that existing power lines pose to large raptors by using risk assessment methodology: The Molopo Case Study. Proceedings of the 5th World Conference on Birds of Prey and Owls. August 4-8,1998. Midrand, South Africa.

[12] Van Rooyen, C.S. 1998. Raptor mortality on power lines in South Africa. Proceedings of the 5th World Conference on Birds of Prey and Owls. Midrand (South Africa), Aug.4 – 8, 1998.

Electrocution refers to the scenario where a bird is perched or attempts to perch on the electrical structure and causes an electrical short circuit by physically bridging the air gap between live components and/or live and earthed components. The electrocution risk is largely determined by the pole/tower design (APLIC 1996)[20]. In South Africa, large raptors and particularly vultures, are most prone to electrocution on electricity infrastructure (Ledger and Annergarn 1981[21], Ledger 1984[22], Verdoorn 1996[23], Van Rooyen 1998[24]; Kruger et al 2004[25]; Boshoff et al 2011[26]).

Collision mortality is probably the biggest threat posed by transmission lines to birds in South Africa (Van Rooyen 2004[27]). Most heavily impacted upon are bustards, storks, cranes and various species of waterbirds (Jenkins et al 2010[28]). These species are mostly heavy-bodied birds with limited manoeuvrability, which makes it difficult for them to take the necessary evasive action to avoid colliding with power lines (Van Rooyen 2004[29]). In a recent PhD study, Shaw (2013[30]) provides a concise summary of the phenomenon of avian collisions with power lines:

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13 Kruger, R. 1999. Towards solving raptor electrocutions on Eskom Distribution Structures in South Africa. Bloemfontein (South Africa): University of the Orange Free State. (M. Phil. Mini-thesis).

14 Van Rooyen, C.S. 1999. An overview of the Eskom-EWT Strategic Partnership in South Africa. EPRI Workshop on Avian Interactions with Utility Structures Charleston (South Carolina), Dec. 2-3 1999.

15 Van Rooyen, C.S. 2000. An overview of Vulture Electrocutions in South Africa. Vulture News, 43: 5-22. (Vulture Study Group, Johannesburg, South Africa).

16 Van Rooyen, C.S. 2007. Eskom-EWT Strategic Partnership: Progress Report April-September 2007. Endangered Wildlife Trust, Johannesburg.

17 Lehman, R.N., Kennedy, P.L. & Savidge, J.A. (2007) The state of the art in raptor electrocution research: a global review. Biological Conservation 136: 159-174.

18 Jenkins, A.R., Smallie, J.J. & Diamond, M. 2010. Avian collisions with power lines: a global review of causes and mitigation with a South African perspective. Bird Conservation International 20: 263-278.

19 Shaw, J.M. 2013. Power line collisions in the Karoo: Conserving Ludwig's Bustard. Unpublished PhD thesis. Percy FitzPatrick Institute of African Ornithology, Department of Biological Sciences, Faculty of Science University of Cape Town May 2013.

20 Avian Power Line Interaction Committee (APLIC), 1996. Suggested practices for raptor protection on power lines – the state of the art in 1996. Edison Electric Institute and Raptor Research Foundation, Washington, DC, USA.

21 Ledger, J.A. & Annegarn H.J. 1981. Electrocution Hazards to the Cape Vulture (Gyps coprotheres) in South Africa. Biological Conservation 20:15-24.

22 Ledger, J.A. 1984. Engineering Solutions to the Problem of Vulture Electrocutions on Electricity Towers. The Certificated Engineer, 57:92-95.

23 Verdoorn, G.H. 1996. Mortality of Cape Griffons *Gyps coprotheres* and African Whitebacked Vultures *Pseudogyps africanus* on 88kV and 132kV power lines in Western Transvaal, South Africa, and mitigation measures to prevent future problems. Proceedings of the 2nd International Conference on Raptors: Urbino (Italy), Oct. 2-5, 1996.

24 Van Rooyen, C.S. 1998. Raptor mortality on power lines in South Africa. Proceedings of the 5th World Conference on Birds of Prey and Owls. Midrand (South Africa), Aug.4 – 8, 1998.

25 Kruger, R., Maritz, A., van Rooyen, C., 2004. Vulture electrocutions on vertically configured medium voltage structures in the Northern Cape Province, South Africa. In: Chancellor, R.D., Meyburg, B.-U. (Eds.), Raptors Worldwide. World Working Group on Birds of Prey and Owls, Berlin, Germany, and MME/ BirdLife Hungary, Budepest, pp. 437–441.

26 A F. Boshoff, J C. Minnie, C J. Tambling & M D. Michael. 2011. The impact of power line-related mortality on the Cape Vulture *Gyps coprotheres* in a part of its range, with an emphasis on electrocution. Bird Conservation International (2011) 21:311–327.

27 Van Rooyen, C.S. 2004. The Management of Wildlife Interactions with overhead lines. In The fundamentals and practice of Overhead Line Maintenance (132kV and above), pp217-245. Eskom Technology, Services International, Johannesburg.

28 Jenkins, A.R., Smallie, J.J. & Diamond, M. 2010. Avian collisions with power lines: a global review of causes and mitigation with a South African perspective. Bird Conservation International 20: 263-278.

29 Van Rooyen, C.S. 2004. The Management of Wildlife Interactions with overhead lines. In The fundamentals and practice of Overhead Line Maintenance (132kV and above), pp217-245. Eskom Technology, Services International, Johannesburg.

30 Shaw, J.M. 2013. Power line collisions in the Karoo: Conserving Ludwig's Bustard. Unpublished PhD thesis. Percy FitzPatrick Institute of African Ornithology, Department of Biological Sciences, Faculty of Science University of Cape Town May 2013.

"The collision risk posed by power lines is complex and problems are often localised. While any bird flying near a power line is at risk of collision, this risk varies greatly between different groups of birds, and depends on the interplay of a wide range of factors (APLIC 2012). Bevanger (1994) described these factors in four main groups – biological, topographical, meteorological and technical. Birds at highest risk are those that are both susceptible to collisions and frequently exposed to power lines, with waterbirds, gamebirds, rails, cranes and bustards usually the most numerous reported victims (Bevanger 1998, Rubolini et al. 2005, Jenkins et al. 2010).

The proliferation of man-made structures in the landscape is relatively recent, and birds are not evolved to avoid them. Body size and morphology are key predictive factors of collision risk, with large-bodied birds with high wing loadings (the ratio of body weight to wing area) most at risk (Bevanger 1998, Janss 2000). These birds must fly fast to remain airborne, and do not have sufficient manoeuvrability to avoid unexpected obstacles. Vision is another key biological factor, with many collision-prone birds principally using lateral vision to navigate in flight, when it is the lower-resolution, and often restricted, forward vision that is useful to detect obstacles (Martin & Shaw 2010, Martin 2011, Martin et al. 2012). Behaviour is important, with birds flying in flocks, at low levels and in crepuscular or nocturnal conditions at higher risk of collision (Bevanger 1994). Experience affects risk, with migratory and nomadic species that spend much of their time in unfamiliar locations also expected to collide more often (Anderson 1978, Anderson 2002). Juvenile birds have often been reported as being more collision-prone than adults (e.g. Brown et al. 1987, Henderson et al. 1996).

Topography and weather conditions affect how birds use the landscape. Power lines in sensitive bird areas (e.g. those that separate feeding and roosting areas, or cross flyways) can be very dangerous (APLIC 2012, Bevanger 1994). Lines crossing the prevailing wind conditions can pose a problem for large birds that use the wind to aid take-off and landing (Bevanger 1994). Inclement weather can disorient birds and reduce their flight altitude, and strong winds can result in birds colliding with power lines that they can see but do not have enough flight control to avoid (Brown et al. 1987, APLIC 2012).

The technical aspects of power line design and siting also play a big part in collision risk. Grouping similar power lines on a common servitude, or locating them along other features such as tree lines, are both approaches thought to reduce risk (Bevanger 1994). In general, low lines with short span lengths (i.e. the distance between two adjacent pylons) and flat conductor configurations are thought to be the least dangerous (Bevanger 1994, Jenkins et al. 2010). On many higher voltage lines, there is a thin earth (or ground) wire above the conductors, protecting the system from lightning strikes. Earth wires are widely accepted to cause the majority of collisions on power lines with this configuration because they are difficult to see, and birds flaring to avoid hitting the conductors often put themselves directly in the path of these wires (Brown et al. 1987, Faanes 1987, Alonso et al. 1994a, Bevanger 1994)."

From incidental record keeping by the Endangered Wildlife Trust, it is possible to give a measure of what species are generally susceptible to power line collisions in South Africa (see Figure 1[31]). This list is far from comprehensive as only a fraction of mortalities are ever reported (Kruger 1999[32], Shaw 2013[33]).

[31] Jenkins, A.R., Smallie, J.J. & Diamond, M. 2010. Avian collisions with power lines: a global review of causes and mitigation with a South African perspective. Bird Conservation International 20: 263-278.
[32] Kruger, R. 1999. Towards solving raptor electrocutions on Eskom Distribution Structures in South Africa. Bloemfontein (South Africa): University of the Orange Free State. (M. Phil. Mini-thesis).
[33] Shaw, J.M. 2013. Power line collisions in the Karoo: Conserving Ludwig's Bustard. Unpublished PhD thesis. Percy FitzPatrick Institute of African Ornithology, Department of Biological Sciences, Faculty of Science University of Cape Town May 2013.

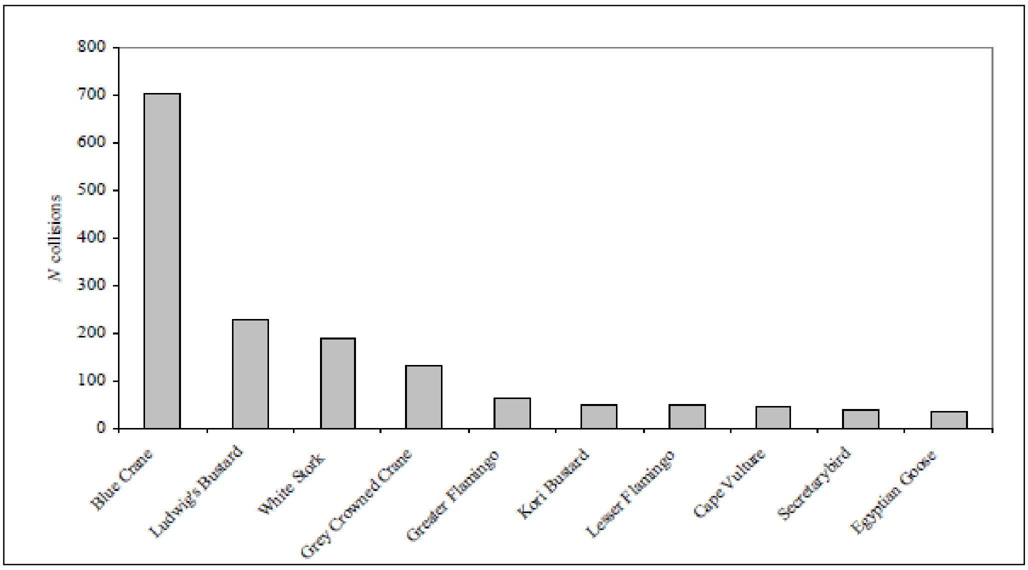

Figure 1: The top 10 collision prone bird species in South Africa, in terms of reported incidents contained in the Eskom/EWT Strategic Partnership central incident register 1996 - 2008 (Jenkins et al 2010).

Power line collisions are generally accepted as a key threat to bustards (Raab et al. 2009[34]; Raab et al. 2010[35]; Jenkins & Smallie 2009[36]; Barrientos et al. 2012[37], Shaw 2013[38]). In a recent study, carcass surveys were performed under high voltage transmission power lines in the Karoo for two years, and low voltage distribution lines for one year. Ludwig's Bustard was the most common collision victim (69% of carcasses), with bustards generally comprising 87% of mortalities recovered. Total annual mortality was estimated at 41% of the Ludwig's Bustard population, with Kori Bustards also dying in large numbers (at least 14% of the South African population killed in the Karoo alone). Karoo Korhaan was also recorded, but to a much lesser extent than Ludwig's Bustard. The reasons for the relatively low collision risk of this species probably include their smaller size (and hence greater agility in flight) as well as their more sedentary lifestyles, as local birds are familiar with their territory and are less likely to collide with power lines (Shaw 2013[39]).

Despite doubts about the efficacy of line marking to reduce the collision risk for bustards (Jenkins et al. 2010[40]; Martin et al. 2010[41]), there are numerous studies which prove that marking a line with PVC spiral

[34] Raab, R., Julius, E., Spakovszky, P. & Nagy, S. 2009. Guidelines for best practice on mitigating impacts of infrastructure development and afforestation on the Great Bustard. Prepared for the Memorandum of Understanding on the conservation and management of the Middle-European population of the Great Bustard under the Convention on Migratory species (CMS). Birdlife International. European Dvision.
[35] Raab, R., Spakovszky, P., Julius, E., Schütz, C. & Schulze, C. 2010. Effects of power lines on flight behaviour of the West-Pannonian Great Bustard Otis tarda population. Bird Conservation International. Birdlife International.
[36] Jenkins, A. & Smallie, J. 2009. Terminal velocity: the end of the line for Ludwig's Bustard? Africa Birds and Birding. Vol 14, No 2.
[37]Barrientos R, Ponce C, Palacin C, Martín Ca, Martín B, . 2012. Wire marking results in a small but significant reduction in avian mortality at power lines: A BACI Designed Study. PLoS ONE 7(3): e32569. doi:10.1371/journal.pone.0032569.
[38] Shaw, J.M. 2013. Power line collisions in the Karoo: Conserving Ludwig's Bustard. Unpublished PhD thesis. Percy FitzPatrick Institute of African Ornithology, Department of Biological Sciences, Faculty of Science University of Cape Town May 2013.
[39] Ibid
[40] Jenkins, A.R., Smallie, J.J. & Diamond, M. 2010. Avian collisions with power lines: a global review of causes and mitigation with a South African perspective. Bird Conservation International 20: 263-278.

type Bird Flight Diverters (BFDs) generally reduce mortality rates (e.g. Sporer et al 2013[42]; Barrientos et al. 2011[43]; Jenkins et al. 2010[44]; Alonso & Alonso 1999[45]; Koops & De Jong 1982[46]), also to some extent for bustards (Barrientos et al. 2012[47], Hoogstad 2015 pers.comm[48]). Beaulaurier (1981[49]) summarised the results of 17 studies that involved the marking of earth wires and found an average reduction in mortality of 45%. Barrientos et al. (2011[50]) reviewed the results of 15 wire marking experiments in which transmission or distribution wires were marked to examine the effectiveness of flight diverters in reducing bird mortality. The presence of flight diverters was associated with a decrease of 55–94% in bird collisions. Koops and De Jong (1982[51]) found that the spacing of the BFDs were critical in reducing the mortality rates - mortality rates are reduced up to 86% with a spacing of 5 metres, whereas using the same devices at 10 metre intervals only reduces the mortality by 57%. Barrientos et al. (2012[52]) found that larger BFDs were more effective in reducing Great Bustard collisions than smaller ones. Line markers should be as large as possible, and highly contrasting with the background. Colour is probably less important as during the day the background will be brighter than the obstacle with the reverse true at lower light levels (e.g. at twilight, or during overcast conditions). Black and white interspersed patterns are likely to maximise the probability of detection (Martin et al. 2010[53]).

During the construction phase and maintenance of power lines and substations, some habitat destruction and transformation inevitably takes place. This happens with the construction of access roads, the clearing of servitudes and the levelling of substation yards. Servitudes have to be cleared of excess vegetation at regular intervals in order to allow access to the line for maintenance, to prevent vegetation from intruding into the legally prescribed clearance gap between the ground and the conductors and to minimize the risk of fire under the line, which can result in electrical flashovers. These activities have an impact on birds breeding, foraging and roosting in or in close proximity of the servitude through transformation of habitat, which could result in temporary or permanent displacement.

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[41] Martin, G., Shaw, J., Smallie J. & Diamond, M. 2010. Bird's eye view – How birds see is key to avoiding power line collisions. Eskom Research Report. Report Nr: RES/RR/09/31613.

[42] Sporer, M.K., Dwyer, J.F., Gerber, B.D, Harness, R.E, Pandey, A.K, 2013. Marking Power Lines to Reduce Avian Collisions Near the Audubon National Wildlife Refuge, North Dakota. Wildlife Society Bulletin 37(4):796–804; 2013; DOI: 10.1002/wsb.329.

[43] Barrientos, R., Alonso, J.C., Ponce, C., Palacín, C. 2011. Meta-Analysis of the effectiveness of marked wire in reducing avian collisions with power lines. Conservation Biology 25: 893-903.

[44] Jenkins, A.R., Smallie, J.J. & Diamond, M. 2010. Avian collisions with power lines: a global review of causes and mitigation with a South African perspective. Bird Conservation International 20: 263-278.

[45] Alonso J.A. and Alonso J.C. 1999. Mitigation of bird collisions with transmission lines through groundwire marking. In: Ferrer M. and Janss G.F.E. (eds), Birds and Power Lines: Collision, Electrocution and Breeding. Quercus, Madrid, Spain, pp. 121–132

[46] Koops, F.B.J. & De Jong, J. 1982. Vermindering van draadslachtoffers door markering van hoogspanningsleidingen in de omgeving van Heerenveen. Electrotechniek 60 (12): 641 – 646.

[47] Barrientos R, Ponce C, Palacin C, Martín Ca, Martín B, 2012. Wire marking results in a small but significant reduction in avian mortality at power lines: A BACI Designed Study. PLoS ONE 7(3): e32569. doi:10.1371/journal.pone.0032569.

[48] Email communication on 25 June 2015 to the authors by Constand Hoogstad, manager of the Eskom-EWT Strategic Partnership on the effectiveness of line marking devices for bustards.

[49] Beaulaurier, D.L. 1981. Mitigation of bird collisions with transmission lines. Bonneville Power Administration. U.S. Dept. of Energy.

[50] Barrientos, R., Alonso, J.C., Ponce, C., Palacín, C. 2011. Meta-Analysis of the effectiveness of marked wire in reducing avian collisions with power lines. Conservation Biology 25: 893-903.

[51] Koops, F.B.J. & De Jong, J. 1982. Vermindering van draadslachtoffers door markering van hoogspanningsleidingen in de omgeving van Heerenveen. Electrotechniek 60 (12): 641 – 646.

[52] Barrientos R, Ponce C, Palacin C, Martín Ca, Martín B, . 2012. Wire marking results in a small but significant reduction in avian mortality at power lines: A BACI Designed Study. PLoS ONE 7(3): e32569. doi:10.1371/journal.pone.0032569.

[53] Martin, G., Shaw, J., Smallie J. & Diamond, M. 2010. Bird's eye view – How birds see is key to avoiding power line collisions. Eskom Research Report. Report Nr: RES/RR/09/31613.

Apart from direct habitat destruction, the above mentioned construction and maintenance activities also impact on birds through disturbance, particularly during breeding activities. Disturbance of breeding individuals could lead to breeding failure through abandonment of the nest or through exposing the eggs and nestlings to predation when the adult birds temporarily leave the nest area[54].

5.2 Study methodology

Below is a summary of the methods followed to compile the report.

- *The Southern African Bird Atlas 2 (SABAP2) data was obtained from the Animal Demography Unit at the University of Cape Town for each pentad in each corridor. A pentad grid cell covers 5 minutes of latitude by 5 minutes of longitude (5'× 5'). Each pentad is approximately 8km × 7.6 km.*

- *Due to the large number of pentads (n = 7974), the pentads were consolidated into Quarter Degree Grid Cells (QDGC). A QDGC is the equivalent of a 1:50 000 topographical map and covers an area of 15 minutes of latitude by 15 minutes of longitude (25km x 27.4km) or approximately 640 square kilometres. From this a consolidated species list was compiled for each biome in each corridor by pooling all the data for the QDGCs which overlapped with a specific biome within a corridor. The total number of QDGCs for all corridors amounted to 886.*

- *All avifaunal species that could potentially be impacted by electricity infrastructure were identified for each biome within each corridor using the SABAP2 data as the main source of information. Where there was no SABAP2 data available (n = 37), data from the Southern African Bird Atlas 1 (SABAP1) was used.*

- *The list of avifaunal species was refined to a list of power line sensitive Red Data priority species for each biome within each corridor. The list was compiled by using the following criteria:*

    - *Electrocution and collision: Morphology, behaviour, habitat, historical records;*
    - *Displacement of breeding individuals: Habitat; and*
    - *SABAP2 reporting rate: A reporting rate of 5% or higher for the species in the biome.*

- *Bird habitat classes and key sensitivity features were identified for each biome within each corridor. The following data sources were used for the delineation of bird habitats and sensitivity features:*

    - *The 2013 - 2014 South African National Land-Cover Dataset database from the Department of Environmental Affairs obtained from the South African National Biodiversity Institute (SANBI);*
    - *Biome maps of South Africa obtained from the 2011 reprint of The Vegetation of South Africa, Lesotho and Swaziland by Mucina and Rutherford;*
    - *The crane and vulture nest databases of the Endangered Wildlife Trust (EWT);*
    - *The Vulpro national vulture restaurant database;*

[54] D. Hockin, M. Ounsted, M. Gormant, D. Hillt, V. Kellert and M. A. Barker. 1992. Examination of the Effects of Disturbance on Birds with Reference to its Importance in Ecological Assessments. Journal of Environmental Management (1992) 36,253-286.

- *Tawny Eagle, Lappet-faced Vulture, White-backed Vulture, Martial Eagle and Bateleur nests identified by Abri Maritz in the Northern Cape;*
- *The Endangered Wildlife Trust's database of eagles nesting on transmission lines in the Karoo;*
- *The Vulpro register of vulture Cape Vulture colonies;*
- *The results of the 2013 aerial survey of Cape Vulture colonies conducted by Eskom, EWT and Birdlife South Africa (BLSA) in the former Transkei, Eastern Cape; and*
- *A map of Blue Swallow breeding areas obtained from Nick Theron at BLSA;*
- *Additional data on Red Data species nests and roosting areas was obtained from the Strategic Environmental Assessment for Wind and Solar Photovoltaic Energy in South Africa via the CSIR;*
- *Data on potential breeding areas of Southern Ground Hornbill was obtained from Lucy Kemp from the Mabula Ground Hornbill Project;*
- *Data on the location of Southern Bald Ibis breeding colonies was obtained from Birdlife South Africa.*
- *Data on the location of various Red Data raptors recorded by Jon Smallie (Wildskies Ecological Services) and the authors in the course of pre-construction monitoring at various wind energy developments.*

- *The potential negative impacts on avifauna by the electricity grid was identified as:*
  - *Electrocutions*[55]*;*
  - *Collisions; and*
  - *Displacement of breeding individuals*

- *The probability of the respective impacts occurring in a habitat class was rated for each priority species to arrive at a **species-specific probability score** for each impact, within each habitat class, within each biome, within each corridor. Probabilities for the respective impacts occurring were rated according to the below scale:*

  - *0 = the impact is highly unlikely to occur*
  - *1 = the impact is unlikely to occur*
  - *2 = the impact could possibly occur*
  - *3 = the impact will most likely occur*

- *The species specific probability score was multiplied by a weighted Red Data status score for each priority species to arrive at a **species-specific habitat sensitivity score** for each species, for each habitat class. The Red Data status were assigned weighted scores according to the below scale:*
  - *Near threatened = 2*
  - *Vulnerable = 4*
  - *Endangered = 8*
  - *Critically endangered = 16*

- *An **aggregated habitat sensitivity score** for each habitat class within each biome, within each corridor was calculated by summing the species-specific probability scores for that*

[55] The Eskom Land and Biodiversity Standard (2012) states that "all designs of new power lines and supporting infrastructure for power generation must be evaluated for the risk it could pose to wildlife and no design which has a high risk, or a record of it causing mortalities to wildlife, shall be used." However, it was assumed that Eskom might not be the only entity building power lines in future; therefore it cannot automatically be assumed that all future distribution pole designs will be electrocution friendly.

particular habitat class.

- *A four-tiered consolidated sensitivity map of all habitat classes indicating their spatial extent in each of the corridors was developed with GIS, using the habitat sensitivity scores of the various habitat classes. The sensitivity ratings were illustrated according to the following classification scheme: Dark Red/Very High, Red/High, Orange/Medium, Green/Low.*

- *Recommendations were compiled for each corridor on what assessments need to be undertaken in each of the sensitivity classes which were then incorporated into an avifaunal Development Protocol for that particular sensitivity class.*

- *Key sensitivity features (i.e. vulture breeding areas, Red Data raptor nests, vulture restaurants, crane nests, Southern Ground Hornbill nests, Southern Bald Ibis breeding colonies and Blue Swallow breeding areas) were buffered and allocated a default Dark Red/Very High sensitivity rating.*

5.3 Data Sources

Below is a detailed list and description of all data sources on which the assessment is based, and from which sensitive features/criteria are extracted.

Table 1: Data sources used in Avifauna Scoping Assessment

Data title	Source and date of publication	Data Description
The Southern African Bird Atlas 1 (SABAP1)	*Animal Demography Unit, University of Cape Town, 1997.*	*The Southern African Bird Atlas Project (SABAP) was conducted between 1987 and 1991.Because a new bird atlas was started in southern Africa in 2007, the earlier project is now referred to as SABAP1. SABAP1 covered six countries: Botswana, Lesotho, Namibia, South Africa, Swaziland and Zimbabwe. At the time, Mozambique was engulfed in a civil war, and had to be excluded. The resolution for SABAP1 was the quarter degree grid cell (QDGC), 15 minutes of latitude by 15 minutes of longitude, 27.4 km north-south and about 25 km east-west, an area of about 700 km^2. Fieldwork was conducted mainly in the five-year period 1987–1991, but the project coordinators included all suitable data collected from 1980–1987. In some areas, particularly those that were remote and inaccessible, data collection continued until 1993.* *Fieldwork was undertaken mainly by birders, and most of it was done on a volunteer basis. Fieldwork consisted of compiling bird lists for the QDGCs. All the checklists were fully captured into a database. The final dataset consisted of 147 605 checklists, containing a total of 7.3 million records of bird distribution. Of the total 3973 QDGCs, only 88 had no checklists (2.2% of the total).*
The Southern African Bird	*Animal Demography*	*SABAP2 is the follow-up project to the Southern African Bird*

Data title	Source and date of publication	Data Description
Atlas 2 (SABAP2)	*Unit, University of Cape Town, 1 July 2007 to present, ongoing. Accessed in May 2015.*	*Atlas Project (for which the acronym was SABAP, and which is now referred to as SABAP1). This first bird atlas project took place from 1987-1991. The second bird atlas project started on 1 July 2007 and plans to run indefinitely. The current project is a joint venture between the Animal Demography Unit at the University of Cape Town, BirdLife South Africa and the South African National Biodiversity Institute (SANBI). The project aims to map the distribution and relative abundance of birds in southern Africa and the atlas area includes South Africa, Lesotho and Swaziland. SABAP2 was launched in Namibia in May 2012. The field work for this project is done by more than one thousand five hundred volunteers. The unit of data collection is the pentad, five minutes of latitude by five minutes of longitude, squares with sides of roughly 9km. By the end of January 2015, the SABAP2 database contained 120000 checklists. The milestone of six million records of bird distribution in the SABAP2 database was reached on 30 October 2014.*
2013 - 2014 South African National Land-Cover Dataset	*SANBI February 2015*	*The 2013-14 South African National Land-cover dataset produced by GEOTERRAIMAGE as a commercial data product has been generated from digital, multi-seasonal Landsat 8 multispectral imagery, acquired between April 2013 and March 2014. The data set was procured by the Department of Environmental Affairs for public use. In excess of 600 Landsat images were used to generate the land-cover information, based on an average of 8 different seasonal image acquisition dates, within each of the 76 x image frames required to cover South Africa. The land-cover dataset, which covers the whole of South Africa, is presented in a map-corrected, raster format, based on 30x30m cells equivalent to the image resolution of the source Landsat 8 multi-spectral imagery. The dataset contains 72 x land cover / use information classes, covering a wide range of natural and man-made landscape characteristics. Each data cell contains a single code representing the dominant land-cover class (by area) within that 30x30m unit, as determined from analysis of the multi-date imagery acquired over that image frame. The original land-cover dataset was processed in UTM (north) / WGS84 map projection format based on the Landsat 8 standard map projection format as provided by the USGS3. The final product is available in UTM35 (north) and (south), WGS84 map projections and Geographic Coordinates, WGS84.*
The biomes of South Africa as contained in the National Vegetation Map of South Africa (2011)	*The Vegetation Map of South Africa, Lesotho and Swaziland by Mucina and Rutherford (eds.), Reprint 2011.*	*The descriptions of vegetation types are given for each biome and include a general introduction to each biome, details about how each vegetation type relates to previously published vegetation maps, distribution, vegetation and landscape features, geology and soils, climate, important taxa, biogeographically important taxa, endemic taxa, conservation, and remarks.*
The crane and vulture nest databases of the Endangered Wildlife Trust (EWT)	*Endangered Wildlife Trust, accessed May 2015*	*Data on Blue Crane, Grey Crowned Crane and Wattled Crane nesting sites in 4 strategic transmission lines corridors, and White-backed Vulture nesting sites in 2 corridors, in South Africa. Data was clipped to the 5 corridors. No known crane*

Data title	Source and date of publication	Data Description
		breeding sites fell within the northern corridor. Absence of records does not imply absence of the species within an area, but simply that this area may not have been sampled. All recorded nesting sites were included, no verification of current status of nests were conducted.
National vulture restaurant database	*Vulpro, accessed May 2015*	*The register contains a georeferenced list of vulture restaurants throughout South Africa as compiled by Vulpro. All recorded vulture restaurants were included; no verification of current status of vulture restaurants was conducted.*
List of eagle nests on Eskom transmission lines in the Karoo	*Endangered Wildlife Trust, 2006*	*The dataset contains a georeferenced list of Tawny Eagle, Martial Eagle and Verreaux's Eagle nests on transmission lines in the Karoo as at 2006. All recorded nesting sites were included, no verification of current status of nests were conducted.*
Raptor nests identified by Abri Maritz in the Northern Cape	*Endangered Wildlife Trust, 2009*	*The dataset contains a georeferenced list of Tawny Eagle, Martial Eagle, Bateleur, Lappet-faced Vulture and White-backed Vulture nests recorded by Abri Maritz as part of his raptor extension work in the Northern Cape in the period 1995 to 2009. All recorded nesting sites were included, no verification of current status of nests were conducted.*
Location of White-backed Vulture nests in the Limpopo Province, obtained from Josef Heymans from the Limpopo Department of Economic Development, Environment and Tourism (LEDET).	*Limpopo Department of Economic Development, Environment and Tourism (LEDET), 2013*	*Location of White-backed Vulture nests in the Limpopo Province. All recorded nesting sites were included, no verification of current status of nests were conducted.*
White-backed Vulture breeding areas around Kimberley, Northern Cape	*Paper by Murn et.al. (2002)*[56]*, supplemented with information from Beryl Wilson, zoologist at the McGregor Museum in Kimberley, 2015.*	*The dataset contains the approximate boundaries of the White-backed Vulture breeding areas around Kimberley, based on aerial and ground surveys conducted in 2001, and verified and updated with information from Beryl Wilson in 2015.*
Information on the locality of Verreaux's Eagle nests in the vicinity of De Aar in the Northern Cape.	*Unpublished pre-construction monitoring reports, 2014*[57][58].	*Verreaux's Eagle nests that were recorded in the course of pre-construction monitoring at two proposed wind farm localities near De Aar in the Northern Cape.*
The national register of Cape Vulture colonies	*Vulpro and Endangered Wildlife Trust, 2015*	*The dataset contains a georeferenced list of Cape Vulture colonies, as well as the results of the 2013 aerial survey of Cape Vulture colonies conducted by Eskom, EWT and Birdlife South Africa (BLSA) in the former Transkei, Eastern Cape.*
A map of Blue Swallow breeding areas	*Birdlife South Africa, 2015*	*The KZN Mistbelt Grassland Important Bird Area (IBA) which incorporates all the known patches of grassland where Blue*

[56] Murn, C., Anderson, M.D. & Anthony, A. 2002. South African Journal of Wildlife Research 32(2): 145–152 (October 2002)
[57] Camiña A. 2013. Pre-Construction Monitoring Of Bird Populations In Maanhaarberg WEF De Aar, Northern Cape. Report to Longyuan Mulilo De Aar Wind Power Pty (Ltd).
[58] Van Rooyen, C., Froneman, A., & Laubscher, N. 2014. Avifaunal pre-construction monitoring at the proposed Longyuan Mulilo De Aar 2 North Wind Energy Facility. Report to Longyuan Mulilo De Aar Wind Power Pty (Ltd).

Data title	Source and date of publication	Data Description
		Swallows are known to nest and forage. No verification of current status of nests was conducted.
Information on the locality of various Red Data raptor nests in the Northern and Eastern Cape, as well as Cape Vulture colonies in the Eastern Cape.	*Email communication from Jon Smallie of WildSkies Ecological Services[59].*	*The data consist of the location of various Verreaux's Eagle nests, Martial Eagle nests and Cape Vulture roosts.*
Information on potential nesting areas of Southern Ground Hornbills.	*Email communication from Lucy Kemp of the Mabula Ground Hornbill Project[60].*	*The data consists of Southern Ground Hornbill sightings data in Limpopo, KwaZulu-Natal and the Eastern Cape. The assumption was made that a nest would be present within a 3 -4km radius around a sighting.*
Information on various Red Data species nests and vulture colonies obtained from the Strategic Environmental Assessment for Wind and Solar Photovoltaic Energy in South Africa.	*The information was obtained from the CSIR.*	*The data comprise nest localities of Black Harrier, Martial Eagle, Verreaux's Eagle, Blue Crane, Lanner Falcon, Grey Crowned Crane and White-backed Vulture in the 8 solar and wind focus areas which overlaps with the corridors. It also includes additional Cape Vulture roost localities in the eastern Cape.*
Information on the localities of Southern Bald Ibis breeding colonies.	*Birdlife South Africa 2015*	*The data comprises nest localities of Southern Bald Ibis in the Eastern Corridor.*

5.4 Assumptions and Limitations

Provide a detailed list and description of all study limitations and assumptions made in this report.

Table 2: Assumptions and limitations for Avifauna Scoping Assessment

Limitation	Included in the scope of this study	Excluded from the scope of this study	Assumption
Resource availability	*Only existing published and unpublished datasets used with limited desk top verification.*	*Field verification of datasets and outcomes, and extensive local expert consultation.*	*Reasonable accuracy of data layers used. Field verification will take place on a site by site basis linked to development proposals.*

5.5 Relevant Regulatory Instruments

Below is a detailed list and description of all relevant regulatory instruments associated with the field of expertise at international, national scale, as well as provincial scale.

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59 Personal email communication to the authors on 23 June 2015.

60 Personal email communication to the authors on 1 July 2015.

Table 3: Relevant regulatory instruments considered for Avifauna Scoping Assessment

Instrument	Key objective
International Instrument	
Ramsar Convention (The Convention of Wetlands of International Importance (1971 and amendments)	*Protection and conservation of wetlands, particularly those of importance to waterfowl and waterfowl habitat.*
Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention)	*Aims to conserve terrestrial, marine and avian migratory species throughout their range.*
The Agreement on the Conservation of African-Eurasian Migratory Waterbirds, or African- Eurasian Waterbird Agreement (AEWA)	*Intergovernmental treaty dedicated to the conservation of migratory waterbirds and their habitats across Africa, Europe, the Middle East, Central Asia, Greenland and the Canadian Archipelago.*
National Instrument	
National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004)	*The National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004) provides for listing threatened or protected ecosystems, in one of four categories: critically endangered (CR), endangered (EN), vulnerable (VU) or protected. Activity 12 in Listing Notice 3 (Government Notice R546 of 2010) relates to the clearance of 300 m^2 or more of vegetation,*
National Environmental Management: Protected Areas Act, 2003. (Act 57 of 2003)	*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.*
National Environmental Management Act,1998 (Act 107 of 1998)	*Promote conservation; and secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development;*
Environment Conservation Act, 1989 (Act 73 of 1989)	*To provide for the effective protection and controlled utilization of the environment and for matters incidental thereto.*
National Water Act, 1998 (Act 36 of 1998),	*Part 3, The Reserve: The ecological reserve relates to the water required to protect the aquatic ecosystems of the water resource.*
Provincial Instrument	
KwaZulu Nature Conservation Act, 1992 (Act 29 of 1992)still in force	*Provides for the protection of fauna and flora in those areas that formed part of the former KwaZulu.*
Natal Nature Conservation Ordinance 15 of 1974 (still in force)	*Provides for the protection of fauna and flora in those areas that form part of the former Natal province.*
Western Cape Nature Conservation Board Act, 1998 (Act 15 of 1998)	*To provide for the establishment, powers, functions and funding of the Western Cape Nature Conservation Board and the establishment, funding a control of a Western Cape Nature Conservation Fund, and to provide for matters incidental thereto. The object of the board shall be, (a) promote and ensure nature conservation and related matter in the Province.*
Western Cape Nature Conservation Laws Amendment Act, 2000. (Act 3 of 2000)	*To provide for the amendment of various laws on nature conservation in order to transfer the administration of the*

Instrument	Key objective
	provisions of those laws to the Western Cape Nature Conservation Board; to amend the Western Cape Nature Conservation Board Act, 1998 to provide for a new definition of Department and the deletion of a definition; to provide for an increase in the number of members of the Board; to provide for additional powers of the Board; to amend the provisions regarding the appointment and secondment of persons to the Board; and to provide for matters incidental thereto.
Northern Cape Nature Conservation Act, 2009 (Act 10 of 2009).	*To provide for the sustainable utilization 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 for offences and penalties for contravention of the Act: to provide for the issuing of permits and other authorisations: and provide for the matter connected therewith.*
Bophuthatswana Nature Conservation Act, 1973 (Act 3 of 1973; still in force)	*To provide for the protection of game and fish, the conservation of flora and fauna and the destruction of vermin in the former Bophuthatswana.*
Free State Nature Conservation Ordinance, 1969 (Act 8 of 1969)	*To provide for the conservation of fauna and flora and the hunting of animals causing damage and for matters incidental thereto.*
Ciskei Nature Conservation, 1987 (Act 10 of 1987, still in force)	*To consolidate and amend the laws relating to the conservation, management and protection of fauna, flora, fish and the habitats generally, to provide for the establishment and management of nature reserves, hiking trails, water catchment areas and a coastal conservation area, to provide for matter relating to the sea and the seashore and the provide for the incidental matters.*
Transvaal Nature Conservation Ordinance No 12 of 1983 as amended (still in force)	*Provides for the protection of fauna and flora in the North-West and Gauteng Provinces (former Transvaal Province).*
Mpumalanga Nature Conservation Act Of 1998.	*Provides for the protection of fauna and flora in the Mpumalanga Province.*
Limpopo Environmental Management Act No 7 Of 2003	*Provides for the protection of fauna and flora in the Limpopo Province.*
Cape Nature Conservation Ordinance, No. 19 of 1974 (still in force)	*Provides for the protection of fauna and flora in parts of the North-West Province and the Eastern Cape (former Cape Province).*
Lebowa Nature Conservation Act 10 of 1973(still in force)	*Provides for the protection of fauna and flora in parts of the Limpopo Province*
Gazankulu Nature Conservation Act 5 of 1975 (still in force)	*Provides for the protection of fauna and flora in parts of the Limpopo Province*
Venda Nature Conservation and National Parks Act 20 of 1986 (still in force)	*Provides for the protection of fauna and flora in parts of the Limpopo Province*

6 CORRIDOR DESCRIPTION

The point of departure in each biome was the delineation of the corridor according to the biomes that are contained in the corridor and then extracting the power line sensitive Red Data species recorded by SABAP 2 within that biome[61]. It is generally accepted that vegetation structure, rather than the actual plant species, influences bird species distribution and abundance (Harrison *et al.*, 1997[62]). The description of the biomes largely follows the classification system used in the Atlas of Southern African Birds (SABAP1)) (Harrison *et al.* (1997) supplemented with material from Mucina and Rutherford (2006)[63]. The criteria used by the SABAP1 authors to amalgamate botanically defined vegetation units, or to keep them separate were (1) the existence of clear differences in vegetation structure, likely to be relevant to birds, and (2) the results of published community studies on bird/vegetation associations.

The biome descriptions used in in this report are as follows:

- <u>Fynbos</u>: Fynbos is dominated by low shrubs and has two major vegetation divisions: fynbos proper characterised by restioid, erioid and proteoid components; and renosterveld, dominated by *Asteraceae*, specifically Renosterbos *Elytropappus rhinocerotis*, with geophytes and some grasses.

- <u>Succulent Karoo</u>: The Succulent Karoo falls within the winter rain-fall region in the far west, and is characterised by succulent shrubs, particularly *Mesembryanthemaceae* and a particular paucity of grass cover and trees, except in the Little Karoo of the Western Cape Province, where tree cover is relatively well developed.

- <u>Nama Karoo</u>: The Nama Karoo vegetation largely comprises low shrubs and grasses; peak rainfall occurs in summer. Trees, e.g. *Vachellia karoo* and aline species such as Mesquite *Prosopis glandulosa* are mainly restricted to water courses where fairly luxuriant stands can develop especially in the Eastern Cape Province, and along the Orange River. In comparison to the Succulent Karoo, the Nama Karoo has a higher proportion of grass and tree cover.

- <u>Savanna</u>: Savanna is defined here as having a grassy understorey and a distinct woody upper storey of trees and tall shrubs. Tree cover can range from sparse to almost closed-canopy cover. The relatively arid fine-leaved, typically *Vacchellia*-dominated woodland types typically occur in the drier western regions, while the mesic, pre-dominantly broadleaved woodlands typically occur in the wetter eastern regions.

- <u>Grassland:</u> The dominant vegetation comprises grasses, with geophytes and herbs also well-represented. These grasslands are maintained largely by a combination of relatively high summer rainfall, frequent fires, frost and grazing, which preclude the presence of shrubs and trees. Sweet grasslands are fond in lower rainfall areas, are taller and less dense, have a lower fibre content and retain nutrients in the leaves during winter. Sour grasslands occur in higher rainfall regions

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[61] It should be noted that due to the relatively coarse resolution of a QDGC (25 x 27.4km) sometimes species were recorded within a QDGC which contains more than one biome, e.g. in the Eastern Corridor African Crowned Eagle was recorded in some of the QDGCs which contains both Nama Karoo (where it is unlikely to occur) and Albany Thicket. In such an instance professional judgment was used to assess the potential for a species to occur in a given habitat, and was taken into account in the risk rating process.

[62] Harrison, J.A., Allan, D.G., Underhill, L.G., Herremans, M., Tree, A.J., Parker, V & Brown, C.J. (eds). 1997. The atlas of southern African birds. Vol 1 & 2. BirdLife South Africa, Johannesburg.

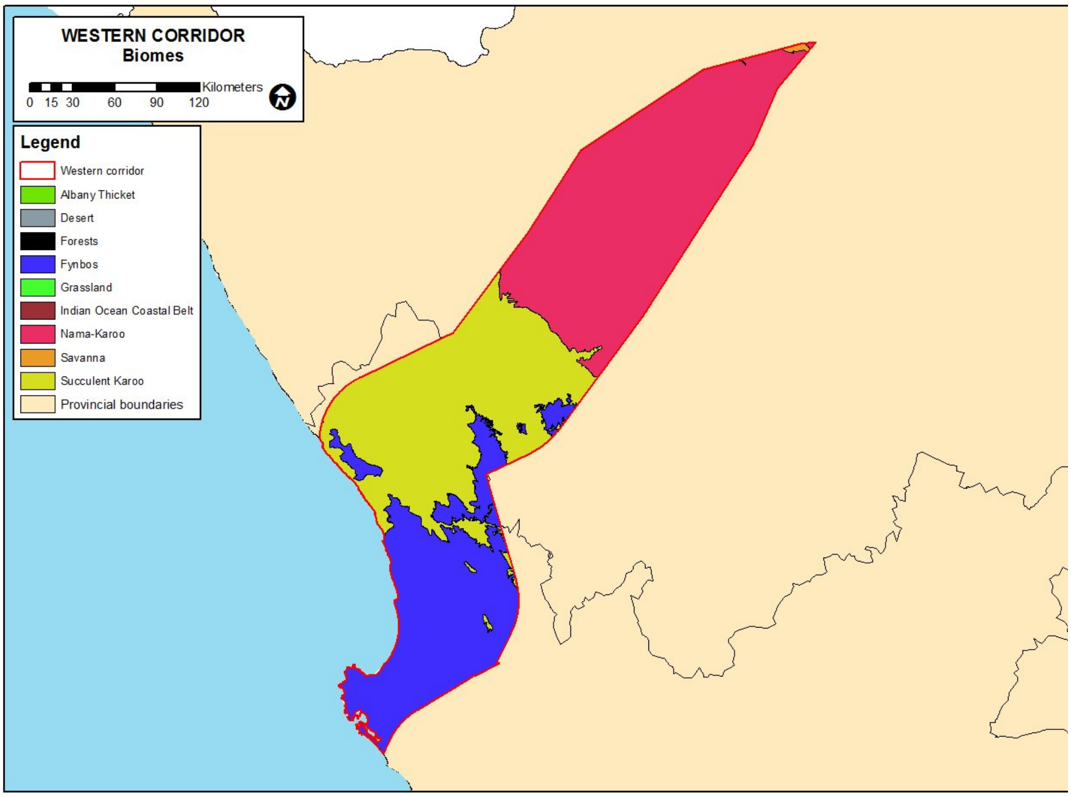
[63] Mucina. L. & Rutherford, M.C. (Eds) 2006. The vegetation of South Africa, Lesotho and Swaziland. Strelitzia 19. South African National Biodiversity Institute, Pretoria.

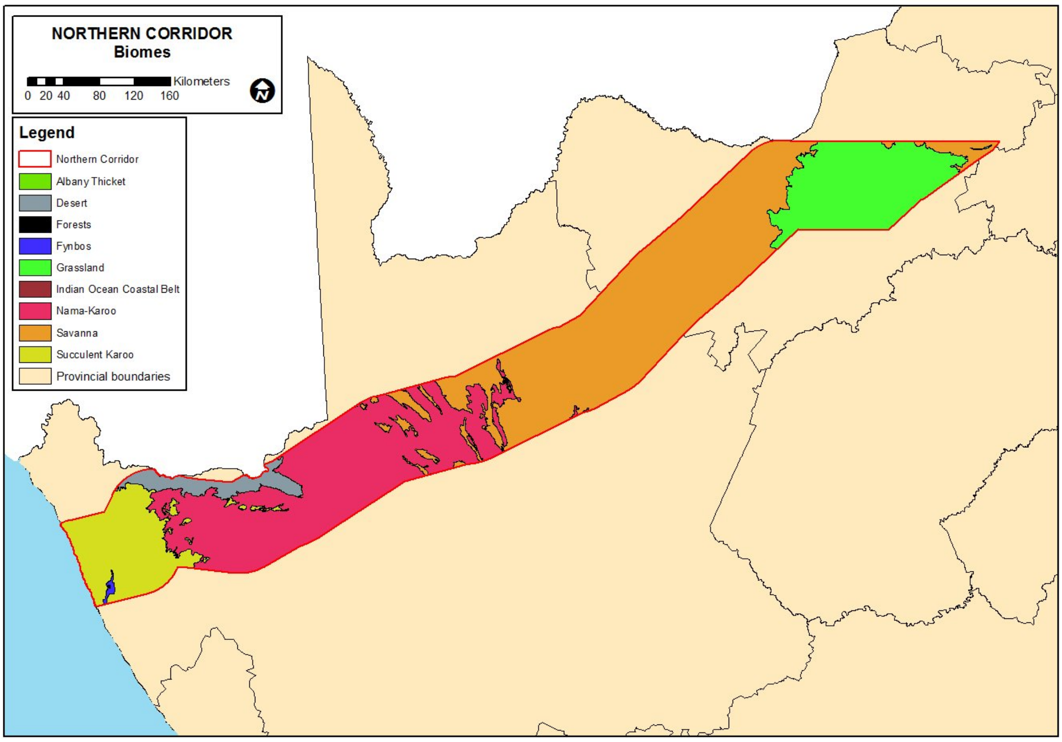
and are characterized by being shorter and denser in structure, having a high fibre content and a tendency to withdraw nutrients to the roots during winter.

- Desert: The dominant vegetation comprises grassland dominated by "white grasses", some spinescent (*Stipograstis* species) on flats with additional shrubs and herbs in the drainage lines or on more gravelly or loamy soil next to mountains. Hills and mountains are dominated by bare outcrops with very sparse shrubby vegetation in crevices, sometimes with localised grassland areas.

- Albany Thicket: The vegetation of this biome comprises dense, woody, semi-succulent and thorny vegetation of an average height of 2-3m, relatively impenetrable with a poorly developed grass cover. There is a wide range of growth forms and a high diversity of plant species which is a reflection of the transitional nature of thicket vegetation, being an interface between the various types of forest, shrublands, karoo and grasslands.

- Indian Ocean Coastal Belt/East Coast Littoral: This is a mosaic of coastal forest, sand forest, coastal thicket, coastal grasslands and mangroves. It is typically moist and tropical to sub-tropical.

Site	Brief description
Western Corridor	*The Western Corridor contains four biomes, In approximate order from south to north these are Fynbos, Succulent Karoo, Nama Karoo and a very small section of Savanna. The following power line sensitive Red Data species were identified and rated for potential impacts in each biome, extracted from a total of 154 QDGCs:* • *<u>Fynbos (52 QDGCs):</u> African Marsh-Harrier, Black Stork, Blue Crane, Great White Pelican, Greater Flamingo, Karoo Korhaan, Kori Bustard, Lanner Falcon, Lesser Flamingo, Ludwig's Bustard, Martial Eagle, Secretarybird, Verreaux's Eagle.* • *<u>Succulent Karoo (50 QDGCs)</u>: African Marsh-Harrier, Black Harrier, Black Stork, Blue Crane, Caspian Tern, Great White Pelican, Greater Flamingo, Karoo Korhaan, Kori Bustard, Lanner Falcon, Lanner Falcon, Lesser Flamingo, Ludwig's Bustard, Martial Eagle, Secretarybird, Verreaux's Eagle.* • *<u>Nama Karoo (47 QDGCs)</u>: Black Harrier, Black Stork, Greater Flamingo, Karoo Korhaan, Kori Bustard, Lanner Falcon, Ludwig's Bustard, Martial Eagle, Secretarybird, Verreaux's Eagle.* • *<u>Savanna (5 QDGCs)</u>: Karoo Korhaan, Kori Bustard, Lanner Falcon, Ludwig's Bustard, Martial Eagle, Verreaux's Eagle.* 
Northern Corridor	*The Northern Corridor contains six biomes. In approximate order from west to east, these biomes are Fynbos (a very small remnant section), Desert, Succulent Karoo, Nama Karoo, Savanna and Grassland. The following power line sensitive Red Data species were identified and rated for potential impacts in each biome, extracted from a total of 300 QDGCs:* • *<u>Fynbos (2 QDGCs):</u> Lanner Falcon, Lesser Flamingo, Ludwig's Bustard, Martial Eagle, Secretarybird.* • *<u>Desert (17 QDGCs):</u> Black Stork, Karoo Korhaan, Kori Bustard, Lanner Falcon, Ludwig's Bustard, Verreaux's Eagle.* • *<u>Succulent Karoo (39 QDGCs):</u> Black Harrier, Black Stork, Caspian Tern, Great White Pelican, Greater Flamingo, Karoo Korhaan, Kori Bustard, Lanner Falcon, Lesser Flamingo, Ludwig's*

	Bustard, Martial Eagle, Secretarybird, Verreaux's Eagle. • *<u>Nama Karoo (86 QDGCs):</u> Abdim's Stork, Black Harrier, Black Stork, Karoo Korhaan, Kori Bustard, Lanner Falcon, Lappet-faced Vulture, Ludwig's Bustard, Martial Eagle, Secretarybird, Tawny Eagle, Verreaux's Eagle, Yellow-billed Stork.* • *<u>Savanna (119 QDGCs)</u>: Abdim's Stork, Black Harrier, Black Stork, Blue Crane, Cape Vulture, Great White Pelican, Greater Flamingo, Karoo Korhaan, Kori Bustard, Lanner Falcon, Lappet-faced Vulture, Lesser Flamingo, Ludwig's Bustard, Marabou Stork, Martial Eagle, Pink-backed Pelican, Secretarybird, Tawny Eagle, Verreaux's Eagle, Yellow-billed Stork.* • *<u>Grassland (37 QDGCs):</u> Abdim's Stork, African Grass-Owl, African Marsh-Harrier, Black Stork, Blue Crane, Cape Vulture, Caspian Tern, Great White Pelican, Greater Flamingo, Lanner Falcon, Lappet-faced Vulture, Lesser Flamingo, Martial Eagle, Pink-backed Pelican, Secretarybird, Verreaux's Eagle, Yellow-billed Stork.* 
International Corridor	*The International Corridor contains three biomes. In approximate order from south to north, these biomes are Grassland and Savanna, with small areas of Forest and Grassland located within the Savanna biome. The following power line sensitive Red Data species were identified and rated for potential impacts in each biome, extracted from a total of 132 QDGCs:* • *<u>Grassland (44 QDGCs):</u> Abdim's Stork, African Crowned Eagle, African Grass-Owl, African Marsh-Harrier, Bat Hawk, Black Harrier, Black Stork,Blue Crane, Caspian Tern, Denham's Bustard, Grey Crowned Crane, Kori Bustard, Lanner Falcon, Lappet-faced Vulture, Lesser Flamingo, Marabou Stork, Martial Eagle, Pallid Harrier, Secretarybird, Southern Bald Ibis, Wattled Crane, White-backed Vulture, White-bellied Korhaan, White-winged Flufftail, Yellow-billed Stork.* • *<u>Savanna (84 QDGCs):</u> Abdim's Stork, African Crowned Eagle, African Finfoot, African Marsh-Harrier, Bateleur, Black Stork, Black-bellied Bustard, Blue Crane, Cape Vulture, Caspian Tern, Greater Flamingo, Grey Crowned Crane, Kori Bustard, Lanner Falcon, Lappet-faced Vulture, Marabou Stork, Martial Eagle, Pallid Harrier, Saddle-billed Stork, Secretarybird, Southern Bald Ibis, Southern Ground-Hornbill, Tawny Eagle, Verreaux's Eagle, White-backed Night-Heron, White-backed Vulture, White-bellied Korhaan, Yellow-billed Stork.* • *<u>Forest (3 QDGCs):</u> African Crowned Eagle, Bat Hawk, Cape Vulture, White-bellied Korhaan.*

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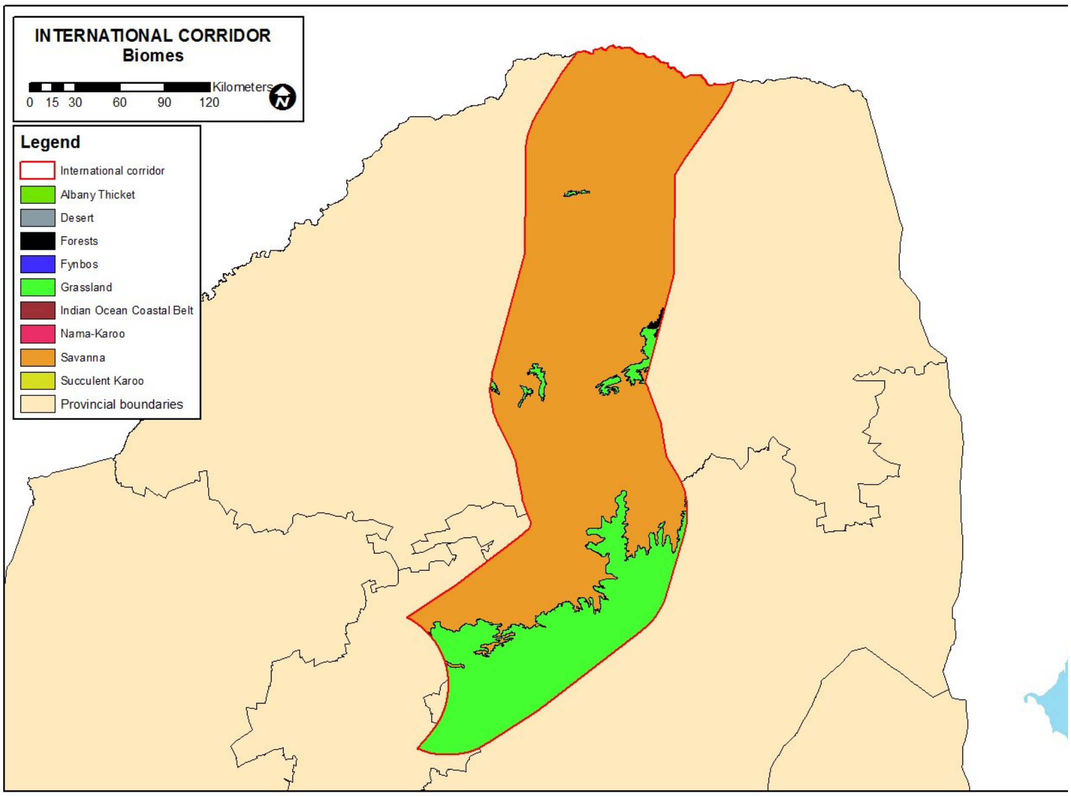
<tr><td></td><td>
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<tr><td>Central Corridor</td><td>The Central Corridor contains five biomes. In approximate order from south to north, these biomes are Fynbos, Succulent Karoo, Nama Karoo, Savanna and Grassland. There are also small areas of grassland within the Nama Karoo biome and savanna within the Grassland biome. The following power line sensitive Red Data species were identified and rated for potential impacts in each biome, extracted from a total of 425 QDGCs:

<u>Fynbos (62 QDGCs):</u> African Marsh-Harrier, Black Harrier, Black Stork, Blue Crane, Caspian Tern, Denham's Bustard, Great White Pelican, Greater Flamingo, Karoo Korhaan, Lanner Falcon, Lesser Flamingo, Ludwig's Bustard, Martial Eagle, Secretarybird, Verreaux's Eagle.
<u>Succulent Karoo (38 QDGCs)</u>: African Marsh-Harrier, Black Harrier, Black Stork, Blue Crane, Greater Flamingo, Karoo Korhaan, Lanner Falcon, Ludwig's Bustard, Martial Eagle, Verreaux's Eagle.
<u>Nama Karoo (131 QDGCs)</u>: Abdim's Stork, African Marsh-Harrier, Black Harrier,Black Stork, Blue Crane, Caspian Tern, Greater Flamingo, Karoo Korhaan, Kori Bustard, Lanner Falcon, Lappet-faced Vulture, Lesser Flamingo, Ludwig's Bustard, Marabou Stork, Martial Eagle, Secretarybird, Tawny Eagle, Verreaux's Eagle, White-backed Vulture, Yellow-billed Stork.
<u>Savanna (77 QDGCs):</u> Abdim's Stork, African Grass-Owl, African Marsh-Harrier, Black Harrier, Black Stork, Blue Crane, Cape Vulture, Caspian Tern, Greater Flamingo, Karoo Korhaan, Kori Bustard, Lanner Falcon, Lappet-faced Vulture, Lesser Flamingo, Ludwig's Bustard, Martial Eagle, Pallid Harrier, Secretarybird, Tawny Eagle, Verreaux's Eagle, White-backed Vulture, White-bellied Korhaan, Yellow-billed Stork.
<u>Grassland (117 QDGCs):</u> Abdim's Stork, African Grass-Owl, African Marsh-Harrier, Black Harrier, Black Stork, Blue Crane, Cape Vulture, Caspian Tern, Greater Flamingo, Grey Crowned Crane, Karoo Korhaan, Kori Bustard, Lanner Falcon, Lesser Flamingo, Ludwig's Bustard, Marabou Stork, Martial Eagle, Pallid Harrier, Secretarybird, Tawny Eagle, Verreaux's Eagle, White-backed Vulture, White-bellied Korhaan, Yellow-billed Stork.
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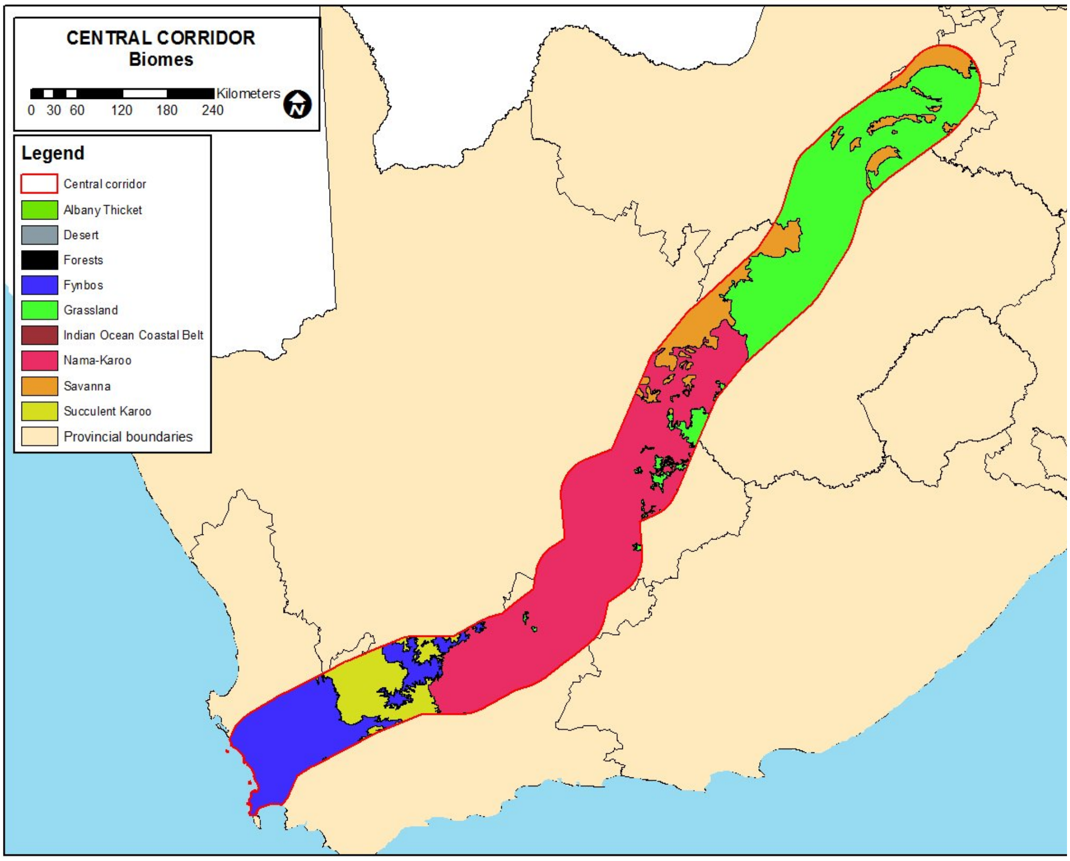
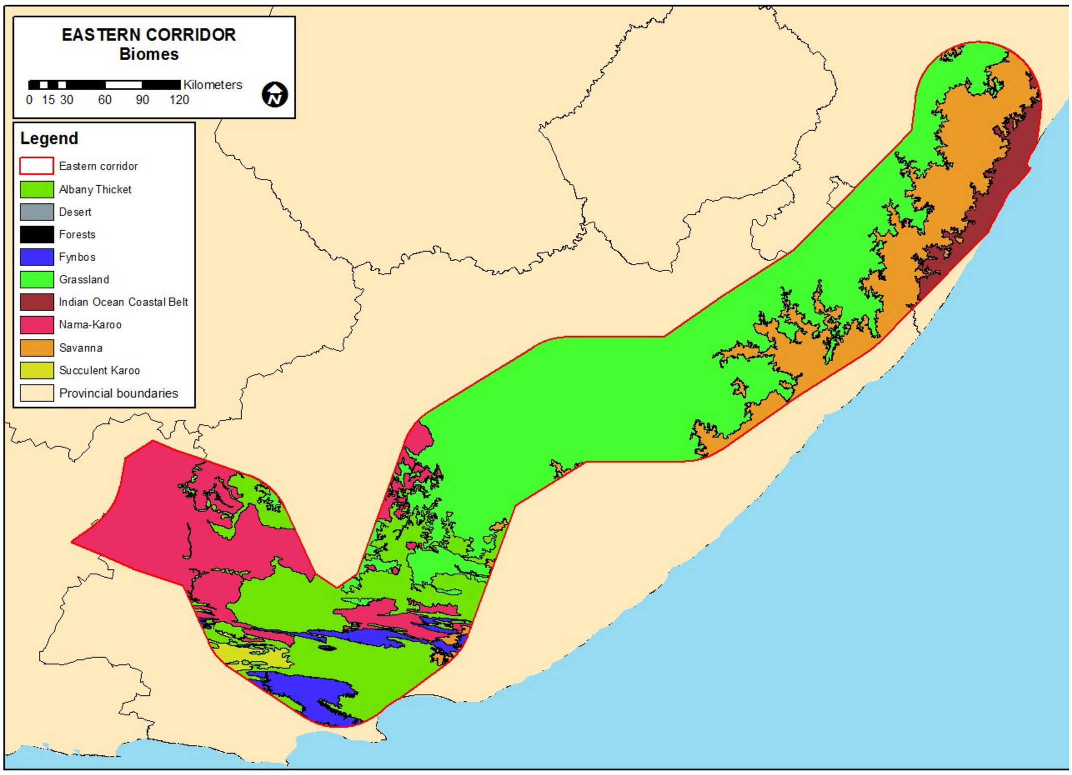


Eastern Corridor	*The Eastern Corridor contains seven biomes. In approximate order from west to east, these biomes are Nama Karoo, a mixture of Fynbos, Succulent Karoo and Thicket, Grassland, Savanna and Indian Ocean Coastal Belt. There are also small areas of grassland within the Nama Karoo biome and savanna within the Grassland biome. The following power line sensitive Red Data species were identified and rated for potential impacts in each biome, extracted from a total of 388 QDGCs:* • *<u>Nama Karoo (62 QDGCs):</u> African Crowned Eagle, African Finfoot, Black Harrier, Black Stork, Blue Crane, Cape Vulture, Caspian Tern, Denham's Bustard, Greater Flamingo, Grey Crowned Crane, Karoo Korhaan, Kori Bustard, Lanner Falcon, Lesser Flamingo, Ludwig's Bustard, Martial Eagle, Secretarybird, Southern Ground-Hornbill, Verreaux's Eagle.* • *<u>Succulent Karoo (8 QDGCs):</u> African Crowned Eagle, Black Harrier, Black Stork, Blue Crane, Karoo Korhaan, Kori Bustard, Lanner Falcon, Ludwig's Bustard, Martial Eagle, Secretarybird, Verreaux's Eagle.* • *<u>Albany Thicket (69 QDGCs):</u> African Crowned Eagle, African Finfoot, African Marsh-Harrier, Black Harrier, Black Stork, Blue Crane, Cape Vulture, Caspian Tern, Denham's Bustard, Greater Flamingo, Grey Crowned Crane, Karoo Korhaan, Kori Bustard, Lanner Falcon, Lesser Flamingo, Ludwig's Bustard, Martial Eagle, Secretarybird, Southern Ground-Hornbill, Verreaux's Eagle, White-bellied Korhaan.* • *<u>Fynbos (27 QDGCs):</u> African Crowned Eagle, African Marsh-Harrier, Black Harrier, Black Stork, Blue Crane, Cape Vulture, Caspian Tern, Denham's Bustard, Greater Flamingo, Grey Crowned Crane, Karoo Korhaan, Kori Bustard, Lanner Falcon, Lesser Flamingo, Ludwig's Bustard, Martial Eagle, Secretarybird, Verreaux's Eagle, White-bellied Korhaan.* • *<u>Grassland (129 QDGCs):</u> African Crowned Eagle, African Grass-Owl, African Marsh-Harrier, Bearded Vulture, Black Harrier, Black Stork, Blue Crane, Cape Parrot, Cape Vulture, Caspian Tern, Denham's Bustard, Greater Flamingo, Grey Crowned Crane, Karoo Korhaan, Kori Bustard, Lanner Falcon, Lesser Flamingo, Ludwig's Bustard, Marabou Stork, Martial Eagle, Pallid Harrier,*

Secretarybird, Southern Bald Ibis, Southern Ground-Hornbill, Tawny Eagle, Verreaux's Eagle, Wattled Crane, White-bellied Korhaan.

- *Savanna (72 QDGCs): African Crowned Eagle, African Finfoot, African Grass-Owl, African Marsh-Harrier, African Pygmy-Goose, Black Harrier, Black Stork, Black-bellied Bustard, Blue Crane, Cape Parrot, Cape Vulture, Caspian Tern, Denham's Bustard, Denham's Bustard, Greater Flamingo, Grey Crowned Crane, Kori Bustard, Lanner Falcon, Martial Eagle, Pink-backed Pelican, Secretarybird, Southern Bald Ibis, Southern Ground-Hornbill, Tawny Eagle, Verreaux's Eagle, Wattled Crane, White-bellied Korhaan.*
- *Indian Ocean Coastal Belt (21 QDGCs): African Crowned Eagle, African Marsh-Harrier, African Pygmy-Goose, Blue Crane, Cape Vulture, Caspian Tern, Denham's Bustard, Great White Pelican, Grey Crowned Crane, Lanner Falcon, Pink-backed Pelican, Southern Bald Ibis, Southern Ground-Hornbill.*



7 FEATURE SENSITIVITY MAPPING

7.1 Identification of feature sensitivity criteria

The basic point of departure for the definition of avifaunal feature sensitivity classes (habitat classes) was the 2013 - 2014 South African National Land-Cover Dataset. This was supplemented with information on specific features (sensitivity features) where available e.g. known nests sites and vulture restaurants. The potential negative impacts on avifauna by the electricity grid were identified as:

- Electrocutions on bird-unfriendly structures[64];

[64] The Eskom Land and Biodiversity Standard (2012) states that "all designs of new power lines and supporting infrastructure for power generation must be evaluated for the risk it could pose to wildlife and no design which has a high risk, or a record of it causing mortalities to wildlife, shall be used." However, it was assumed that Eskom might not

- Collisions with the conductors of reticulation lines, and the earth-wire of transmission and sub-transmission lines; and
- Displacement of breeding individuals through construction activity and habitat destruction.

The probability of the respective impacts occurring in a habitat class was rated for each priority species to arrive at a species-specific probability score for each impact, within each habitat class, within each biome, within each corridor. Probabilities for the respective impacts occurring were rated according to the below scale:

- 0 = the impact is highly unlikely to occur
- 1 = the impact is unlikely to occur
- 2 = the impact could possibly occur
- 3 = the impact will most likely occur

The species specific probability score was multiplied by a weighted Red Data status score for each priority species to arrive at a species-specific habitat sensitivity score for each species, for each habitat class. The Red Data status was assigned weighted scores according to the below scale:

- Near threatened = 2
- Vulnerable = 4
- Endangered = 8
- Critically endangered = 16

An aggregated habitat sensitivity score for each habitat class within each biome, within each corridor was calculated by summing the species-specific probability scores for that particular habitat class.

Sensitivity Feature Class (Habitat class)	Data Source + Date of Publications	Data Description, Preparation and Processing	Relevant Corridors
Water permanent	*South African National Land-Cover Dataset, 2015*	*Areas of open, surface water, that are detectable on all image dates used in the Landsat 8 based water modelling processes. Permanent water extent typically refers to the minimum water extent, which occurs throughout the 2013-14 assessment period.* *Includes both natural and man-made water features.*	*All*
Water seasonal	*South African National Land-Cover Dataset, 2015*	*Areas of open, surface water, that are detectable on one or more, but not all image dates used in the Landsat 8 based water modelling processes. Seasonal water extent typically refers to the maximum water extent, which may only occur for a limited time within the 2013-14 assessment period. Includes both natural and man-made water features.*	*All*
Wetlands	*South African National Land-Cover Dataset, 2015*	*Wetland areas that are primarily vegetated on a seasonal or permanent basis. Defined on the basis of seasonal image identifiable surface vegetation patterns (not subsurface soil characteristics. The*	*All*

be the only entity building power lines in future, therefore it cannot automatically be assumed that all future distribution pole designs will be bird- friendly.

Sensitivity Feature Class (Habitat class)	Data Source + Date of Publications	Data Description, Preparation and Processing	Relevant Corridors
		vegetation can be either rooted or floating. Wetlands may be either daily (i.e. coastal), temporarily, seasonal or permanently wet and/or saturated. Vegetation is predominately herbaceous. Includes but not limited to wetlands associated with seeps/springs, marshes, floodplains, lakes/pans, swamps, estuaries, and some riparian areas. Wetlands associated with riparian zones represent image identified vegetation along the edges of watercourses that show similar spectral characteristics to nearby wetland vegetation. *Excludes Mangrove swamps. Permanent or seasonal open water areas within the wetlands are classified separately. Seasonal wetland occurrences within commercially cultivated field boundaries are not shown, although they have been retained within subsistence level cultivation fields.*	
Indigenous Forest	*South African National Land-Cover Dataset, 2015*	*Natural / semi-natural indigenous forest, dominated by tall trees, where tree canopy heights are typically > ± 5m and tree canopy densities are typically > ± 75 %, often with multiple understory vegetation canopies.*	*All*
Thicket/dense bush	*South African National Land-Cover Dataset, 2015*	*Natural / semi-natural tree and / or bush dominated areas, where typically canopy heights are between 2 - 5 m, and canopy density is typically > ± 75%, but may include localised sparser areas down to ± 60%. Includes dense bush, thicket, closed woodland, tall, dense shrubs, scrub forest and mangrove swamps. Can include self-seeded bush encroachment areas if sufficient canopy density.*	*All*
Woodland/open bush	*South African National Land-Cover Dataset, 2015*	*Natural / semi-natural tree and / or bush dominated areas, where typically canopy heights are between ± 2 - 5 m, and canopy densities typically between 40 - 75%, but may include localised sparser areas down to ± 15 - 20 %. Includes sparse – open bushland and woodland, including transitional wooded grassland areas. Can include self-seeded bush encroachment areas if canopy density is within indicated range. In the arid western regions (i.e. Northern Cape), this cover class may be associated with a transitional bush / shrub cover that is lower than typical Open Bush / Woodland cover but higher and/or more dense than typical Low Shrub cover.*	*All*
Grassland	*South African National Land-Cover Dataset, 2015*	*Natural / semi-natural grass dominated areas, where typically the tree and / or bush canopy densities are typically < ± 20 %, but may include localised denser areas up to ± 40 %, (regardless of canopy heights). Includes open grassland, and sparse bushland and woodland areas, including*	*All*

Sensitivity Feature Class (Habitat class)	Data Source + Date of Publications	Data Description, Preparation and Processing	Relevant Corridors
		transitional wooded grasslands. May include planted pasture (i.e. grazing) if not irrigated. Irrigated pastures will typically be classified as cultivated, and urban parks and golf courses etc under urban.	
Shrubland fynbos	*South African National Land-Cover Dataset, 2015*	*Natural / semi-natural low shrub dominated areas, typically with < ± 2m canopy height, specifically associated with the Fynbos Biome. Includes a range of canopy densities encompassing sparse to dense canopy covers. Very sparse covers may be associated with the bare ground class. Note that taller tree / bush / shrub communities within this vegetation type are typically classified separately as one of the other tree or bush dominated cover classes.*	*All*
Low shrubland	*South African National Land-Cover Dataset, 2015*	*Natural / semi-natural low shrub dominated areas, typically with ≤ 2m canopy height. Includes a range of canopy densities encompassing sparse to dense canopy covers. Very sparse covers may be associated with the bare ground class. Typically associated with low, woody shrub, karoo-type vegetation communities, although can also represent locally degraded vegetation areas where there is a significantly reduced vegetation cover in comparison to surrounding, less impacted vegetation cover, including long-term wildfire scars in some mountainous areas in the western Cape. Note that taller tree / bush / shrub communities within this vegetation type are typically classified separately as one of the other tree or bush dominated cover classes.*	*All*
Cultivated commercial fields rainfed	*South African National Land-Cover Dataset, 2015*	*Cultivated lands used primarily for the production of rain-fed, annual crops for commercial markets. Typically represented by large field units, often in dense local or regional clusters. In most cases the defined cultivated extent represents the actual cultivated or potentially extent.*	*All*
Commercial pivots	*South African National Land-Cover Dataset, 2015*	*Cultivated lands used primarily for the production of centre pivot irrigated, annual crops for commercial markets. In most cases the defined cultivated extent represents the actual cultivated or potentially extent.*	*All*
Cultivate orchards and vines	*South African National Land-Cover Dataset, 2015*	*Cultivated lands used primarily for the production of both rain-fed and irrigated permanent crops for commercial markets. Includes both tree, shrub and non-woody crops, such as citrus, tea, coffee, grapes, lavender and pineapples etc. In most cases the defined cultivated extent represents the actual cultivated or potentially extent.*	*All*
Cultivated subsistence	*South African National Land-Cover Dataset, 2015*	*Cultivated lands used primarily for the production of rain-fed, annual crops for local markets and / or home use. Typically represented by small field*	*All*

Sensitivity Feature Class (Habitat class)	Data Source + Date of Publications	Data Description, Preparation and Processing	Relevant Corridors
		units, often in dense local or regional clusters. The defined area may include intra-field areas of non-cultivated land, which may be degraded or use-impacted, if the individual field units are too small to be defined as separate features.	
Cultivated sugar cane	*South African National Land-Cover Dataset, 2015*	*Commercial, pivot irrigated fields that appear to be used continuously for growing sugarcane on the majority of multi-date Landsat images used in the 2013-14 analysis period. Also includes commercial and semi-commercial / emerging farmer status, non-pivot fields, that appear to be used continuously for growing sugarcane on the majority of multi-date Landsat images used in the 2013-14 analysis period.*	*Eastern Corridor*
Plantations	*South African National Land-Cover Dataset, 2015*	*Planted forestry plantations used for growing commercial timber tree species. The class represents mature tree stands which have approximately 70% or greater tree canopy closure (regardless of canopy height), on all the multi-date Landsat images in the 2013-14 analysis period. The class includes spatially smaller woodlots and windbreaks with the same cover characteristics. It also includes young tree stands that have approximately 40 - 70% tree canopy closure (regardless of canopy height), clear-felled stands and spatially smaller woodlots and windbreaks with the same cover characteristics.*	*All*
Industrial	*South African National Land-Cover Dataset, 2015*	*Mining activity footprint, based on pure, non-vegetated, bare ground surfaces. Includes extraction pits, tailings, waste dumps and associated surface infrastructure such as roads and buildings (unless otherwise indicated), for both active and abandoned* *mining activities. Class may include open cast pits, sand mines, quarries and borrow pits etc.* also includes *mining activity footprint, based on semi-bare ground surfaces, which may be sparsely vegetated . Includes extraction pits, tailings, waste dumps and associated surface infrastructure such as roads and buildings (unless otherwise indicated) and surrounding dust-impacted areas, for both active and abandoned mining activities. Water bodies inside mining areas which represent permanent and non-permanent water extents are also included. Areas containing buildings and large surface infrastructure associated with the extraction, processing or administration of the associated mining area are also included.*	*All*
Bare	*South African National Land-Cover Dataset, 2015*	*Non-vegetated donga and gully features, typically associated with significant natural or man-induced erosion activities along or in association with stream and flow lines. The mapped extent of the*	*All*

Sensitivity Feature Class (Habitat class)	Data Source + Date of Publications	Data Description, Preparation and Processing	Relevant Corridors
		dongas and gullies is represented by bare ground conditions in all or the majority of the multi-date Landsat images used in the land-cover modelling. Note that these erosion features are significantly better represented both spatially and numerically in the wetter, more lush regions of the country where the non-vegetated erosion surface is significantly different from the surrounding vegetation cover (i.e. bushveld and grassland regions). In general, sparsely vegetated sheet eroded areas and degraded areas with significantly reduced local vegetation cover are not included in this class, but will be represented by local areas of low shrub or bare ground. Also included are bare, non-vegetated ground, with little or very sparse vegetation cover (i.e. typically < ± 5 - 10 % vegetation cover), occurring as a result of either natural or man-induced processes. Includes but not limited to natural rock exposures, dry river beds, dry *pans, coastal dunes and beaches, sand and rocky desert areas, very sparse low shrublands and grasslands, surface (sheet) erosion areas, severely degraded areas, and major road networks etc. May also include long-term wildfire scars in some mountainous areas in the western Cape.*	
Urban	*South African National Land-Cover Dataset, 2015*	*Areas containing the following:* • *high density buildings and other built-up structures associated with mainly non-residential, commercial, administrative, health, religious or transport (i.e. train station) activities;* • *buildings and other built-up structures associated with mainly non-residential, industrial and manufacturing activities, including power stations;* • *high density buildings and other built-up structures typically associated with informal, often non-regulated, residential housing;* • *variable density buildings and other built-up structures typically associated with formal, regulated, residential housing;* • *buildings, other built-up structures and open sports areas typically* • *areas associated with schools and school sports grounds.* • *Areas containing a low density mix of buildings, other built-up structures within open* • *areas, which may or may not be cultivated, that are representative of*	*All*

Sensitivity Feature Class (Habitat class)	Data Source + Date of Publications	Data Description, Preparation and Processing	Relevant Corridors
		both formally declared agricultural holdings, and similar small holdings / small farms, typically located on the periphery of urban areas. • Areas containing a low density mix of buildings, other built-up structures associated with golf courses. The class includes both residential golf estates and non-residential golf courses, and typically represents the border extent of the entire estate or course. • Areas containing high density buildings and other built-up structures typically associated with formal, regulated, residential housing associated with townships and "RDP" type housing developments. • Areas containing variable density structures typically associated with rural villages, including both traditional and modern building formats. • Areas containing variable densities of buildings other built-up structures, or no structures at all, that are not clearly identifiable as one of the other Built-Up classes. May include runways, major infrastructure development sites, holiday chalets, roads, car parks, cemeteries etc.	
Steep slopes with potential cliffs	*U.S. Geological Survey: http://www.usgs.gov/ and [http://wiki.gis.com/wiki/index.php/Grade_(slope))](http://wiki.gis.com/wiki/index.php/Grade_(slope)) 2015*	• *A 30m digital elevation model was used to generate a slope map in ArcGIS Spatial Analyst. Areas with a slope angle of 45° or 100% rise were classified as steep slopes which potentially include cliffs.*	*All*
Nest sites	• *The crane and White-backed Vulture nest databases of the Endangered Wildlife Trust (EWT); 2015* • *Tawny Eagle, Lappet-faced Vulture, White-backed Vulture, Martial Eagle and Bateleur nests identified by Abri Maritz in the Northern Cape in the period; 2009* • *The Endangered Wildlife Trust's*	• *Nest sites of Martial Eagle, Verreaux's Eagle, Tawny Eagle, Bateleur. White-backed Vulture, Lappet-faced Vulture, Black Harrier, Lanner Falcon.* • *Blue Swallow breeding areas in KwaZulu-Natal* • *Nest sites of Blue Crane, Grey Crowned Cranes and Wattled Crane.* • *Potential nest sites of Southern Ground Hornbill.*	*All* *Eastern Corridor* *All corridors except Northern Corridor* *International and Eastern Corridor*

Sensitivity Feature Class (Habitat class)	Data Source + Date of Publications	Data Description, Preparation and Processing	Relevant Corridors
	database of eagles nesting on transmission lines in the Karoo; 2006 • *A map of Blue Swallow breeding areas obtained from Nick Theron at BLSA; 2015* • *Information on the locality of various Red Data raptor nests in the Northern and Eastern Cape, as well as Cape Vulture colonies in the Eastern Cape. Received from Jon Smallie from WildSkies Ecological Services, 2015* • *Information on potential nesting areas of Southern Ground Hornbills, Mabula Ground Hornbill Project, 2015.* • *Information on various Red Data species nests and vulture colonies obtained from the Strategic Environmental Assessment for Wind and Solar Photovoltaic Energy in South Africa.* • *Information on the locality of Southern Bald Ibis breeding colonies, Birdlife South Africa, 2015.*	• *Southern Bald Ibis breeding areas in KwaZulu-Natal.*	*Eastern Corridor*

Sensitivity Feature Class (Habitat class)	Data Source + Date of Publications	Data Description, Preparation and Processing	Relevant Corridors
Vultures	• *National vulture restaurant database obtained from Vulpro in May 2015* • *The results of the 2013 aerial survey of Cape Vulture colonies conducted by Eskom, EWT and Birdlife South Africa (BLSA) in the former Transkei, Eastern Cape.* • *The national register of vulture Cape Vulture colonies obtained from Vulpro in May 2015* • *Information on the locality of Cape Vulture colonies in the Eastern Cape. Received from Jon Smallie from WildSkies Ecological Services, 2015*	• *Cape Vulture breeding and roosting colonies* • *White-backed Vulture breeding areas* • *Known vulture restaurants, both active and inactive*	*All corridors except Western Corridor*

Below are all feature types considered in the sensitivity analysis and the rating given to each feature and buffered area, where applicable. Details on each individual feature ratings are provided in Appendix 1.

Corridor	Biome	Feature Class	Feature Class Sensitivity	Buffer Distance Sensitivity
Western	*Fynbos*	*Bare*	*Low*	
		Cultivated commercial fields rainfed	*Medium*	
		Cultivated commercial pivots	*Medium*	
		Cultivated orchards	*Low*	
		Cultivated subsistence	*Low*	
		Cultivated vines	*Low*	
		Grassland	*Medium*	
		Industrial	*Low*	
		Low shrubland	*Medium*	
		Plantations	*Low*	
		Shrubland fynbos	*Medium*	
		Spp Nest sites	*Very High*	*2.5km*
		Steep slopes incl cliffs	*Medium*	*1km*
		Thicket /Dense bush	*Low*	

Corridor	Biome	Feature Class	Feature Class Sensitivity	Buffer Distance Sensitivity
		Urban (500m buffer)	*Low*	*500m*
		Wetlands and waterbodies (500m buffer)	*High*	*500m*
		Woodland/Open bush	*Medium*	
	Nama-Karoo	*Bare*	*Medium*	
		Cultivated commercial fields rainfed	*Medium*	
		Cultivated orchards	*Low*	
		Grassland	*Medium*	
		Industrial	*Low*	
		Low shrubland	*High*	
		Plantations	*Low*	
		Shrubland fynbos	*Medium*	
		Spp Nest sites	*Very High*	*2.5km*
		Steep slopes incl cliffs	*Medium*	*1km*
		Thicket /Dense bush	*Low*	
		Urban (500m buffer)	*Low*	*500m*
		Wetlands and waterbodies (500m buffer)	*Medium*	*500m*
		Woodland/Open bush	*Medium*	
	Savanna	*Bare*	*Low*	
		Grassland	*Medium*	
		Industrial	*Low*	
		Low shrubland	*Medium*	
		Thicket /Dense bush	*Low*	
		Woodland/Open bush	*Medium*	
	Succulent Karoo	*Bare*	*Medium*	
		Cultivated commercial fields rainfed	*Medium*	
		Cultivated commercial pivots	*Medium*	
		Cultivated orchards	*Low*	
		Cultivated subsistence	*Low*	
		Cultivated vines	*Low*	
		Grassland	*Medium*	
		Industrial	*Low*	
		Low shrubland	*High*	
		Plantations	*Low*	
		Shrubland fynbos	*High*	
		Spp Nest sites	*Very High*	*2.5km*
		Steep slopes incl cliffs	*Medium*	*1km*
		Thicket /Dense bush	*Low*	
		Urban (500m buffer)	*Low*	*500m*
		Wetlands and waterbodies (500m buffer)	*High*	*500m*
		Woodland/Open bush	*Medium*	
Northern	*Desert*	*Bare*	*Medium*	
		Cultivated commercial fields rainfed	*Medium*	
		Cultivated orchards	*Low*	
		Cultivated vines	*Low*	

Corridor	Biome	Feature Class	Feature Class Sensitivity	Buffer Distance Sensitivity
		Grassland	*Medium*	
		Industrial	*Low*	
		Low shrubland	*Medium*	
		Plantations	*Low*	
		Shrubland fynbos	*Medium*	
		Spp Nest sites	*Very High*	*2.5km*
		Steep slopes incl cliffs	*Medium*	*1km*
		Thicket /Dense bush	*Low*	
		Urban (500m buffer)	*Low*	*500m*
		Wetlands and waterbodies (500m buffer)	*Medium*	*500m*
		Woodland/Open bush	*Low*	
	Fynbos	*Bare*	*Low*	
		Grassland	*Medium*	
		Low shrubland	*Medium*	
		Shrubland fynbos	*Medium*	
		Woodland/Open bush	*Low*	
	Grassland	*Bare*	*Low*	
		Cultivated commercial fields rainfed	*Low*	
		Cultivated commercial pivots	*Low*	
		Cultivated orchards	*Low*	
		Cultivated subsistence	*Low*	
		Grassland	*High*	
		Indigenous Forest	*Low*	
		Industrial	*Low*	
		Low shrubland	*High*	
		Plantations	*Low*	
		Steep slopes incl cliffs	*Medium*	*1km*
		Thicket /Dense bush	*Low*	
		Urban (500m buffer)	*Low*	*500m*
		Vultures	*Very High*	*5km*
		Wetlands and waterbodies (500m buffer)	*High*	*500m*
		Woodland/Open bush	*Low*	
	Nama-Karoo	*Bare*	*Medium*	
		Cultivated commercial fields rainfed	*Medium*	
		Cultivated commercial pivots	*Medium*	
		Cultivated orchards	*Low*	
		Cultivated vines	*Low*	
		Grassland	*High*	
		Industrial	*Low*	
		Low shrubland	*High*	
		Plantations	*Low*	
		Shrubland fynbos	*High*	
		Spp Nest sites	*Very High*	*2.5km*
		Steep slopes incl cliffs	*Medium*	*1km*
		Thicket /Dense bush	*Low*	

Corridor	Biome	Feature Class	Feature Class Sensitivity	Buffer Distance Sensitivity
		Urban (500m buffer)	*Low*	*500m*
		Wetlands and waterbodies (500m buffer)	*High*	*500m*
		Woodland/Open bush	*Low*	
	Savanna	*Bare*	*Low*	
		Cultivated commercial fields rainfed	*Medium*	
		Cultivated commercial pivots	*Low*	
		Cultivated orchards	*Low*	
		Cultivated subsistence	*Low*	
		Cultivated vines	*Low*	
		Grassland	*High*	
		Indigenous Forest	*Low*	
		Industrial	*Low*	
		Low shrubland	*High*	
		Plantations	*Low*	
		Spp Nest sites	*Very High*	*2.5km*
		Steep slopes incl cliffs	*Medium*	*1km*
		Thicket /Dense bush	*Low*	
		Urban (500m buffer)	*Low*	*500m*
		Vultures	*Very High*	*5km*
		Wetlands and waterbodies (500m buffer)	*High*	*500m*
		Woodland/Open bush	*Low*	
	Succulent Karoo	*Bare*	*Medium*	
		Cultivated commercial fields rainfed	*Medium*	
		Grassland	*Medium*	
		Industrial	*Low*	
		Low shrubland	*High*	
		Plantations	*Low*	
		Shrubland fynbos	*High*	
		Spp Nest sites	*Very High*	*Lanner Falcon = 500m* *Black Harrier = 1km* *Others = 2.5km*
		Steep slopes incl cliffs	*Medium*	
		Thicket /Dense bush	*Low*	
		Urban (500m buffer)	*Low*	*500m*
		Wetlands and waterbodies (500m buffer)	*Medium*	*500m*
		Woodland/Open bush	*Low*	
International	*Forests*	*Bare*	*Low*	
		Cultivated commercial fields rainfed	*Low*	
		Cultivated orchards	*Low*	
		Grassland	*Low*	
		Indigenous Forest	*Medium*	
		Low shrubland	*Low*	
		Plantations	*Low*	
		Steep slopes incl cliffs	*Low*	*1km*

Corridor	Biome	Feature Class	Feature Class Sensitivity	Buffer Distance Sensitivity
		Thicket /Dense bush	*Low*	
		Urban (500m buffer)	*Low*	*500m*
		Wetlands and waterbodies (500m buffer)	*Low*	*500m*
		Woodland/Open bush	*Low*	
	Grassland	*Bare*	*Low*	
		Cultivated commercial fields rainfed	*Low*	
		Cultivated commercial pivots	*Low*	
		Cultivated orchards	*Low*	
		Cultivated subsistence	*Low*	
		Grassland	*High*	
		Indigenous Forest	*Medium*	
		Industrial	*Low*	
		Low shrubland	*Low*	
		Plantations	*Low*	
		Spp Nest sites	*Very High*	*Southern Bald Ibis = 1km* *Other = 2.5km*
		Steep slopes incl cliffs	*High*	*1km*
		Thicket /Dense bush	*Low*	
		Urban (500m buffer)	*Low*	*500m*
		Wetlands and waterbodies (500m buffer)	*Very High*	*500m*
		Woodland/Open bush	*Low*	
	Savanna	*Bare*	*Low*	
		Cultivated commercial fields rainfed	*Low*	
		Cultivated commercial pivots	*Low*	
		Cultivated orchards	*Low*	
		Cultivated subsistence	*Low*	
		Grassland	*High*	
		Indigenous Forest	*Medium*	
		Industrial	*Low*	
		Low shrubland	*High*	
		Plantations	*Low*	
		Spp Nest sites	*Very High*	*2.5km*
		Steep slopes incl cliffs	*Medium*	
		Thicket /Dense bush	*Low*	
		Urban (500m buffer)	*Low*	*500m*
		Vultures	*Very High*	*5km*
		Wetlands and waterbodies (500m buffer)	*Very High*	*500m*
		Woodland/Open bush	*Low*	
Central	*Fynbos*	*Bare*	*Low*	
		Cultivated commercial fields rainfed	*Medium*	
		Cultivated commercial pivots	*Medium*	
		Cultivated orchards	*Low*	

Corridor	Biome	Feature Class	Feature Class Sensitivity	Buffer Distance Sensitivity
		Cultivated vines	*Low*	
		Grassland	*Medium*	
		Industrial	*Low*	
		Low shrubland	*Medium*	
		Plantations	*Low*	
		Shrubland fynbos	*Medium*	
		Spp Nest sites	*Very High*	*2.5km*
		Steep slopes incl cliffs	*Medium*	*1km*
		Thicket /Dense bush	*Low*	
		Urban (500m buffer)	*Low*	*500m*
		Wetlands and waterbodies (500m buffer)	*High*	*500m*
		Woodland/Open bush	*Medium*	
	Grassland	*Bare*	*Low*	
		Cultivated commercial fields rainfed	*Low*	
		Cultivated commercial pivots	*Medium*	
		Cultivated orchards	*Low*	
		Cultivated subsistence	*Low*	
		Grassland	*High*	
		Industrial	*Low*	
		Low shrubland	*High*	
		Plantations	*Low*	
		Spp Nest sites	*Very High*	*2.5km*
		Steep slopes incl cliffs	*Medium*	*1km*
		Thicket /Dense bush	*Low*	
		Urban (500m buffer)	*Low*	*500m*
		Vultures	*Very High*	*5km*
		Wetlands and waterbodies (500m buffer)	*High*	*500m*
		Woodland/Open bush	*Low*	
	Nama-Karoo	*Bare*	*Medium*	
		Cultivated commercial fields rainfed	*Medium*	
		Cultivated commercial pivots	*Medium*	
		Cultivated orchards	*Low*	
		Cultivated vines	*Low*	
		Grassland	*High*	
		Industrial	*Low*	
		Low shrubland	*High*	
		Plantations	*Low*	
		Shrubland fynbos	*High*	
		Spp Nest sites	*Very High*	*2.5km*
		Steep slopes incl cliffs	*Medium*	*1km*
		Thicket /Dense bush	*Low*	
		Urban (500m buffer)	*Low*	*500m*
		Vultures	*Very High*	*5km*
		Wetlands and waterbodies (500m buffer)	*High*	*500m*

Corridor	Biome	Feature Class	Feature Class Sensitivity	Buffer Distance Sensitivity
		Woodland/Open bush	*Medium*	
	Savanna	*Bare*	*Low*	
		Cultivated commercial fields rainfed	*Low*	
		Cultivated commercial pivots	*Medium*	
		Cultivated orchards	*Low*	
		Cultivated subsistence	*Low*	
		Grassland	*High*	
		Indigenous Forest	*Low*	
		Industrial	*Low*	
		Low shrubland	*High*	
		Plantations	*Low*	
		Spp Nest sites	*Very High*	*2.5km*
		Steep slopes incl cliffs	*Medium*	*1km*
		Thicket /Dense bush	*Low*	
		Urban (500m buffer)	*Low*	*500m*
		Vultures	*Very High*	*5km*
		Wetlands and waterbodies (500m buffer)	*High*	*500m*
		Woodland/Open bush	*Medium*	
	Succulent Karoo	*Bare*	*Medium*	
		Cultivated commercial fields rainfed	*Medium*	
		Cultivated commercial pivots	*Medium*	
		Cultivated orchards	*Low*	
		Grassland	*Medium*	
		Industrial	*Low*	
		Low shrubland	*Medium*	
		Shrubland fynbos	*Medium*	
		Spp Nest sites	*Very High*	*2.5km*
		Steep slopes incl cliffs	*Medium*	*1km*
		Thicket /Dense bush	*Low*	
		Urban (500m buffer)	*Low*	*500m*
		Wetlands and waterbodies (500m buffer)	*Medium*	*500m*
		Woodland/Open bush	*Low*	
Eastern	*Albany Thicket*	*Bare*	*Medium*	
		Cultivated commercial fields rainfed	*Medium*	
		Cultivated commercial pivots	*Medium*	
		Cultivated orchards	*Low*	
		Cultivated subsistence	*Low*	
		Grassland	*High*	
		Indigenous Forest	*Medium*	
		Industrial	*Low*	
		Low shrubland	*High*	
		Plantations	*Low*	
		Shrubland fynbos	*High*	

Corridor	Biome	Feature Class	Feature Class Sensitivity	Buffer Distance Sensitivity
		Spp Nest sites	*Very High*	*2.5km*
		Steep slopes incl cliffs	*High*	*1km*
		Thicket /Dense bush	*Low*	
		Urban (500m buffer)	*Low*	*500m*
		Vultures	*Very High*	*5km*
		Wetlands and waterbodies (500m buffer)	*High*	*500m*
		Woodland/Open bush	*Medium*	
	Fynbos	*Bare*	*Medium*	
		Cultivated commercial fields rainfed	*Low*	
		Cultivated commercial pivots	*Low*	
		Cultivated orchards	*Low*	
		Cultivated subsistence	*Low*	
		Grassland	*Medium*	
		Indigenous Forest	*Low*	
		Industrial	*Low*	
		Low shrubland	*Medium*	
		Plantations	*Low*	
		Shrubland fynbos	*Medium*	
		Spp Nest sites	*Very High*	*2.5km*
		Steep slopes incl cliffs	*Medium*	*1km*
		Thicket /Dense bush	*Low*	
		Urban (500m buffer)	*Low*	*500m*
		Wetlands and waterbodies (500m buffer)	*Medium*	*500m*
		Woodland/Open bush	*Low*	
	Grassland	*Bare*	*Medium*	
		Cultivated commercial fields rainfed	*Medium*	
		Cultivated commercial pivots	*Medium*	
		Cultivated orchards	*Low*	
		Cultivated subsistence	*Medium*	
		Cultivated sugar cane	*Low*	
		Grassland	*Very High*	
		Indigenous Forest	*Medium*	
		Industrial	*Low*	
		Low shrubland	*High*	
		Plantations	*Low*	
		Spp Nest sites	*Very High*	*Lanner Falcon-= 500m* *Southern Bald Ibis = 1km* *Other = 2.5km*
		Steep slopes incl cliffs	*Very High*	*1km*
		Thicket /Dense bush	*Low*	
		Urban (500m buffer)	*Low*	*500m*
		Vultures	*Very High*	*5km*
		Wetlands and waterbodies	*Very High*	*500m*

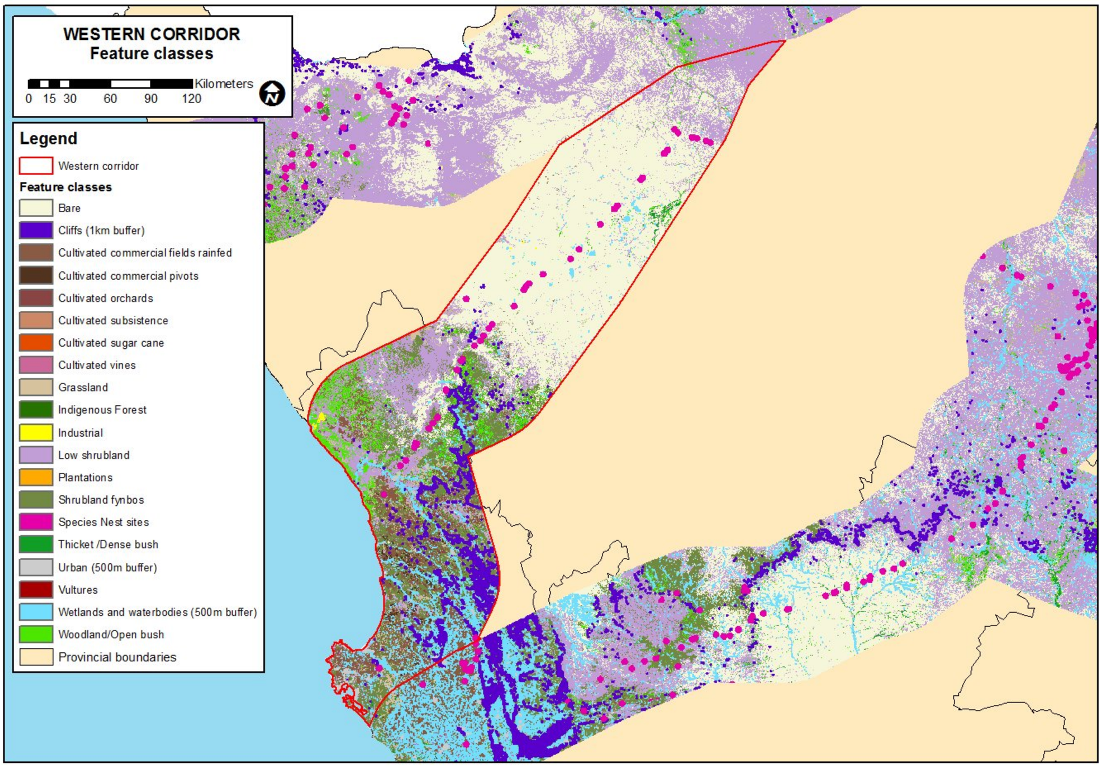
Corridor	Biome	Feature Class	Feature Class Sensitivity	Buffer Distance Sensitivity
		(500m buffer)		
		Woodland/Open bush	*Medium*	
	Indian Ocean Coastal Belt	*Bare*	*Medium*	
		Cultivated commercial fields rainfed	*Medium*	
		Cultivated orchards	*Low*	
		Cultivated subsistence	*Low*	
		Cultivated sugar cane	*Low*	
		Grassland	*High*	
		Indigenous Forest	*Medium*	
		Industrial	*Low*	
		Low shrubland	*Medium*	
		Plantations	*Low*	
		Spp Nest sites	*Very High*	*2.5km*
		Steep slopes incl cliffs	*High*	*1km*
		Thicket /Dense bush	*Low*	
		Urban (500m buffer)	*Low*	*500m*
		Vultures	*Very High*	*5km*
		Wetlands and waterbodies (500m buffer)	*High*	*500m*
		Woodland/Open bush	*Low*	
	Nama-Karoo	*Bare*	*Medium*	
		Cultivated commercial fields rainfed	*Medium*	
		Cultivated commercial pivots	*Medium*	
		Cultivated orchards	*Low*	
		Cultivated subsistence	*Low*	
		Grassland	*High*	
		Industrial	*Low*	
		Low shrubland	*High*	
		Plantations	*Low*	
		Shrubland fynbos	*High*	
		Spp Nest sites	*Very High*	*Lanner Falcon = 500m* *Other = 2.5km*
		Steep slopes incl cliffs	*Medium*	*1km*
		Thicket /Dense bush	*Low*	
		Urban (500m buffer)	*Low*	*500m*
		Vultures	*Very High*	*5km*
		Wetlands and waterbodies (500m buffer)	*Medium*	*500m*
		Woodland/Open bush	*Low*	
	Savanna	*Bare*	*Low*	
		Cultivated commercial fields rainfed	*Medium*	
		Cultivated commercial pivots	*Medium*	
		Cultivated orchards	*Low*	
		Cultivated subsistence	*Medium*	
		Cultivated sugar cane	*Low*	
		Grassland	*High*	

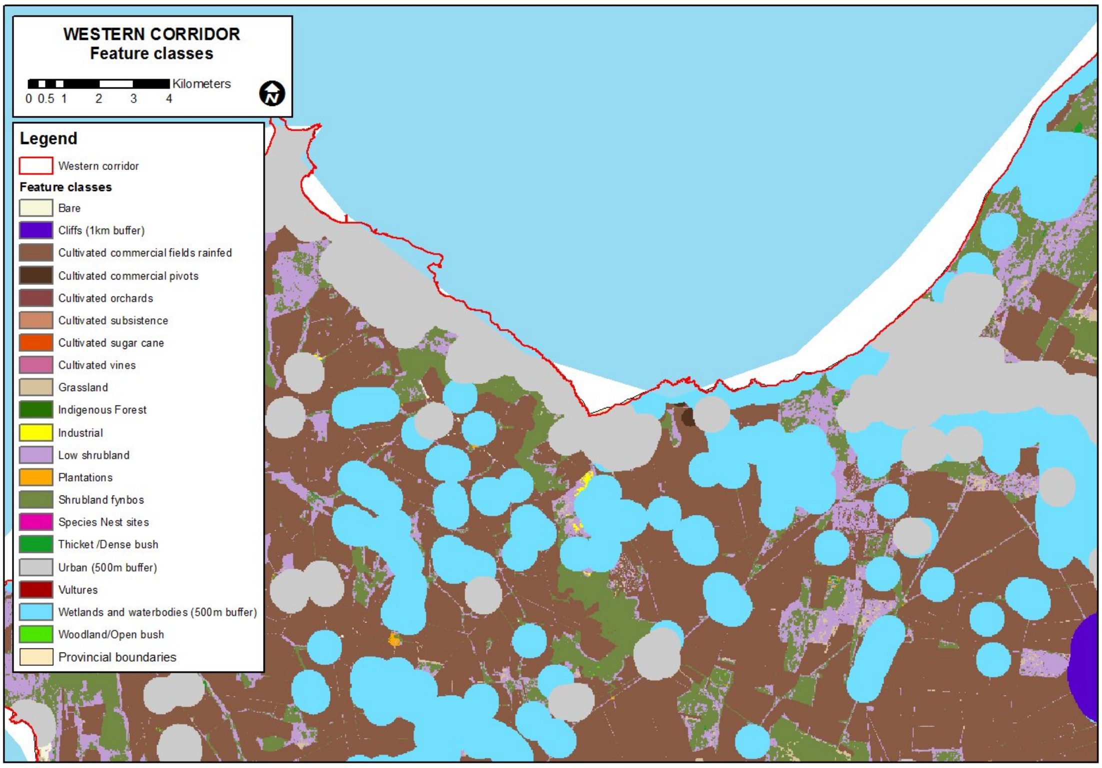
Corridor	Biome	Feature Class	Feature Class Sensitivity	Buffer Distance Sensitivity
		Indigenous Forest	*Medium*	
		Industrial	*Low*	
		Low shrubland	*Medium*	
		Plantations	*Low*	
		Shrubland fynbos	*High*	
		Spp Nest sites	*Very High*	*2.5km*
		Steep slopes incl cliffs	*High*	*1km*
		Thicket /Dense bush	*Low*	
		Urban (500m buffer)	*Low*	*500m*
		Vultures	*Very High*	*5km*
		Wetlands and waterbodies (500m buffer)	*High*	*500m*
		Woodland/Open bush	*Low*	
	Succulent Karoo	*Bare*	*Medium*	
		Cultivated commercial fields rainfed	*Medium*	
		Grassland	*Medium*	
		Industrial	*Low*	
		Low shrubland	*Medium*	
		Shrubland fynbos	*Medium*	
		Steep slopes incl cliffs	*Medium*	*1km*
		Thicket /Dense bush	*Low*	
		Urban (500m buffer)	*Low*	*500m*
		Wetlands and waterbodies (500m buffer)	*Medium*	*500m*
		Woodland/Open bush	*Low*	

7.2 Feature maps

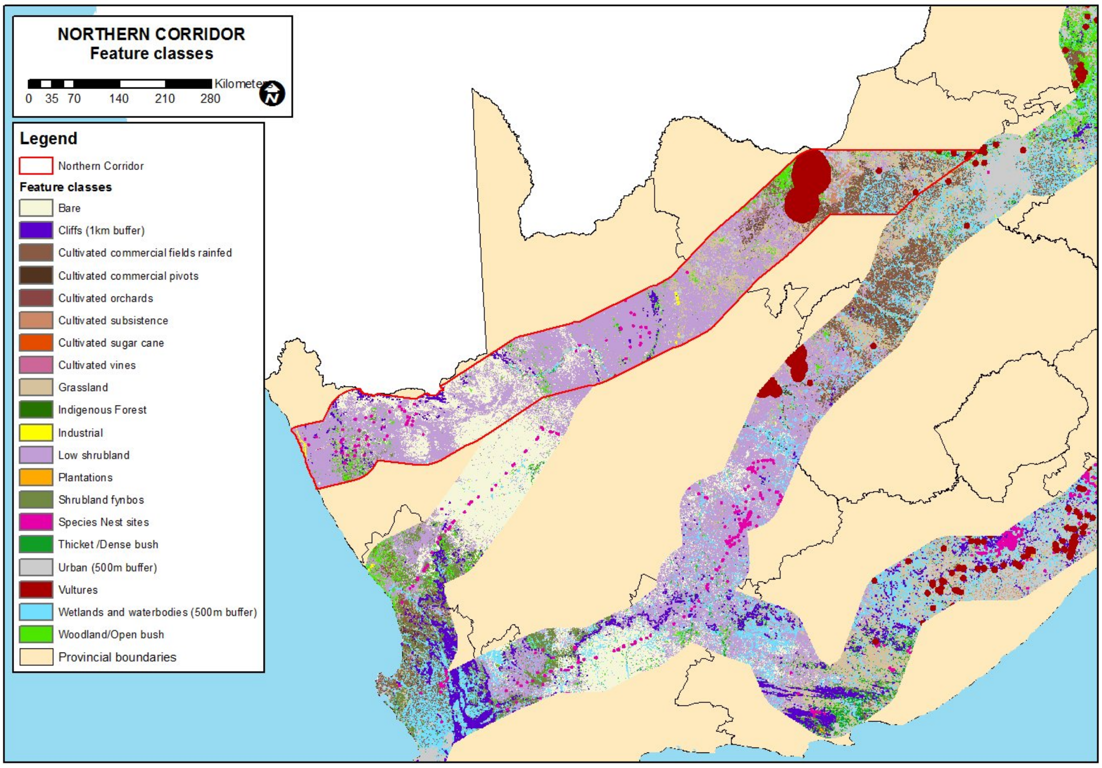
Two sets of maps are provided for each corridor. The first map provides an overview of the whole corridor, and the second map is a high resolution snapshot of a portion of the map to indicate the level of detail.

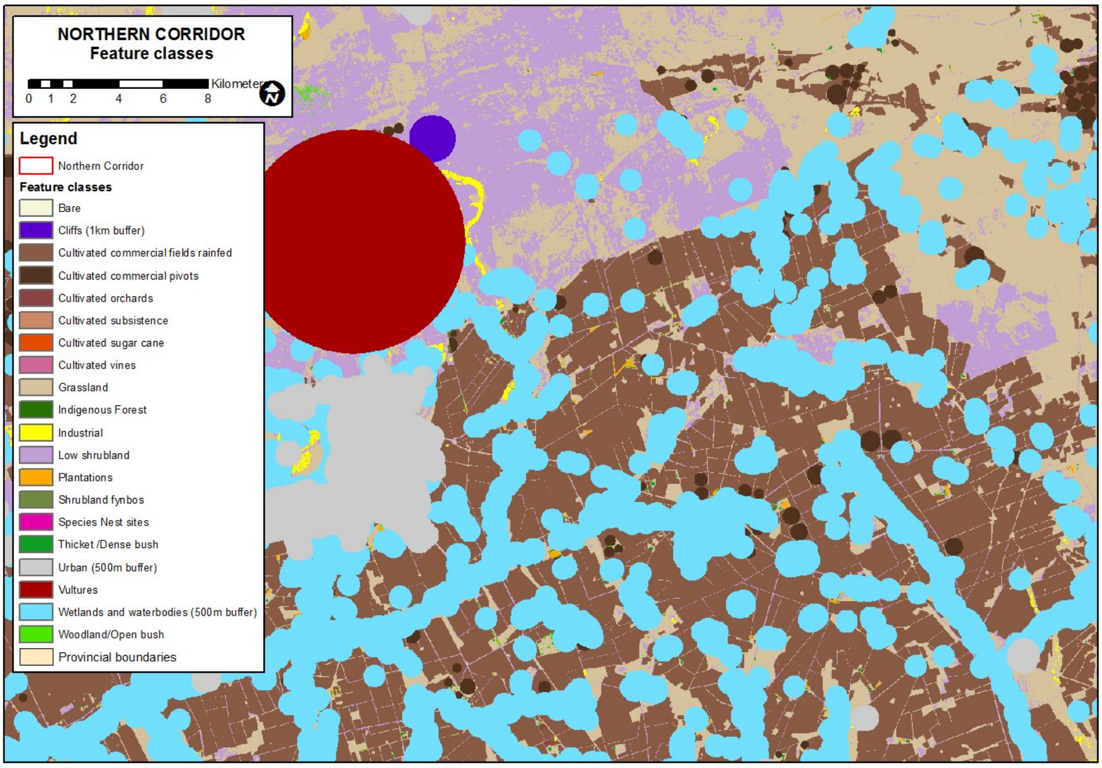
7.2.1 Western Corridor



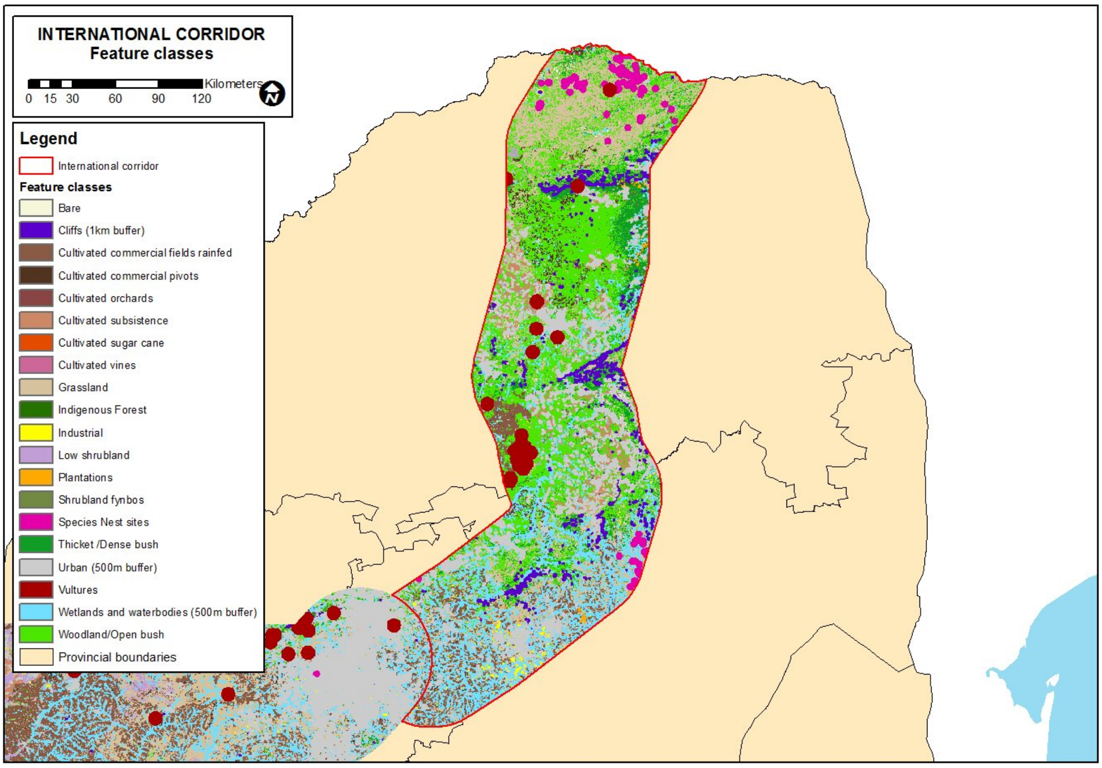


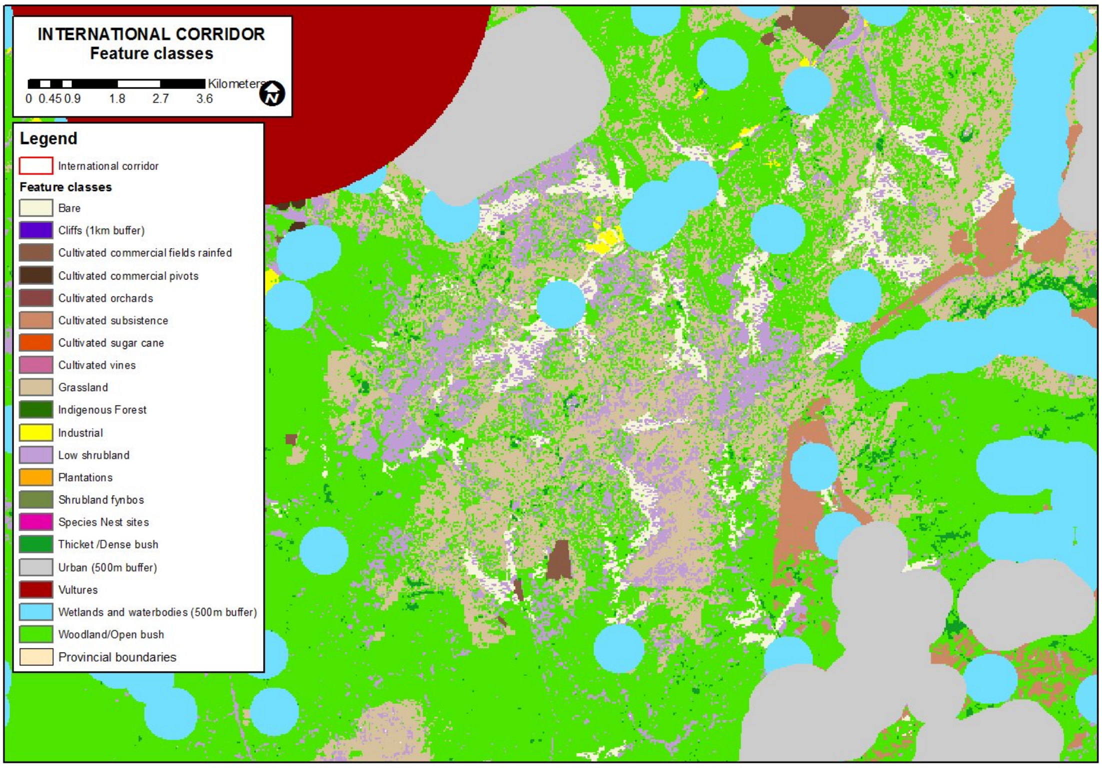
7.2.2 Northern Corridor



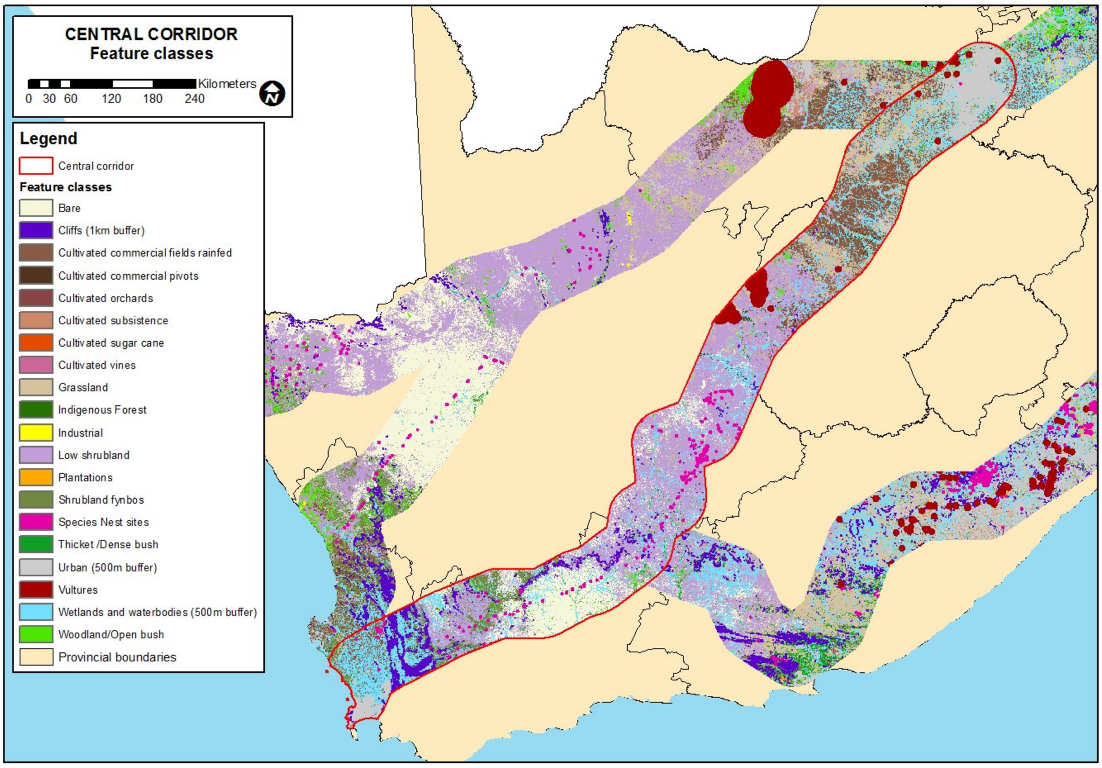


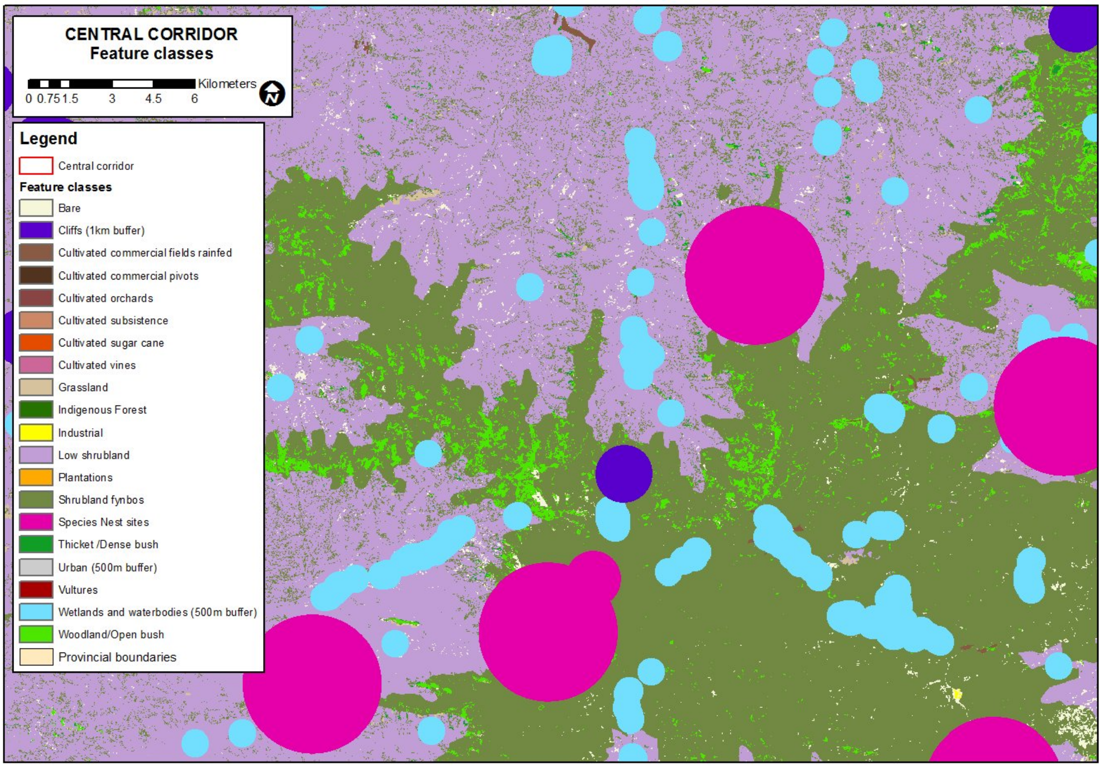
7.2.3 International Corridor



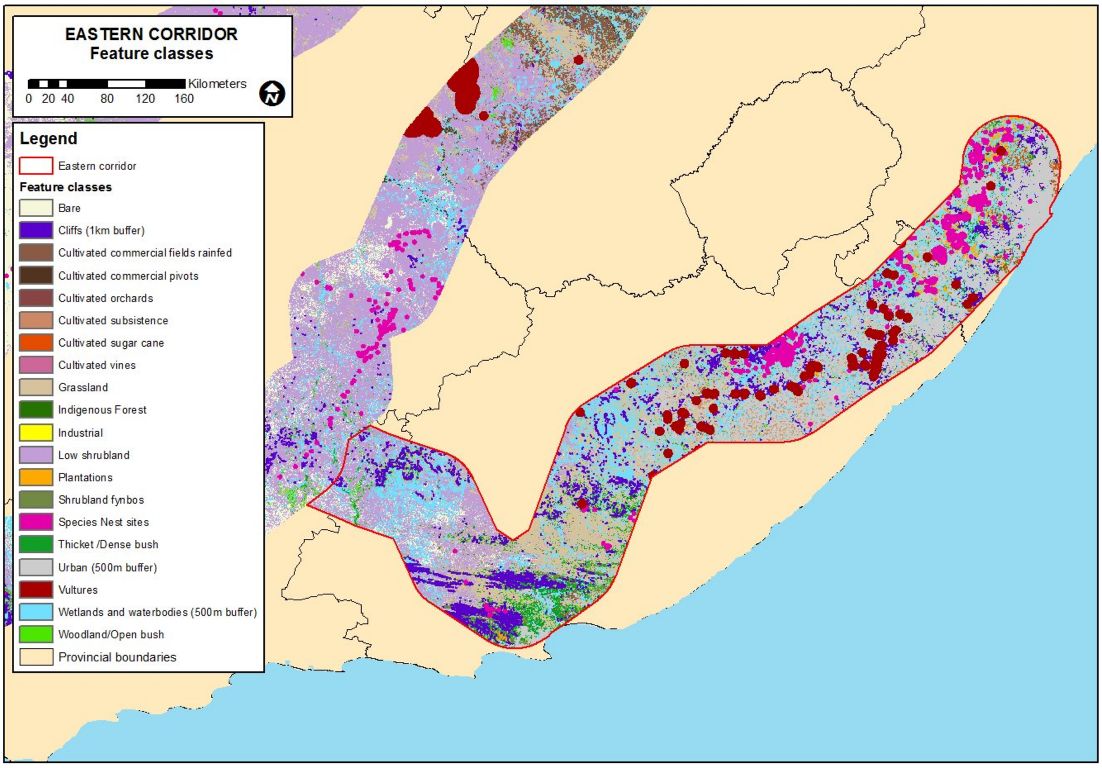


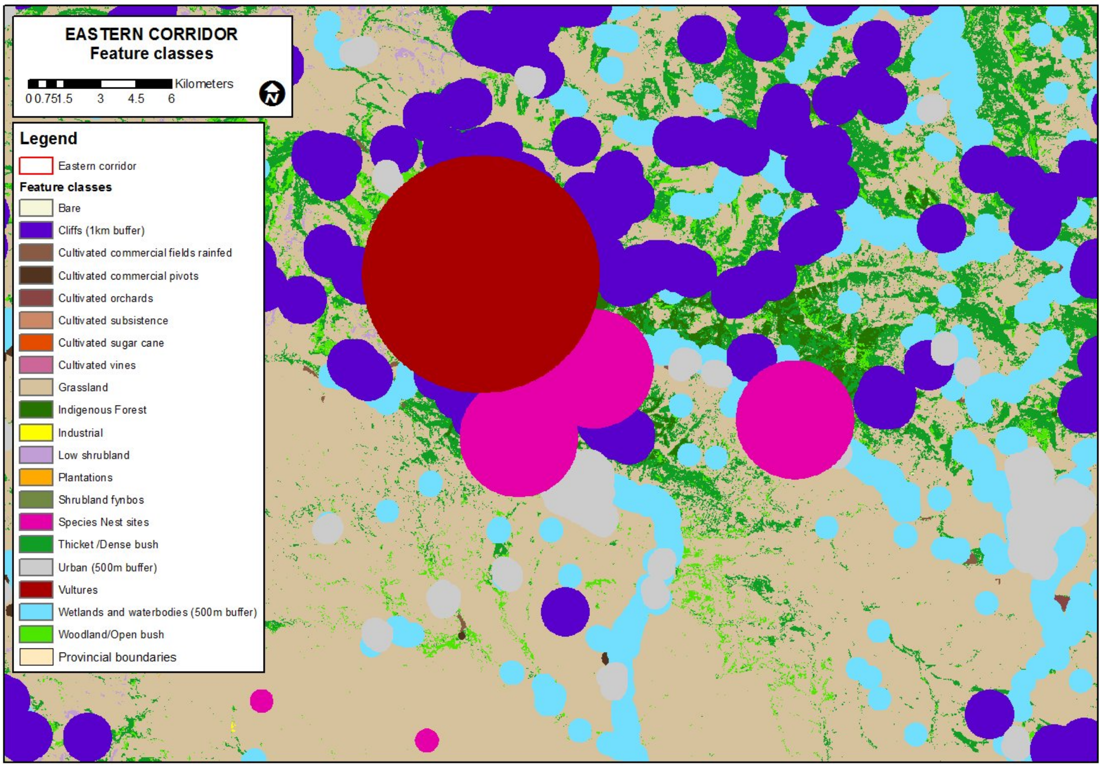
7.2.4 Central Corridor





7.2.5 Eastern Corridor





8 FOUR- TIER SENSITIVITY MAPPING

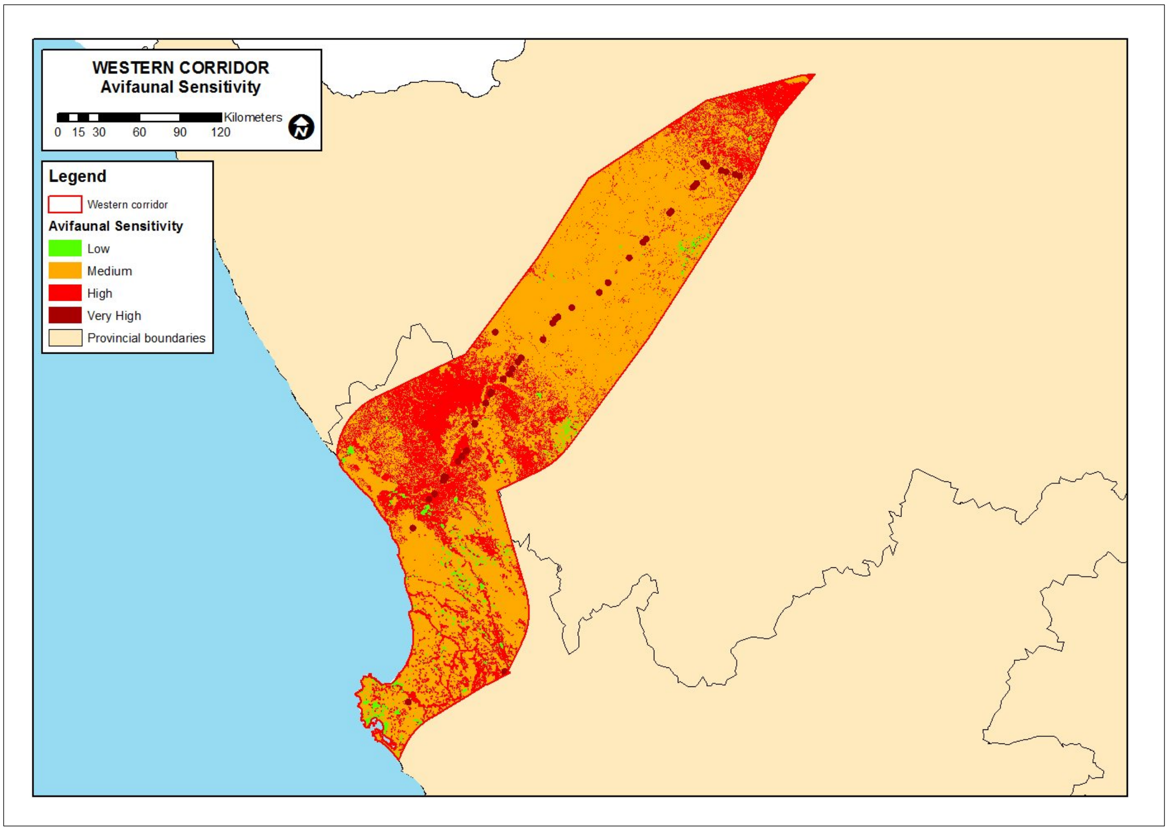
The relative sensitivity mapping follows a four tier sensitivity classes approach with

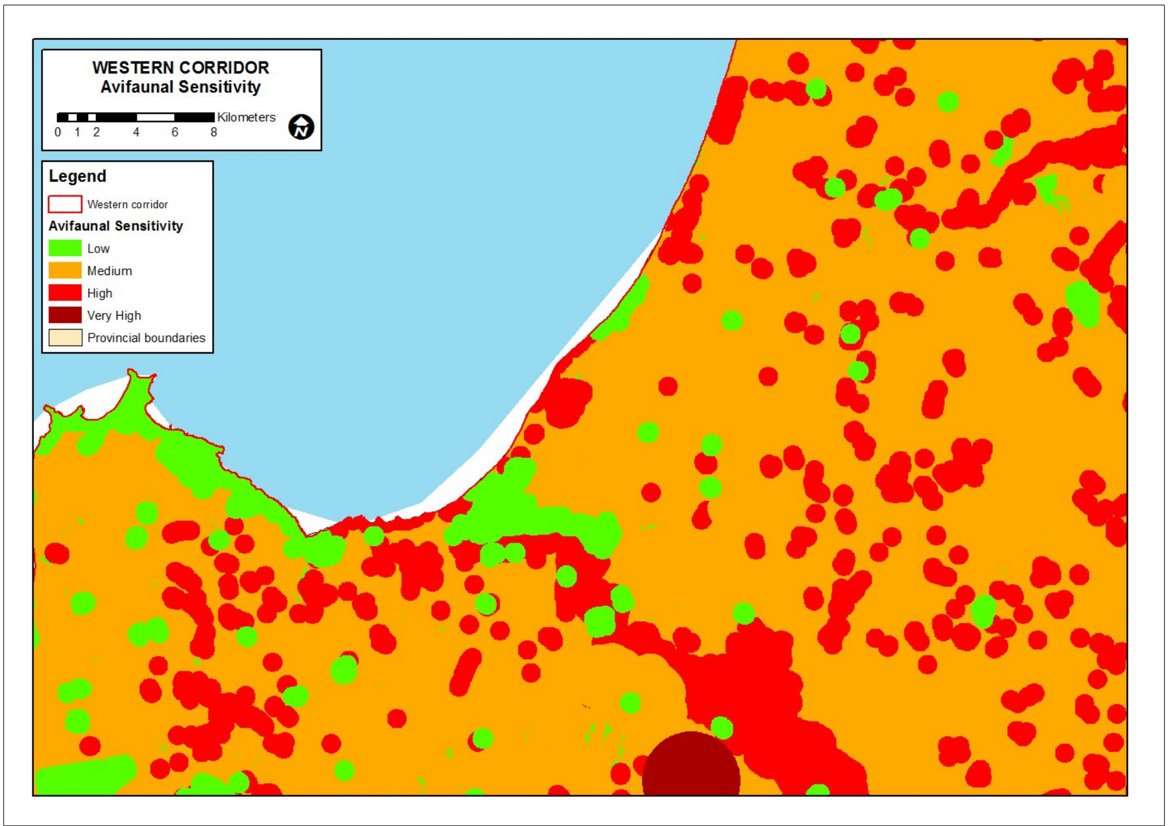
- Dark Red (RGB 168, 0, 0): Very High Sensitivity
- Red (RGB 255, 0, 0): High Sensitivity,
- Orange (RGB 255, 170, 0): Medium Sensitivity
- Green (RGB 85, 255, 0): Low Sensitivity

8.1 Four Tier sensitivity maps

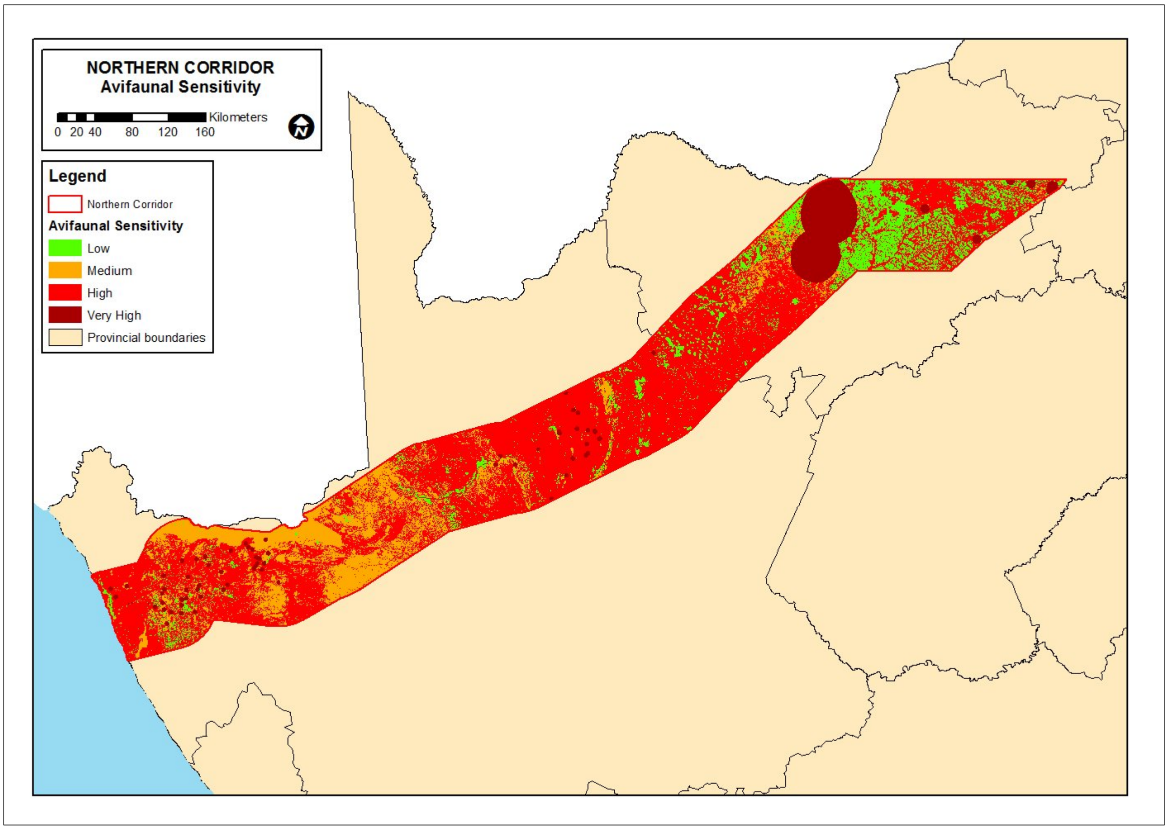
Two sets of maps are provided for each corridor. The first map provides an overview of the whole corridor, and the second map is a high resolution snapshot of a portion of the map to indicate the level of detail.

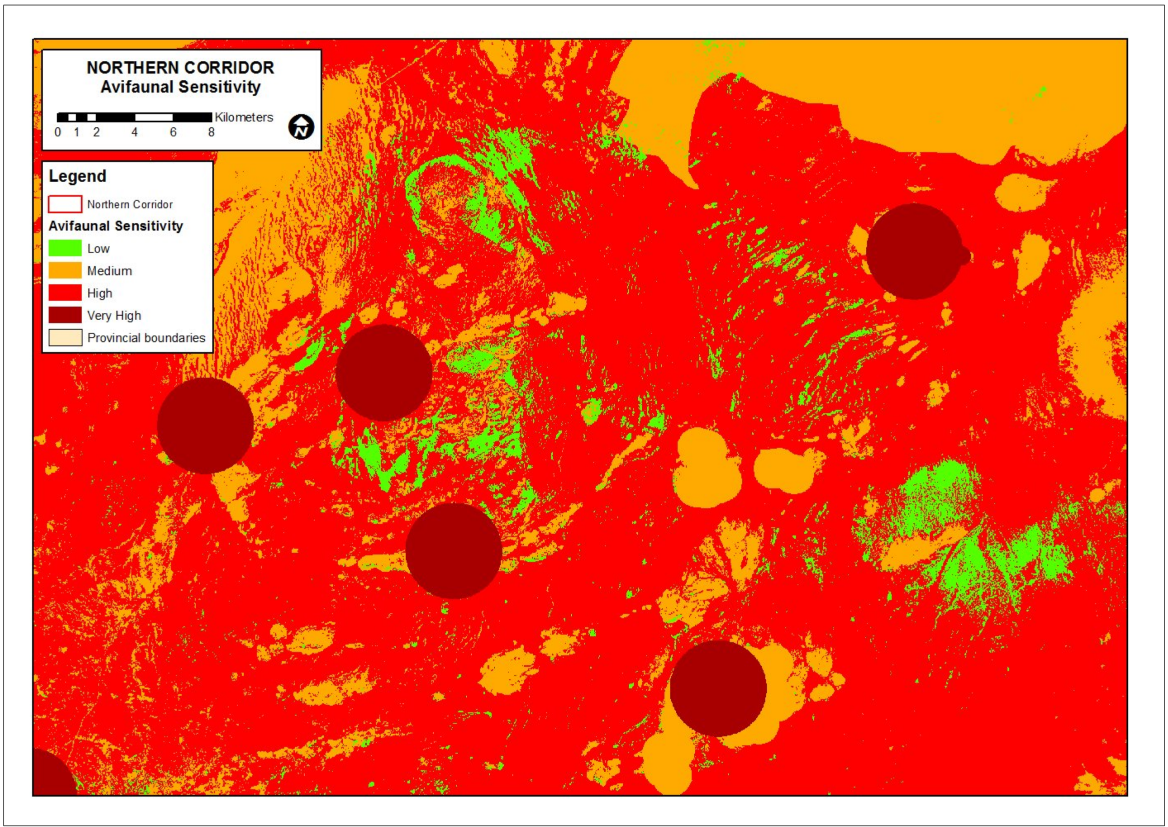
8.1.1 Western Corridor



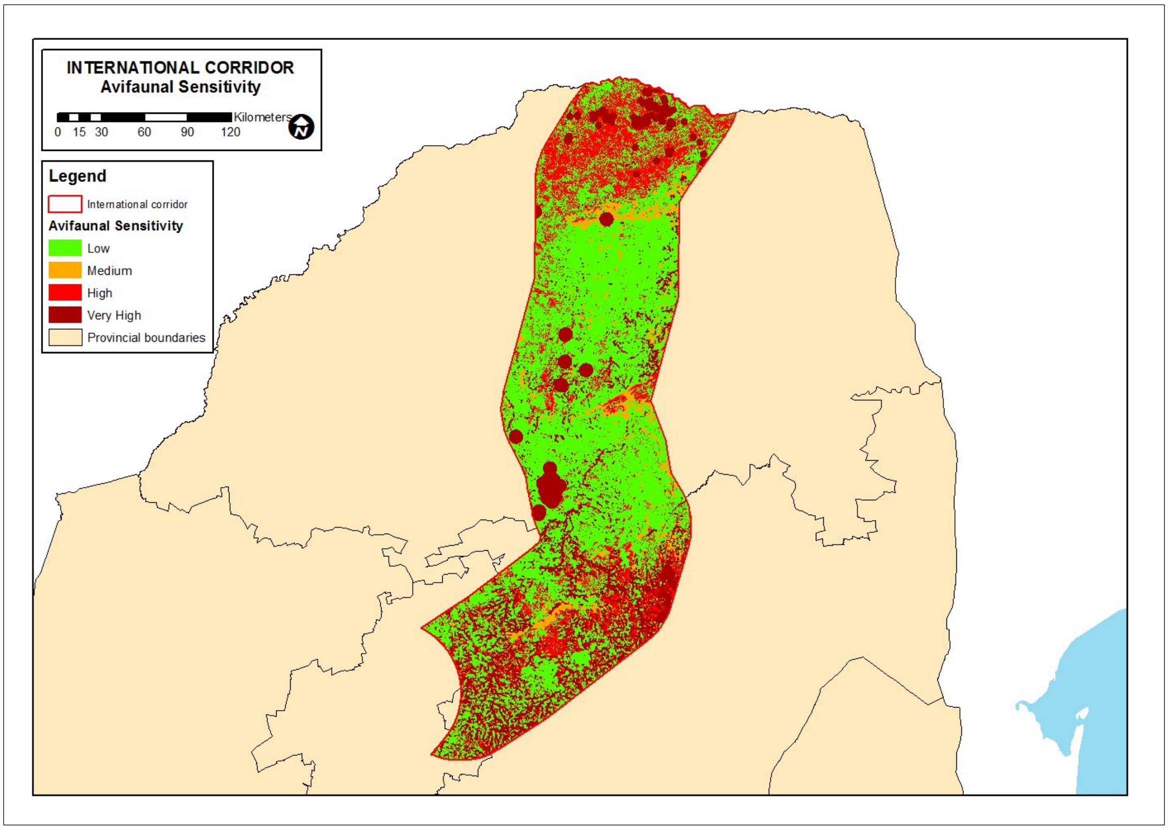


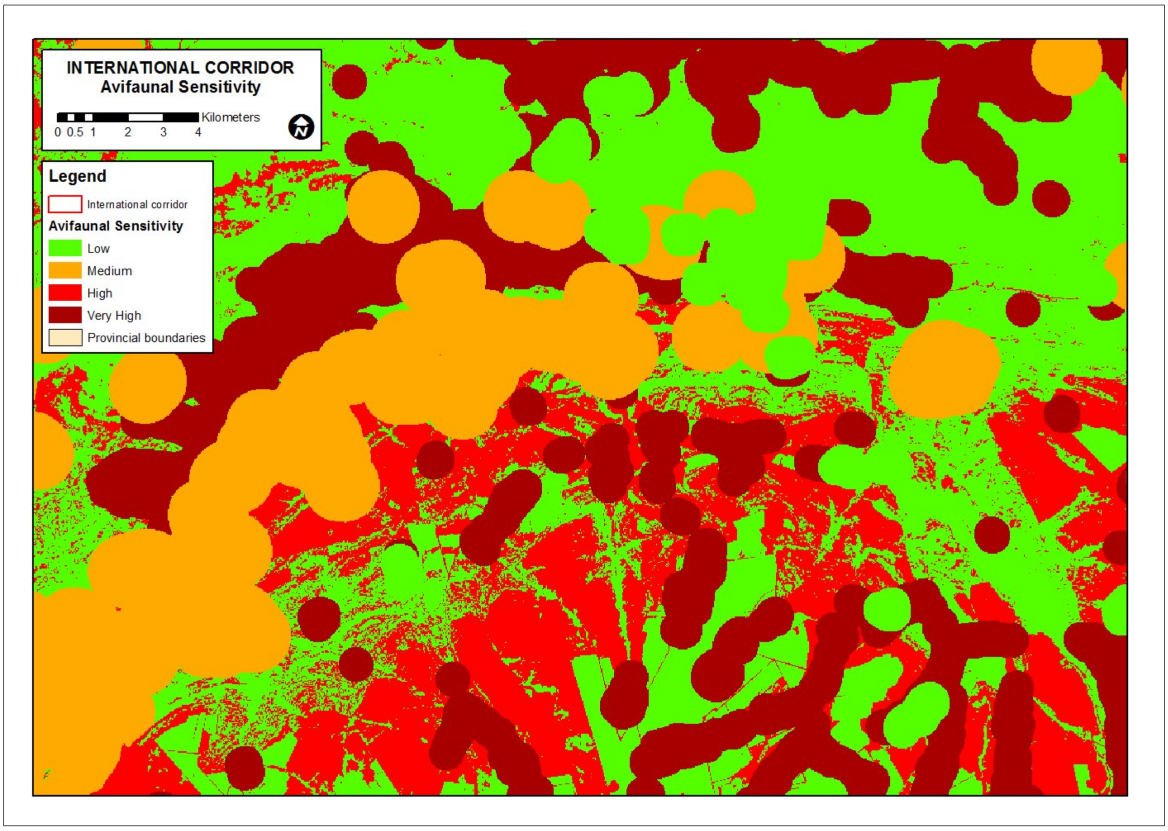
8.1.2 Northern Corridor



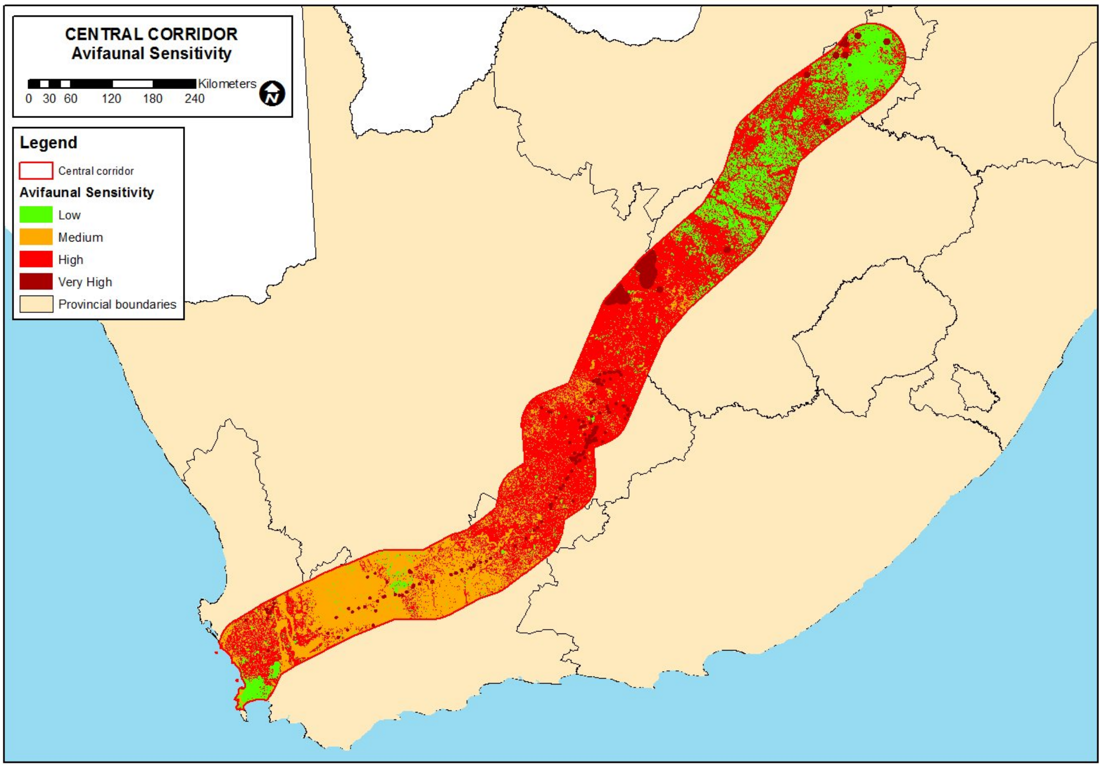


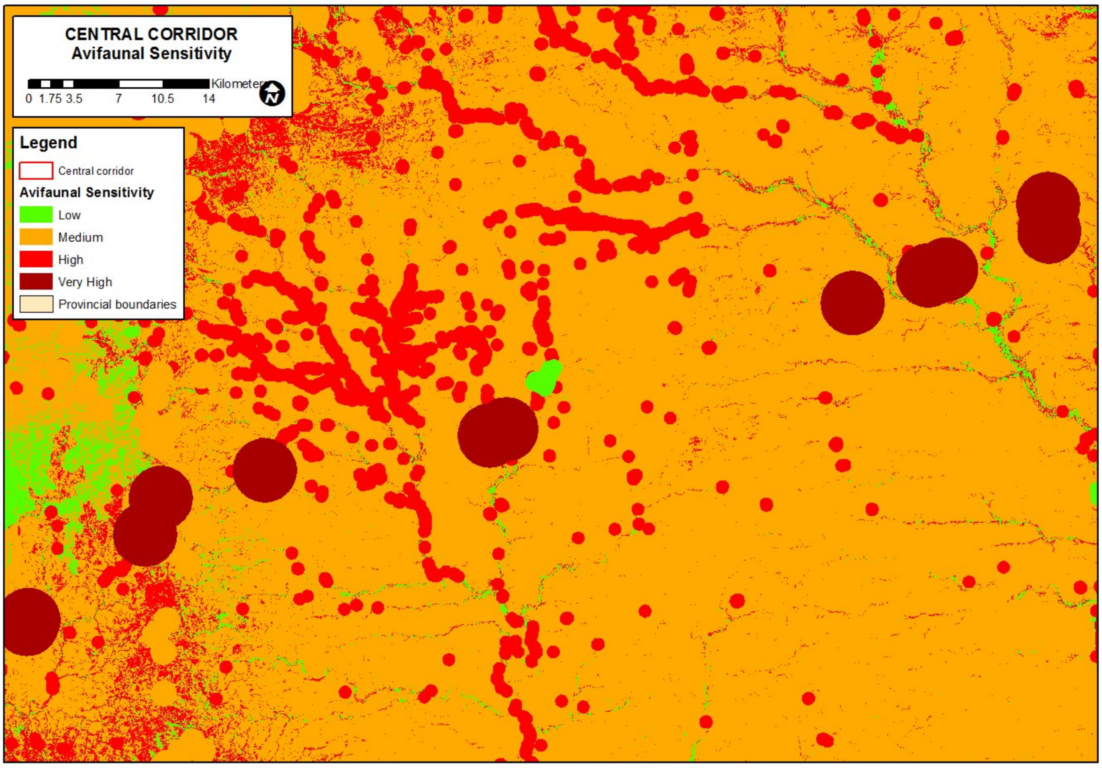
8.1.3 International Corridor



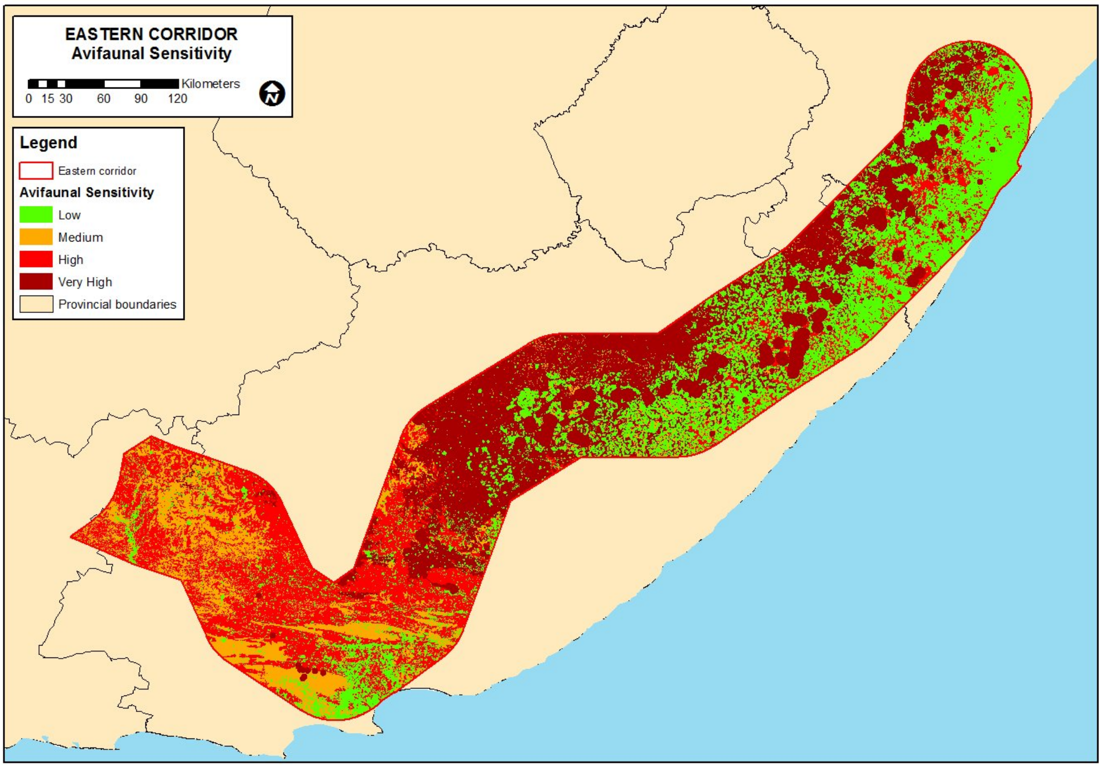


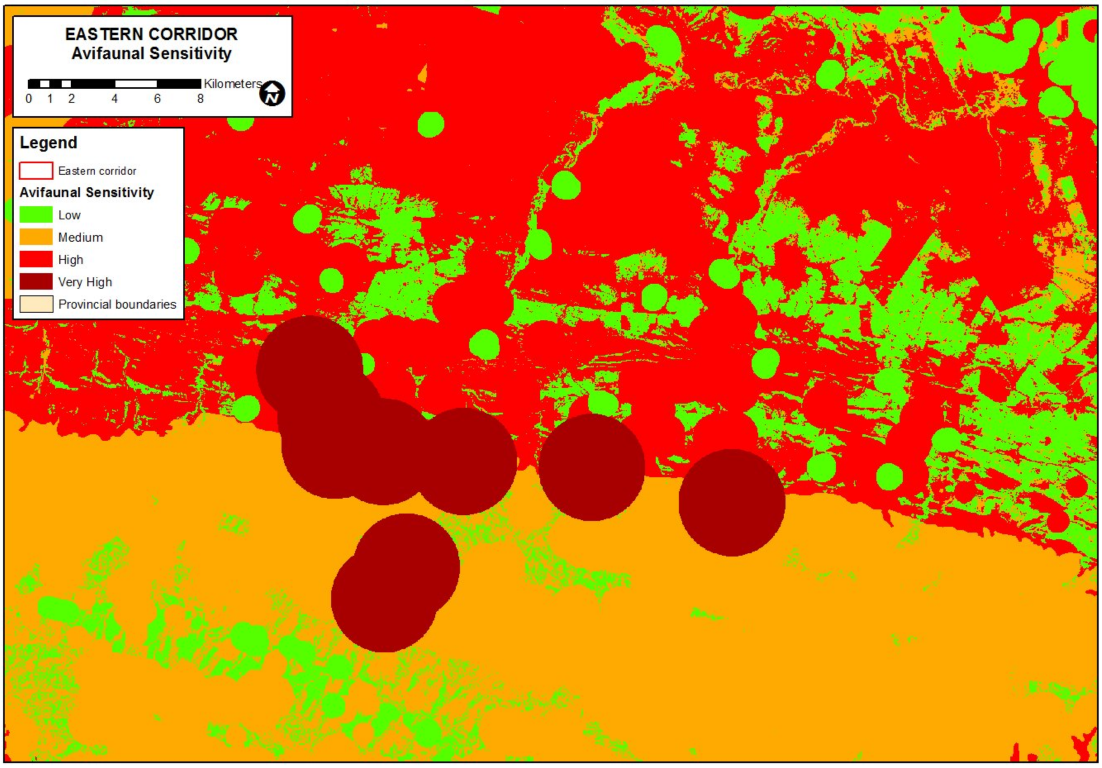
8.1.4 Central Corridor





8.1.5 Eastern Corridor





9 INTERPRETATION AND IMPLEMENTATION OF SENSITIVITY MAPS

9.1 Interpretation and implementation of the four tier map

Sensitivity Class	Sensitivity Class	Interpretation	Implementation and additional assessments at project level	Permit requirements (if any)
Very High	*Dark Red*	*Very High sensitivity areas known to support important populations of threatened, impact susceptible species. Potentially unsuited to development owing to their high avifaunal importance*	*Development in these areas is discouraged. The onus is on any would-be developer to provide sound, empirical evidence of effective mitigation in spite of the impact sensitivities identified. Qualitative and quantitative field surveys should be conducted, and should include sample counts representative of high risk environmental conditions likely to occur on each site. If need be, additional research by a suitably experienced avifaunal specialist is required to obtain a sufficient understanding of the avifaunal impacts and potential effectiveness of the proposed mitigation measures.*	*BLSA and the Endangered Wildlife Trust should be notified of any development proposals.*
High	*Red*	*High sensitivity areas likely to support important populations of threatened, impact susceptible species. Potentially unsuited for development unless sensitivities are fully investigated and impacts can be sufficiently mitigated.*	*Development in these areas may take place, provided sound, empirical evidence of effective mitigation is provided. Qualitative field surveys by a suitably experienced avifaunal specialist are required to obtain a sufficient understanding of the avifaunal impacts and potential effectiveness of the proposed mitigation measures.*	*BLSA and the Endangered Wildlife Trust should be notified of any development proposals.*
Medium	*Orange*	*Medium sensitivity areas that could*	*Development in these areas may take place,*	*If the development overlaps with an IBA,*

Sensitivity Class	Sensitivity Class	Interpretation	Implementation and additional assessments at project level	Permit requirements (if any)
		support important populations of threatened, impact susceptible species. Possibly suitable for development, but potential sensitivities must be fully investigated and effective mitigation options clearly identified.	*provided sound, empirical evidence of effective mitigation is provided. Limited, qualitative field surveys by a suitably experienced avifaunal specialist may be required to obtain a sufficient understanding of the avifaunal impacts and potential effectiveness of the proposed mitigation measures. In the case of a substation development, field surveys will not be required unless the desk top assessment indicate the need for an on-site survey.*	*BLSA and the Endangered Wildlife Trust should be notified of any development proposals.*
Low	*Green*	*Lower sensitivity areas that probably don't support important populations of threatened, impact susceptible species. Probably suitable for development, with no anticipated unsustainable impacts on birds.*	*Development in these areas may take place. A desk-top level assessment by a suitably experienced avifaunal specialist is required. Additional, qualitative field surveys will only be required if specific avifaunal sensitivities are identified by the desk-top study.*	*If the development overlaps with an IBA, BLSA and the Endangered Wildlife Trust should be notified of any development proposals.*

In the table below the key impacts and proposed mitigation are set out. The individual species ratings are available on request.

Corridor	Key Impacts	Site Specific Descriptions	Possible Effect	Mitigation
Western Corridor	• *Mortality of power line sensitive Red Data species through collisions* • *Mortality of power line sensitive Red Data species through*	*Greater Flamingo collisions at waterbodies.*	*Multiple casualties could destabilise the population.*	*Avoid routing power lines within 500m of waterbodies found to be suitable for the species, and if unavoidable, mark power lines at waterbodies with nocturnal light emitting diode (LED) mitigation*

Corridor	Key Impacts	Site Specific Descriptions	Possible Effect	Mitigation
	electrocutions • *Displacement of Red Data species*			*devices.*
		Kori Bustard collisions in the Nama and Succulent Karoo.	*Multiple casualties could destabilise the population and result in a negative population growth (Shaw 2013)[65].*	*Mark power lines with Bird Flight Diverters.*
		Black Stork collisions and displacement at waterbodies, drainage lines and cliffs.	*Multiple casualties could destabilise the population.*	*Avoid routing power lines within 500m of waterbodies found to be suitable for the species, and if unavoidable, mark power lines at waterbodies and across drainage lines with Bird Flight Diverters. Search suitable cliffs for nest sites and buffer nests by 2.5km. Should the full extent of the buffering not be practically possible it would require management of the potential impacts on the breeding birds once construction commences, which would necessitate the involvement of the avifaunal specialist and the Environmental Control Officer. An effective communication strategy should be implemented whereby the avifaunal specialist is provided with a construction schedule which will enable him/her to ascertain, if, when and where breeding birds could be impacted by the construction activities. This could then be addressed through the timing of construction activities during critical*

[65] Shaw, J.M. 2013. Power line collisions in the Karoo: Conserving Ludwig's Bustard. Unpublished PhD thesis. Percy FitzPatrick Institute of African Ornithology, Department of Biological Sciences, Faculty of Science University of Cape Town May 2013.

Corridor	Key Impacts	Site Specific Descriptions	Possible Effect	Mitigation
				periods of the breeding cycle.
		Blue Crane collisions at cultivated commercial fields and waterbodies.	*Multiple casualties could destabilise the population and result in a negative population growth (Shaw et.al 2010)*[66]	*Avoid routing power lines within 500m of waterbodies found to be suitable for the species, and if unavoidable, mark power lines at waterbodies with nocturnal light emitting diode (LED) mitigation devices. Buffer all nests by 2.5km. Should the full extent of the buffering not be practically possible it would require management of the potential impacts on the breeding birds once construction commences, which would necessitate the involvement of the avifaunal specialist and the Environmental Control Officer. An effective communication strategy should be implemented whereby the avifaunal specialist is provided with a construction schedule which will enable him/her to ascertain if, when and where breeding birds could be impacted by the construction activities. This could then be addressed through the timing of construction activities during critical periods of the breeding cycle.*
		Great White Pelican collisions at waterbodies in the Fynbos biome.	*Multiple casualties could destabilise the population.*	*Avoid routing power lines within 500m of waterbodies found to be suitable for the species, and if unavoidable, mark power lines at waterbodies with Bird Flight Diverters.*

[66] Shaw, J., Jenkins, A.R. & Ryan, P.G. 2010. Modelling power line collision risk in the Blue Crane Anthropoides paradiseus in South Africa. Ibis 152: 590-599.

Corridor	Key Impacts	Site Specific Descriptions	Possible Effect	Mitigation
		Lesser Flamingo collisions at waterbodies.	*Multiple casualties could destabilise the population.*	*Avoid routing power lines within 500m of waterbodies found to be suitable for the species, and if unavoidable, mark power lines at waterbodies with nocturnal light emitting diode (LED) mitigation devices.*
		Ludwig's Bustard collisions in the Nama and Succulent Karoo.	*Multiple casualties could destabilise the population and result in a negative population growth (Shaw 2013)[67].*	*Mark power lines with Bird Flight Diverters.*
		Martial Eagle electrocutions and displacement of breeding birds on transmission lines in the Nama and Succulent Karoo.	*Multiple casualties and disturbance of breeding birds could destabilise the population.*	*Use only bird-friendly power line designs. Investigate all suitable transmission lines for nests and buffer by 2.5km. Should the full extent of the buffering not be practically possible it would require management of the potential impacts on the breeding birds once construction commences, which would necessitate the involvement of the avifaunal specialist and the Environmental Control Officer. An effective communication strategy should be implemented whereby the avifaunal specialist is provided with a construction schedule which will enable him/her to ascertain if, when and where breeding birds could be impacted by the construction activities. This could then be addressed through the timing of construction*

[67] Shaw, J.M. 2013. Power line collisions in the Karoo: Conserving Ludwig's Bustard. Unpublished PhD thesis. Percy FitzPatrick Institute of African Ornithology, Department of Biological Sciences, Faculty of Science University of Cape Town May 2013.

Corridor	Key Impacts	Site Specific Descriptions	Possible Effect	Mitigation
				activities during critical periods of the breeding cycle.
		Secretarybird collisions throughout the corridor.	*Multiple casualties could destabilise the population. The species upgraded from near-threatened to vulnerable in the 2014 national Red Data list*[68]*.*	*Mark power lines with Bird Flight Diverters.*
		Verreaux's Eagle electrocutions, collisions and displacement of breeding birds at cliff sites throughout the corridor.	*Multiple casualties could destabilise the population. The species upgraded from not threatened to vulnerable in the 2014 national Red Data list*[69]*.*	*Use only bird-friendly power line designs. Investigate all suitable cliff sites for nests and buffer by 2.5km. Should the full extent of the buffering not be practically possible it would require management of the potential impacts on the breeding birds once construction commences, which would necessitate the involvement of the avifaunal specialist and the Environmental Control Officer. An effective communication strategy should be implemented whereby the avifaunal specialist is provided with a construction schedule which will enable him/her to ascertain if, when and where breeding birds could be impacted by the construction activities. This could then be addressed through the timing of construction activities during critical periods of the breeding cycle.*

[68] Taylor, M.R. (Ed.) In press. The Eskom Red Data Book of Birds of South Africa, Lesotho and Swaziland. BirdLife South Africa, Johannesburg.
[69] Ibid

Corridor	Key Impacts	Site Specific Descriptions	Possible Effect	Mitigation
		Caspian Tern collision at large waterbodies throughout the corridor.	*Multiple casualties could destabilise the population.*	*Mark power lines with Bird Flight Diverters.*
Corridor	**Key Impacts**	**Site Specific Descriptions**	**Possible Effect**	**Mitigation**
Northern Corridor	• *Mortality of power line sensitive Red Data species through collisions* • *Mortality of power line sensitive Red Data species through electrocutions* • *Displacement of Red Data species*	*Abdim's Stork collisions at cultivated commercial fields and waterbodies*	*Multiple casualties could destabilise the population.*	*Avoid routing power lines within 500m of waterbodies found to be suitable for the species, and if unavoidable, mark power lines at waterbodies with Bird Flight Diverters.*
		Black Stork collisions and displacement at waterbodies, cliffs and drainage lines, especially in the Desert Biome.	*Multiple casualties could destabilise the population.*	*Avoid routing power lines within 500m of waterbodies found to be suitable for the species, and if unavoidable, mark power lines at waterbodies and across drainage lines with Bird Flight Diverters. Search suitable cliffs for nest sites and buffer nests by 2.5km. Should the full extent of the buffering not be practically possible it would require management of the potential impacts on the breeding birds once construction commences, which would necessitate the involvement of the avifaunal specialist and the Environmental Control Officer. An effective communication strategy should be implemented whereby the avifaunal specialist is provided with a construction schedule which will enable him/her to ascertain, if, when and where breeding birds could be impacted by the construction activities. This could then be addressed through the timing of construction activities during critical periods of the breeding*

Corridor	Key Impacts	Site Specific Descriptions	Possible Effect	Mitigation
				cycle.
		Cape Vulture electrocutions in Grassland and Savanna and disturbance at breeding colonies and roosts in the Magaliesberg. Collisions and electrocutions at vulture restaurants.	*Multiple casualties and disturbance of breeding birds could destabilise the population and lead to population decline.*	*Use only bird-friendly designs. Buffer breeding colonies and vulture restaurants by 5km. Should the full extent of the buffering at vulture restaurants and breeding colonies not be practically possible, the areas must be thoroughly investigated by an avifaunal specialist and those power lines that could pose a collision threat to vultures must be identified and marked with Bird Flight Diverters. In addition it would require management of the potential impacts on the breeding birds once construction commences, which would necessitate the involvement of the avifaunal specialist and the Environmental Control Officer. An effective communication strategy should be implemented whereby the avifaunal specialist is provided with a construction schedule which will enable him/her to ascertain if, when and where breeding birds could be impacted by the construction activities. This could then be addressed through the timing of construction activities during critical periods of the breeding cycle.*
		Great White Pelican collisions at waterbodies in the Succulent Karoo.	*Multiple casualties could destabilise the population.*	*Avoid routing power lines within 500m of waterbodies found to be suitable for the species, and if unavoidable, mark power lines at waterbodies with Bird Flight Diverters.*
		Greater Flamingo	*Multiple*	*Avoid routing power lines*

Corridor	Key Impacts	Site Specific Descriptions	Possible Effect	Mitigation
		collisions at waterbodies in Savanna and Succulent Karoo.	*casualties could destabilise the population.*	*within 500m of waterbodies found to be suitable for the species, and if unavoidable, mark power lines at waterbodies with nocturnal light emitting diode (LED) mitigation devices.*
		Kori Bustard collisions throughout the corridor	*Multiple casualties could destabilise the population and result in a negative population growth (Shaw 2013)[70].*	*Mark power lines with Bird Flight Diverters.*
		Lesser Flamingo collision at waterbodies.	*Multiple casualties could destabilise the population.*	*Avoid routing power lines within 500m of waterbodies found to be suitable for the species, and if unavoidable, mark power lines at waterbodies with nocturnal light emitting diode (LED) mitigation devices.*
		Ludwig's Bustard collisions in the Nama Karoo, Succulent Karoo and Desert Biome.	*Multiple casualties could destabilise the population and result in a negative population growth (Shaw 2013)[71].*	*Mark power lines with Bird Flight Diverters.*
		Martial Eagle electrocutions throughout the corridor and displacement of breeding birds on transmission lines.	*Multiple casualties and disturbance of breeding birds could destabilise the population.*	*Use only bird-friendly power line designs. Investigate all suitable transmission lines for nests and buffer by 2.5km. Should the full extent of the buffering not be practically possible it would require management of the potential impacts on the breeding birds once*

[70] Shaw, J.M. 2013. Power line collisions in the Karoo: Conserving Ludwig's Bustard. Unpublished PhD thesis. Percy FitzPatrick Institute of African Ornithology, Department of Biological Sciences, Faculty of Science University of Cape Town May 2013.
[71] Ibid.

Corridor	Key Impacts	Site Specific Descriptions	Possible Effect	Mitigation
				construction commences, which would necessitate the involvement of the avifaunal specialist and the Environmental Control Officer. An effective communication strategy should be implemented whereby the avifaunal specialist is provided with a construction schedule which will enable him/her to ascertain if, when and where breeding birds could be impacted by the construction activities. This could then be addressed through the timing of construction activities during critical periods of the breeding cycle.
		Pink-backed Pelican collisions at waterbodies in Grassland and Savanna.	*Multiple casualties could destabilise the population.*	*Avoid routing power lines within 500m of waterbodies found to be suitable for the species, and if unavoidable, mark power lines at waterbodies with Bird Flight Diverters.*
		Secretarybird collisions throughout the corridor.	*Multiple casualties could destabilise the population. The species upgraded from near-threatened to vulnerable in the 2014 national Red Data list[72].*	*Mark power lines with Bird Flight Diverters.*
		Tawny Eagle electrocutions in the Nama and Succulent Karoo. Displacement of breeding birds in Savanna.	*Multiple casualties and disturbance could destabilise the population.*	*Use only bird-friendly power line designs. Buffer all nests by 2.5km. Should the full extent of the buffering not be practically possible it would require management of the potential impacts on the breeding birds once*

72 Taylor, M.R. (Ed.) In press. The Eskom Red Data Book of Birds of South Africa, Lesotho and Swaziland. BirdLife South Africa, Johannesburg.

Corridor	Key Impacts	Site Specific Descriptions	Possible Effect	Mitigation
				construction commences, which would necessitate the involvement of the avifaunal specialist and the Environmental Control Officer. An effective communication strategy should be implemented whereby the avifaunal specialist is provided with a construction schedule which will enable him/her to ascertain if, when and where breeding birds could be impacted by the construction activities. This could then be addressed through the timing of construction activities during critical periods of the breeding cycle.
		Verreaux's Eagle electrocutions, collisions and displacement of breeding birds at cliff sites.	*Multiple casualties could destabilise the population. The species upgraded from not threatened to vulnerable in the 2014 national Red Data list[73].*	*Use only bird-friendly power line designs. Investigate all suitable cliff sites for nests and buffer by 2.5km. Should the full extent of the buffering not be practically possible it would require management of the potential impacts on the breeding birds once construction commences, which would necessitate the involvement of the avifaunal specialist and the Environmental Control Officer. An effective communication strategy should be implemented whereby the avifaunal specialist is provided with a construction schedule which will enable him/her to ascertain if, when and where breeding birds could be impacted by the construction activities.*

[73] Ibid

Corridor	Key Impacts	Site Specific Descriptions	Possible Effect	Mitigation
				This could then be addressed through the timing of construction activities during critical periods of the breeding cycle.
		White-backed Vulture electrocutions in Savanna, Nama Karoo and Grassland and displacement of breeding birds in the vicinity of Mahikeng. Collisions and electrocutions at vulture restaurants.	*Multiple casualties and disturbance of breeding birds could destabilise the population and lead to population decline*[74].	*Use only bird-friendly power line designs. Buffer all nests and vulture restaurants by 5km. Should the full extent of the buffering at vulture restaurants and breeding colonies not be practically possible, the areas must be thoroughly investigated by an avifaunal specialist and those power lines that could pose a collision threat to vultures must be identified and marked with Bird Flight Diverters. In addition it would require management of the potential impacts on the breeding birds once construction commences, which would necessitate the involvement of the avifaunal specialist and the Environmental Control Officer. An effective communication strategy should be implemented whereby the avifaunal specialist is provided with a construction schedule which will enable him/her to ascertain if, when and where breeding birds could be impacted by the construction activities. This could then be addressed through the timing of construction activities during critical periods of the breeding cycle.*
		Yellow-billed Stork	*Multiple*	*Avoid routing power lines*

[74] BirdLife International (2015) Species factsheet: *Gyps africanus*. Downloaded from http://www.birdlife.org on 12/06/2015.

Corridor	Key Impacts	Site Specific Descriptions	Possible Effect	Mitigation
		collisions at waterbodies in the Nama Karoo and Savanna.	*casualties could destabilise the population. The species was upgraded to Endangered in 2014*[75]*.*	*within 500m of waterbodies found to be suitable for the species, and if unavoidable, mark power lines at waterbodies with Bird Flight Diverters.*
Corridor	**Key Impacts**	**Site Specific Descriptions**	**Possible Effect**	**Mitigation**
International Corridor	• *Mortality of power line sensitive Red Data species through collisions* • *Mortality of power line sensitive Red Data species through electrocutions* • *Displacement of Red Data species*	*African Grass-Owl collisions at wetlands in Grassland.*	*Multiple casualties could destabilise the population.*	*Avoid routing power lines within 500m of waterbodies found to be suitable for the species, and if unavoidable, mark power lines at waterbodies with nocturnal light emitting diode (LED) mitigation devices.*
		Blue Crane collisions at wetlands in Grassland. Displacement of breeding birds in Grassland.	*Multiple casualties could destabilise the population.*	*Avoid routing power lines within 500m of waterbodies found to be suitable for the species, and if unavoidable, mark power lines at waterbodies with nocturnal light emitting diode (LED) mitigation devices. Buffer all nests by 2.5km. Should the full extent of the buffering not be practically possible it would require management of the potential impacts on the breeding birds once construction commences, which would necessitate the involvement of the avifaunal specialist and the Environmental Control Officer. An effective communication strategy should be implemented whereby the avifaunal specialist is provided with a construction schedule which will enable him/her to ascertain if, when and where breeding birds*

[75] Taylor, M.R. (Ed.) In press. The Eskom Red Data Book of Birds of South Africa, Lesotho and Swaziland. BirdLife South Africa, Johannesburg.

Corridor	Key Impacts	Site Specific Descriptions	Possible Effect	Mitigation
				could be impacted by the construction activities. This could then be addressed through the timing of construction activities during critical periods of the breeding cycle.
		Cape Vulture electrocutions in Grassland and Savanna and disturbance at breeding colonies and roosts in the Soutpansberg. Collisions and electrocutions at vulture restaurants.	*Multiple casualties and disturbance of breeding birds could destabilise the population and lead to population decline.*	*Use only bird-friendly designs. Buffer breeding colonies and vulture restaurants by 5km. Should the full extent of the buffering at vulture restaurants and breeding colonies not be practically possible, the areas must be thoroughly investigated by an avifaunal specialist and those power lines that could pose a collision threat to vultures must be identified and marked with Bird Flight Diverters. In addition it would require management of the potential impacts on the breeding birds once construction commences, which would necessitate the involvement of the avifaunal specialist and the Environmental Control Officer. An effective communication strategy should be implemented whereby the avifaunal specialist is provided with a construction schedule which will enable him/her to ascertain if, when and where breeding birds could be impacted by the construction activities. This could then be addressed through the timing of construction activities during critical periods of the breeding cycle.*
		Greater Flamingo collisions at	*Multiple casualties could*	*Avoid routing power lines within 500m of*

Corridor	Key Impacts	Site Specific Descriptions	Possible Effect	Mitigation
		waterbodies in Savanna and Grassland.	*destabilise the population.*	*waterbodies found to be suitable for the species, and if unavoidable, mark power lines at waterbodies with nocturnal light emitting diode (LED) mitigation devices.*
		Grey Crowned Crane collisions at wetlands in Grassland. Displacement of breeding birds in Grassland.	*Multiple casualties could destabilise the population.*	*Avoid routing power lines within 500m of waterbodies found to be suitable for the species, and if unavoidable, mark power lines at waterbodies with nocturnal light emitting diode (LED) mitigation devices. Buffer all nests by 2.5km. Should the full extent of the buffering not be practically possible it would require management of the potential impacts on the breeding birds once construction commences, which would necessitate the involvement of the avifaunal specialist and the Environmental Control Officer. An effective communication strategy should be implemented whereby the avifaunal specialist is provided with a construction schedule which will enable him/her to ascertain if, when and where breeding birds could be impacted by the construction activities. This could then be addressed through the timing of construction activities during critical periods of the breeding cycle.*
		Kori Bustard collisions in grassland areas and cultivated commercial fields in Savanna.	*Multiple casualties could destabilise the population and result in a negative*	*Mark power lines with Bird Flight Diverters.*

Corridor	Key Impacts	Site Specific Descriptions	Possible Effect	Mitigation
			population growth (Shaw 2013)[76].	
		Lappet-faced Vulture electrocutions at vulture restaurants, and at grassland areas and waterbodies in Savanna.	*Multiple casualties could destabilise the population and lead to population decline.*	*Use only bird-friendly designs. Buffer vulture restaurants by 5km. Should the full extent of the buffering at vulture restaurants not be practically possible, the areas must be thoroughly investigated by an avifaunal specialist and those power lines that could pose a collision threat to vultures must be identified and marked with Bird Flight Diverters.*
		Marabou Stork collisions at waterbodies in Grassland and Savanna	*Multiple casualties could destabilise the population.*	*Avoid routing power lines within 500m of waterbodies found to be suitable for the species, and if unavoidable, mark power lines at waterbodies with Bird Flight Diverters.*
		Martial Eagle electrocutions in Savanna especially at old land (grassland) and waterbodies.	*Multiple casualties could destabilise the population.*	*Use only bird-friendly power line designs.*
		Saddle-billed Stork collisions at waterbodies and drainage lines in Savanna	*Multiple casualties could destabilise the population.*	*Avoid routing power lines within 500m of waterbodies found to be suitable for the species, and if unavoidable, mark power lines at waterbodies and across drainage lines with Bird Flight Diverters.*
		Secretarybird collisions throughout the corridor in Grassland and Savanna.	*Multiple casualties could destabilise the population. The species upgraded from near-threatened to vulnerable in*	*Mark power lines with Bird Flight Diverters.*

[76] Shaw, J.M. 2013. Power line collisions in the Karoo: Conserving Ludwig's Bustard. Unpublished PhD thesis. Percy FitzPatrick Institute of African Ornithology, Department of Biological Sciences, Faculty of Science University of Cape Town May 2013.

Corridor	Key Impacts	Site Specific Descriptions	Possible Effect	Mitigation
			the 2014 national Red Data list[77]*.*	
		Southern Bald Ibis collision and displacement at cliffs in Grassland.	*Multiple casualties could destabilise the population.*	*Investigate all suitable cliff sites for nests and buffer all nests by 1km. Should the full extent of the buffering not be practically possible it would require management of the potential impacts on the breeding birds once construction commences, which would necessitate the involvement of the avifaunal specialist and the Environmental Control Officer. An effective communication strategy should be implemented whereby the avifaunal specialist is provided with a construction schedule which will enable him/her to ascertain if, when and where breeding birds could be impacted by the construction activities. This could then be addressed through the timing of construction activities during critical periods of the breeding cycle.*
		Verreaux's Eagle electrocutions, collisions and displacement of breeding birds at cliff sites.	*Multiple casualties could destabilise the population. The species upgraded from not threatened to vulnerable in the 2014 national Red Data list*[78]*.*	*Use only bird-friendly power line designs. Investigate all suitable cliff sites for nests and buffer by 2.5km. Should the full extent of the buffering not be practically possible it would require management of the potential impacts on the breeding birds once construction commences, which would necessitate the involvement of the*

77 Taylor, M.R. (Ed.) In press. The Eskom Red Data Book of Birds of South Africa, Lesotho and Swaziland. BirdLife South Africa, Johannesburg.
78 Ibid

Corridor	Key Impacts	Site Specific Descriptions	Possible Effect	Mitigation
				avifaunal specialist and the Environmental Control Officer. An effective communication strategy should be implemented whereby the avifaunal specialist is provided with a construction schedule which will enable him/her to ascertain if, when and where breeding birds could be impacted by the construction activities. This could then be addressed through the timing of construction activities during critical periods of the breeding cycle.
		Wattled Crane collisions and displacement at wetlands in Grassland.	*Multiple casualties and displacement of breeding birds could destabilise the population.*	*Avoid routing power lines within 500m of waterbodies found to be suitable for the species, and if unavoidable, mark power lines at waterbodies with nocturnal light emitting diode (LED) mitigation devices. Buffer all nests by 2.5km. Should the full extent of the buffering not be practically possible it would require management of the potential impacts on the breeding birds once construction commences, which would necessitate the involvement of the avifaunal specialist and the Environmental Control Officer. An effective communication strategy should be implemented whereby the avifaunal specialist is provided with a construction schedule which will enable him/her to ascertain if, when and where breeding birds could be impacted by the construction activities.*

Corridor	Key Impacts	Site Specific Descriptions	Possible Effect	Mitigation
				This could then be addressed through the timing of construction activities during critical periods of the breeding cycle.
		Southern Ground Hornbill collisions, electrocutions and displacement in the area north of the Soutpansberg.	*Multiple casualties could destabilise the populatio[79]n.*	*Use only bird-friendly power line designs. Buffer all nests by 2.5km. Should the full extent of the buffering not be practically possible it would require management of the potential impacts on the breeding birds once construction commences, which would necessitate the involvement of the avifaunal specialist and the Environmental Control Officer. An effective communication strategy should be implemented whereby the avifaunal specialist is provided with a construction schedule which will enable him/her to ascertain if, when and where breeding birds could be impacted by the construction activities. This could then be addressed through the timing of construction activities during critical periods of the breeding cycle.*
		White-backed Vulture electrocutions and displacement of breeding birds in the vicinity of Marble Hall. Collisions and electrocutions at vulture restaurants.	*Multiple casualties and disturbance of breeding birds could destabilise the population.*	*Use only bird-friendly power line designs. Buffer all nests and vulture restaurants by 5km. Should the full extent of buffering at vulture restaurants and breeding colonies not be practically possible, the areas must be thoroughly*

[79] Theron, N., Jansen, R.,Grobler, P. & Kotze, A.,2013, 'The home range of arecently established groupof Southern ground-hornbill (*Bucorvus leadbeateri*) in the Limpopo Valley, South Africa', Koedoe 55(1), Art. #1135, 8 pages. http://dx.doi.org/
10.4102/koedoe.v55i1.1135.

Corridor	Key Impacts	Site Specific Descriptions	Possible Effect	Mitigation
				investigated by an avifaunal specialist and those power lines that could pose a collision threat to vultures must be identified and marked with Bird Flight Diverters. In addition it would require management of the potential impacts on the breeding birds once construction commences, which would necessitate the involvement of the avifaunal specialist and the Environmental Control Officer. An effective communication strategy should be implemented whereby the avifaunal specialist is provided with a construction schedule which will enable him/her to ascertain if, when and where breeding birds could be impacted by the construction activities. This could then be addressed through the timing of construction activities during critical periods of the breeding cycle.
Corridor	**Key Impacts**	**Site Specific Descriptions**	**Possible Effect**	**Mitigation**
Central Corridor	• *Mortality of power line sensitive Red Data species through collisions* • *Mortality of power line sensitive Red Data species through electrocutions* • *Displacement of Red Data species*	*Abdim's Stork collisions at cultivated commercial pivots and waterbodies in Savanna, Grassland and Nama Karoo.*	*Multiple casualties could destabilise the population.*	*Avoid routing power lines within 500m of waterbodies found to be suitable for the species, and if unavoidable, mark power lines with Bird Flight Diverters.*
		African Marsh-Harrier collisions and displacement at wetlands in Fynbos.	*Multiple casualties and disturbance of breeding birds could destabilise the population.*	*Avoid routing power lines within 500m of waterbodies found to be suitable for the species, and if unavoidable, mark power lines with Bird Flight Diverters. Thoroughly scan for nests and buffer accordingly.*
		Black Stork collisions and displacement at	*Multiple casualties could*	*Avoid routing power lines within 500m of*

Corridor	Key Impacts	Site Specific Descriptions	Possible Effect	Mitigation
		waterbodies, cliffs and drainage lines throughout the corridor.	*destabilise the population.*	*waterbodies found to be suitable for the species, and if unavoidable, mark power lines at waterbodies and across drainage lines with Bird Flight Diverters. Search cliff areas for nest sites and buffer these by 2.5km. Should the full extent of the buffering not be practically possible it would require management of the potential impacts on the breeding birds once construction commences, which would necessitate the involvement of the avifaunal specialist and the Environmental Control Officer. An effective communication strategy should be implemented whereby the avifaunal specialist is provided with a construction schedule which will enable him/her to ascertain if, when and where breeding birds could be impacted by the construction activities. This could then be addressed through the timing of construction activities during critical periods of the breeding cycle.*
		Blue Crane collisions at cultivated commercial fields and waterbodies in the Fynbos, Nama Karoo and Succulent Karoo.	*Multiple casualties could destabilise the population and result in a negative population growth (Shaw et.al 2010)*[80]	*Avoid routing power lines within 500m of waterbodies found to be suitable for the species, and if unavoidable, mark power lines at waterbodies with nocturnal light emitting diode (LED) mitigation devices. Buffer nest sites by 2.5km. Should the buffering not be*

[80] Shaw, J., Jenkins, A.R. & Ryan, P.G. 2010. Modelling power line collision risk in the Blue Crane *Anthropoides paradiseus* in South Africa. Ibis 152: 590-599.

Corridor	Key Impacts	Site Specific Descriptions	Possible Effect	Mitigation
				practically possible it would require management of the potential impacts on the breeding birds once construction commences, which would necessitate the involvement of the avifaunal specialist and the Environmental Control Officer. An effective communication strategy should be implemented whereby the avifaunal specialist is provided with a construction schedule which will enable him/her to ascertain when and where breeding birds could be impacted by the construction activities. This could then be addressed through the timing of construction activities during critical periods of the breeding cycle.
		Cape Vulture electrocutions in Grassland and Savanna and disturbance at breeding colonies and roosts in the Magaliesberg. Collisions and electrocutions at vulture restaurants.	*Multiple casualties and disturbance of breeding birds could destabilise the population and lead to population decline.*	*Use only bird-friendly designs. Buffer breeding colonies and vulture restaurants by 5km. Should the buffering at vulture restaurants and breeding colonies not be practically possible, the areas must be thoroughly investigated by an avifaunal specialist and those power lines that could pose a collision threat to vultures must be identified and marked with Bird Flight Diverters. In addition it would require management of the potential impacts on the breeding birds once construction commences, which would necessitate the involvement of the avifaunal specialist and the Environmental Control Officer. An*

Corridor	Key Impacts	Site Specific Descriptions	Possible Effect	Mitigation
				effective communication strategy should be implemented whereby the avifaunal specialist is provided with a construction schedule which will enable him/her to ascertain when and where breeding birds could be impacted by the construction activities. This could then be addressed through the timing of construction activities during critical periods of the breeding cycle.
		Great White Pelican collisions at waterbodies in the Fynbos biome.	*Multiple casualties could destabilise the population.*	*Avoid routing power lines within 500m of waterbodies found to be suitable for the species, and if unavoidable, mark power lines at waterbodies with Bird Flight Diverters.*
		Greater Flamingo collisions at waterbodies throughout the corridor.	*Multiple casualties could destabilise the population.*	*Avoid routing power lines within 500m of waterbodies found to be suitable for the species, and if unavoidable, mark power lines at waterbodies with nocturnal light emitting diode (LED) mitigation devices.*
		Kori Bustard collisions in the Nama Karoo.	*Multiple casualties could destabilise the population and result in a negative population growth (Shaw 2013)[81].*	*Mark power lines with Bird Flight Diverters.*
		Lesser Flamingo collision at waterbodies throughout the corridor.	*Multiple casualties could destabilise the population.*	*Avoid routing power lines within 500m of waterbodies found to be suitable for the species, and if unavoidable, mark power lines at waterbodies with*

[81] Shaw, J.M. 2013. Power line collisions in the Karoo: Conserving Ludwig's Bustard. Unpublished PhD thesis. Percy FitzPatrick Institute of African Ornithology, Department of Biological Sciences, Faculty of Science University of Cape Town May 2013.

Corridor	Key Impacts	Site Specific Descriptions	Possible Effect	Mitigation
				nocturnal light emitting diode (LED) mitigation devices.
		Ludwig's Bustard collisions in the Nama Karoo, Succulent Karoo and at commercial cultivation in Fynbos.	*Multiple casualties could destabilise the population and result in a negative population growth (Shaw 2013)[82].*	*Mark power lines with Bird Flight Diverters.*
		Martial Eagle electrocutions in the Nama and Succulent Karoo and displacement of breeding birds on transmission lines.	*Multiple casualties and disturbance of breeding birds could destabilise the population.*	*Use only bird-friendly power line designs. Investigate all suitable transmission lines for nests and buffer by 2.5km. Should the full extent of the buffering not be practically possible it would require management of the potential impacts on the breeding birds once construction commences, which would necessitate the involvement of the avifaunal specialist and the Environmental Control Officer. An effective communication strategy should be implemented whereby the avifaunal specialist is provided with a construction schedule which will enable him/her to ascertain if, when and where breeding eagles could be impacted by the construction activities. This could then be addressed through the timing of construction activities during critical periods of the breeding cycle.*
		Secretarybird collisions throughout the corridor in Grassland and	*Multiple casualties could destabilise the population.*	*Mark power lines with Bird Flight Diverters.*

[82] Shaw, J.M. 2013. Power line collisions in the Karoo: Conserving Ludwig's Bustard. Unpublished PhD thesis. Percy FitzPatrick Institute of African Ornithology, Department of Biological Sciences, Faculty of Science University of Cape Town May 2013.

Corridor	Key Impacts	Site Specific Descriptions	Possible Effect	Mitigation
		Savanna.	*The species upgraded from near-threatened to vulnerable in the 2014 national Red Data list[83].*	
		Tawny Eagle electrocutions in the Nama Karoo, and displacement of breeding birds.	*Multiple casualties and disturbance could destabilise the population.*	*Use only bird-friendly power line designs. Buffer all nests by 2.5km. Should the full extent of the buffering not be practically possible it would require management of the potential impacts on the breeding birds once construction commences, which would necessitate the involvement of the avifaunal specialist and the Environmental Control Officer. An effective communication strategy should be implemented whereby the avifaunal specialist is provided with a construction schedule which will enable him/her to ascertain if, when and where breeding birds could be impacted by the construction activities. This could then be addressed through the timing of construction activities during critical periods of the breeding cycle.*
		Verreaux's Eagle electrocutions, collisions and displacement of breeding birds at cliff sites.	*Multiple casualties could destabilise the population. The species upgraded from not threatened to vulnerable in the 2014 national Red Data list[84].*	*Use only bird-friendly power line designs. Investigate all suitable cliff sites for nests and buffer by 2.5km. Should the full extent of the buffering not be practically possible it would require management of the potential impacts on the*

[83] Taylor, M.R. (Ed.) In press. The Eskom Red Data Book of Birds of South Africa, Lesotho and Swaziland. BirdLife South Africa, Johannesburg.
[84] Ibid

Corridor	Key Impacts	Site Specific Descriptions	Possible Effect	Mitigation
				breeding birds once construction commences, which would necessitate the involvement of the avifaunal specialist and the Environmental Control Officer. An effective communication strategy should be implemented whereby the avifaunal specialist is provided with a construction schedule which will enable him/her to ascertain if, when and where breeding birds could be impacted by the construction activities. This could then be addressed through the timing of construction activities during critical periods of the breeding cycle.
		White-backed Vulture electrocutions and displacement of breeding birds in the vicinity of Kimberley. Collisions and electrocutions at vulture restaurants.	*Multiple casualties and disturbance of breeding birds could destabilise the population.*	*Use only bird-friendly power line designs. Buffer all nests and vulture restaurants by 5km. Should the full extent of the buffering at nests not be practically possible it would require management of the potential impacts on the breeding birds once construction commences, which would necessitate the involvement of the avifaunal specialist and the Environmental Control Officer. An effective communication strategy should be implemented whereby the avifaunal specialist is provided with a construction schedule which will enable him/her to ascertain if, when and where breeding birds could be impacted by the construction activities. This could then be addressed through the*

Corridor	Key Impacts	Site Specific Descriptions	Possible Effect	Mitigation
				timing of construction activities during critical periods of the breeding cycle. Should the buffering at vulture restaurant not be practically possible, the areas must be thoroughly investigated by an avifaunal specialist and those power lines that could pose a collision threat to vultures must be identified and marked with Bird Flight Diverters.
		Yellow-billed Stork collisions at waterbodies in Grassland.	*Multiple casualties could destabilise the population. The species was upgraded to Endangered in 2014*[85]*.*	*Avoid routing power lines within 500m of waterbodies found to be suitable for the species, and if unavoidable, mark power lines at waterbodies Bird Flight Diverters.*
		Caspian Tern collision at large waterbodies throughout the corridor.	*Multiple casualties could destabilise the population.*	*Mark power lines with Bird Flight Diverters.*
Corridor	Key Impacts	Site Specific Descriptions	Possible Effect	Mitigation
Eastern Corridor		*African Grass-Owl collisions at wetlands in Grassland, Savannah and Indian Ocean Coastal Belt.*	*Multiple casualties could destabilise the population.*	*Avoid routing power lines within 500m of waterbodies found to be suitable for the species, and if unavoidable, mark power lines at waterbodies with nocturnal light emitting diode (LED) mitigation devices.*
		Southern Ground Hornbill collisions, electrocutions and displacement in the extreme north of the corridor	*Multiple casualties and displacement of breeding birds could destabilise the population.*[86]	*Use only bird-friendly power line designs. Buffer all nests by 2.5km. Should the full extent of the buffering not be practically possible it would require management of the*

[85] Taylor, M.R. (Ed.) In press. The Eskom Red Data Book of Birds of South Africa, Lesotho and Swaziland. BirdLife South Africa, Johannesburg.

[86] Theron, N., Jansen, R.,Grobler, P. & Kotze, A.,2013, 'The home range of arecently established groupof Southern ground-hornbill (*Bucorvus leadbeateri*) in the Limpopo Valley, South Africa', Koedoe 55(1), Art. #1135, 8 pages. http://dx.doi.org/
10.4102/koedoe.v55i1.1135.

Corridor	Key Impacts	Site Specific Descriptions	Possible Effect	Mitigation
				potential impacts on the breeding birds once construction commences, which would necessitate the involvement of the avifaunal specialist and the Environmental Control Officer. An effective communication strategy should be implemented whereby the avifaunal specialist is provided with a construction schedule which will enable him/her to ascertain if, when and where breeding birds could be impacted by the construction activities. This could then be addressed through the timing of construction activities during critical periods of the breeding cycle.
		Bearded Vulture collisions and electrocutions at vulture restaurants in the northern part of the Grassland.	*Multiple casualties could destabilise the population and lead to population decline (Krueger et.al 2013)*[87]*.*	*Use only bird-friendly power line designs. Buffer all vulture restaurants by 5km. Should the full extent of the buffering at vulture restaurant not be practically possible, the areas must be thoroughly investigated by an avifaunal specialist and those power lines that could pose a collision threat to vultures must be identified and marked with Bird Flight Diverters.*
		Black Stork collisions and displacement at waterbodies, cliffs and drainage lines throughout the corridor.	*Multiple casualties could destabilise the population.*	*Avoid routing power lines within 500m of waterbodies found to be suitable for the species, and if unavoidable, mark power lines at waterbodies and across drainage lines with Bird Flight Diverters. Search cliff areas for nest sites*

[87] Sonja C. Krüger , David G. Allan , Andrew R. Jenkins and Arjun Amar. 2013. Trends in territory occupancy, distribution and density of the Bearded Vulture *Gypaetus barbatus meridionalis* in southern Africa Bird Conservation International, page 1 of 16. © BirdLife International, 2013 doi:10.1017/S0959270913000440.

Corridor	Key Impacts	Site Specific Descriptions	Possible Effect	Mitigation
				and buffer these by 2.5km. Should the full extent of the buffering not be practically possible it would require management of the potential impacts on the breeding birds once construction commences, which would necessitate the involvement of the avifaunal specialist and the Environmental Control Officer. An effective communication strategy should be implemented whereby the avifaunal specialist is provided with a construction schedule which will enable him/her to ascertain if, when and where breeding birds could be impacted by the construction activities. This could then be addressed through the timing of construction activities during critical periods of the breeding cycle.
		Blue Crane collisions and disturbance of breeding birds at cultivated commercial fields and waterbodies in the Albany Thicket, Fynbos, Nama Karoo, Succulent Karoo and generally in Grassland and grassland and wetland areas in Indian Ocean Coastal Belt.	*Multiple casualties could destabilise the population and result in a negative population growth (Shaw et.al 2010)*[88]	*Avoid routing power lines within 500m of waterbodies found to be suitable for the species, and if unavoidable, mark power lines at waterbodies with nocturnal light emitting diode (LED) mitigation devices. Buffer nest sites by 2.5km. Should the full extent of the buffering not be practically possible it would require management of the potential impacts on the breeding birds once construction commences, which would necessitate the involvement of the*

[88] Shaw, J., Jenkins, A.R. & Ryan, P.G. 2010. Modelling power line collision risk in the Blue Crane *Anthropoides paradiseus* in South Africa. Ibis 152: 590-599.

Corridor	Key Impacts	Site Specific Descriptions	Possible Effect	Mitigation
				avifaunal specialist and the Environmental Control Officer. An effective communication strategy should be implemented whereby the avifaunal specialist is provided with a construction schedule which will enable him/her to ascertain if, when and where breeding birds could be impacted by the construction activities. This could then be addressed through the timing of construction activities during critical periods of the breeding cycle.
		Cape Parrot displacement in indigenous forest patches in Grassland, Albany Thicket and Savanna through habitat destruction.	*Habitat destruction, especially the destruction of large yellow-wood trees (Podocarpus spp) could destabilise the population and result in a negative population growth*[89]	*No construction of power lines should take place in indigenous forest patches. Power lines should be routed around forest patches.*
		Cape Vulture electrocutions in Grassland, Savanna, Albany Thicket and Indian Ocean Coastal Belt. Disturbance at breeding colonies and roosts in the former Transkei. Collisions and electrocutions at vulture restaurants.	*Multiple casualties and disturbance of breeding birds could destabilise the population and lead to population decline*[90]*.*	*Use only bird-friendly designs. Buffer breeding colonies and vulture restaurants by 5km. Should the full extent of the buffering at vulture restaurants and breeding colonies not be practically possible, the areas must be thoroughly investigated by an avifaunal specialist and those power lines that could pose a collision threat to vultures must be identified and marked*

[89]Hockey, P. undated. http://www.fitzpatrick.uct.ac.za/pdf/Project_CapeParrot.pdf

[90] Boshoff AF, Anderson MD. 2006. Towards a conservation plan for the Cape Griffon *Gyps coprotheres*: identifying priorities for research and conservation action. Centre for African Conservation Ecology Report No. 55. Port Elizabeth: Nelson Mandela Metropolitan University.

Corridor	Key Impacts	Site Specific Descriptions	Possible Effect	Mitigation
				with Bird Flight Diverters. In addition it would require management of the potential impacts on the breeding birds once construction commences, which would necessitate the involvement of the avifaunal specialist and the Environmental Control Officer. An effective communication strategy should be implemented whereby the avifaunal specialist is provided with a construction schedule which will enable him/her to ascertain if, when and where breeding birds could be impacted by the construction activities. This could then be addressed through the timing of construction activities during critical periods of the breeding cycle.
		Denham's Bustard collisions in grassland areas throughout the corridor except in Succulent Karoo,	*Multiple casualties could destabilise the population.*	*Mark power lines with Bird Flight Diverters.*
		Great White Pelican collisions at waterbodies in the Indian Ocean Coastal Belt.	*Multiple casualties could destabilise the population.*	*Avoid routing power lines within 500m of waterbodies found to be suitable for the species, and if unavoidable, mark power lines at waterbodies Bird Flight Diverters.*
		Greater Flamingo collisions at waterbodies throughout the corridor except in the Indian Ocean Coastal Belt.	*Multiple casualties could destabilise the population.*	*Avoid routing power lines within 500m of waterbodies found to be suitable for the species, and if unavoidable, mark power lines at waterbodies with nocturnal light emitting diode (LED) mitigation devices.*
		Grey Crowned Crane collisions at wetlands	*Multiple casualties*	*Avoid routing power lines within 500m of*

Corridor	Key Impacts	Site Specific Descriptions	Possible Effect	Mitigation
		and cultivated commercial fields in Grassland and Indian Ocean Coastal Belt. Displacement of breeding birds in wetlands in Grassland and Indian Ocean Coastal Belt.	*could destabilise the population.*	*waterbodies found to be suitable for the species, and if unavoidable, mark power lines at waterbodies with nocturnal light emitting diode (LED) mitigation devices. Buffer all nests by 2.5km. Should the full extent of the buffering not be practically possible it would require management of the potential impacts on the breeding birds once construction commences, which would necessitate the involvement of the avifaunal specialist and the Environmental Control Officer. An effective communication strategy should be implemented whereby the avifaunal specialist is provided with a construction schedule which will enable him/her to ascertain if, when and where breeding birds could be impacted by the construction activities. This could then be addressed through the timing of construction activities during critical periods of the breeding cycle.*
		Kori Bustard collisions in the Nama Karoo, Succulent Karoo and Albany Thicket.	*Multiple casualties could destabilise the population and result in a negative population growth (Shaw 2013)[91].*	*Mark power lines with Bird Flight Diverters.*
		Lesser Flamingo collisions at waterbodies throughout the	*Multiple casualties could destabilise the population.*	*Avoid routing power lines within 500m of waterbodies found to be suitable for the species,*

[91] Shaw, J.M. 2013. Power line collisions in the Karoo: Conserving Ludwig's Bustard. Unpublished PhD thesis. Percy FitzPatrick Institute of African Ornithology, Department of Biological Sciences, Faculty of Science University of Cape Town May 2013.

Corridor	Key Impacts	Site Specific Descriptions	Possible Effect	Mitigation
		corridor except in the Indian Ocean Coastal Belt.		*and if unavoidable, mark power lines at waterbodies with nocturnal light emitting diode (LED) mitigation devices.*
		Ludwig's Bustard collisions in the Nama Karoo, Succulent Karoo and at commercial cultivation, grassland and bare areas in Fynbos and Albany Thicket.	*Multiple casualties could destabilise the population and result in a negative population growth (Shaw 2013)[92].*	*Mark power lines with Bird Flight Diverters.*
		Martial Eagle electrocutions and displacement of breeding birds on transmission lines in the Nama and Succulent Karoo.	*Multiple casualties and disturbance of breeding birds could destabilise the population.*	*Use only bird-friendly power line designs. Investigate all suitable transmission lines for nests and buffer by 2.5km. Should the full extent of the buffering not be practically possible it would require management of the potential impacts on the breeding birds once construction commences, which would necessitate the involvement of the avifaunal specialist and the Environmental Control Officer. An effective communication strategy should be implemented whereby the avifaunal specialist is provided with a construction schedule which will enable him/her to ascertain if, when and where breeding eagles could be impacted by the construction activities. This could then be addressed through the timing of construction activities during critical periods of the breeding cycle.*
		Pink-backed Pelican	*Multiple*	*Avoid routing power lines*

[92] Ibid.

Corridor	Key Impacts	Site Specific Descriptions	Possible Effect	Mitigation
		collisions at waterbodies in the Indian Ocean Coastal Belt.	*casualties could destabilise the population.*	*within 500m of waterbodies found to be suitable for the species, and if unavoidable, mark power lines at waterbodies Bird Flight Diverters.*
		Secretarybird collisions throughout the corridor except Indian Ocean Coastal Belt.	*Multiple casualties could destabilise the population. The species upgraded from near-threatened to vulnerable in the 2014 national Red Data list*[93]*.*	*Mark power lines with Bird Flight Diverters.*
		Verreaux's Eagle electrocutions, collisions and displacement of breeding birds at cliff sites.	*Multiple casualties could destabilise the population. The species upgraded from not threatened to vulnerable in the 2014 national Red Data list*[94]*.*	*Use only bird-friendly power line designs. Investigate all suitable cliff sites for nests and buffer by 2.5km. Should the full extent of the buffering not be practically possible it would require management of the potential impacts on the breeding birds once construction commences, which would necessitate the involvement of the avifaunal specialist and the Environmental Control Officer. An effective communication strategy should be implemented whereby the avifaunal specialist is provided with a construction schedule which will enable him/her to ascertain if, when and where breeding birds could be impacted by the construction activities. This could then be addressed through the timing of construction activities during critical*

[93] Taylor, M.R. (Ed.) In press. The Eskom Red Data Book of Birds of South Africa, Lesotho and Swaziland. BirdLife South Africa, Johannesburg.
[94] Ibid

Corridor	Key Impacts	Site Specific Descriptions	Possible Effect	Mitigation
				periods of the breeding cycle.
		Wattled Crane collisions and displacement at wetlands in Grassland in KwaZulu-Natal.	*Multiple casualties could destabilise the population.*	*Avoid routing power lines within 500m of waterbodies found to be suitable for the species, and if unavoidable, mark power lines at waterbodies with nocturnal light emitting diode (LED) mitigation devices. Buffer all nests by 2.5km. Should the full extent of the buffering not be practically possible it would require management of the potential impacts on the breeding birds once construction commences, which would necessitate the involvement of the avifaunal specialist and the Environmental Control Officer. An effective communication strategy should be implemented whereby the avifaunal specialist is provided with a construction schedule which will enable him/her to ascertain if, when and where breeding birds could be impacted by the construction activities. This could then be addressed through the timing of construction activities during critical periods of the breeding cycle.*
		Southern Bald Ibis collision and displacement at cliffs in Grassland.	*Multiple casualties*	*Investigate all suitable cliff sites for nests and buffer all nests by 1km. Should the full extent of the buffering not be practically possible it would require management of the potential impacts on the breeding birds once construction commences, which would necessitate*

Corridor	Key Impacts	Site Specific Descriptions	Possible Effect	Mitigation
				the involvement of the avifaunal specialist and the Environmental Control Officer. An effective communication strategy should be implemented whereby the avifaunal specialist is provided with a construction schedule which will enable him/her to ascertain if, when and where breeding birds could be impacted by the construction activities. This could then be addressed through the timing of construction activities during critical periods of the breeding cycle.
		Blue Swallow displacement due to habitat destruction in the KwaZulu – Natal mistbelt in the Grassland biome.	*Habitat destruction, especially the destruction of suitable nest holes could destabilise the population and contribute to the negative population growth*[95]	*Buffer all known Blue Swallow breeding habitat by 2.5km. Should the full extent of the buffering not be practically possible, a thorough investigation must be conducted by a suitably experienced avifaunal specialist with experience of Blue Swallows to identify any potential nesting holes, which must then be appropriately buffered, in consultation with EKZN Wildlife and BLSA to prevent destruction of the nest holes.*

[95] Steven W. Evans and H. Bouwman.2010. Historical and current distribution, population size, and possible migration routes of the Blue Swallow *Hirundo atrocaerulea* in Africa. Bird Conservation International (2010) 20:1–15. ª BirdLife International, 2010 doi:10.1017/S0959270910000158

10 GENERAL COMMENTS & DISCUSSION

10.1 General comments

Corridor	Overall Suitability	Comment
Western Corridor	*Moderate suitability for power line infrastructure development.*	*The few Low sensitivity areas are mostly urban areas. Medium and High sensitivity areas in the corridor are mostly linked to potential collisions of large terrestrial and cliff-dwelling species, potential collisions of a range of waterbirds in drainage lines and at wetlands and waterbodies, and potential electrocutions of large raptors. Very High sensitivity features are linked to the potential disturbance of large eagles breeding on transmission lines and breeding cranes.*
Northern Corridor	*Low – moderate suitability for power line infrastructure development.*	*The Low sensitivity areas are mostly urban, subsistence and commercial agriculture, and mining areas. Medium and High sensitivity areas in the corridor are mostly linked to potential collisions of large terrestrial species, potential collisions of a range of waterbirds in drainage lines and at wetlands and waterbodies, and potential electrocutions of large raptors. Very High sensitivity features are linked to the potential disturbance of breeding large raptors and vultures and collisions and electrocutions at vulture restaurants.*
International Corridor	*Moderate – high suitability for power line infrastructure development.*	*The Low sensitivity areas are mostly urban, subsistence agriculture, open (degraded) woodland, eroded and mining areas. Medium and High sensitivity areas in the corridor are mostly linked to potential collisions of large terrestrial species (grassland and open bush areas), potential collisions of a range of waterbirds in drainage lines and at wetlands and waterbodies, and potential electrocutions of large raptors (in grassland and open bush areas in the Savanna Biome, particularly north of the Soutpansberg). Very High sensitivity features are linked to the potential disturbance of breeding vultures, cranes and Southern Ground Hornbills, and collisions and electrocutions at vulture restaurants.*
Central Corridor	*Low – moderate suitability for power line infrastructure development.*	*The Low sensitivity areas are mostly urban areas, commercial agriculture (in the north-west Free State) and bare areas in the Fynbos Biome near Sutherland. Medium and High sensitivity areas in the corridor are mostly linked to potential collisions of large terrestrial and cliff-dwelling species, potential collisions of a range of waterbirds in drainage lines and at wetlands and waterbodies, and potential electrocutions of large raptors. Very High sensitivity features are linked to the potential disturbance of breeding large raptors, cranes and vultures, and collisions and electrocutions at vulture*

Corridor	Overall Suitability	Comment
		restaurants and colonies (Magaliesberg).
Eastern Corridor	*Very low suitability in some areas to high suitability for power line infrastructure development.*	*The Low sensitivity areas are mostly urban and densely populated semi-urban areas in KwaZulu-Natal and the former Transkei, and a few commercial agriculture areas. Medium and High sensitivity areas in the corridor are mostly linked to potential collisions of large terrestrial and cliff-dwelling species, potential collisions of a range of waterbirds in drainage lines and at wetlands and waterbodies, and potential electrocutions of large raptors. Very High sensitivity features are linked to the potential disturbance of breeding large raptors, cranes, Southern Ground Hornbills and Cape Vultures, and collisions and electrocutions of Cape Vultures at vulture restaurants and in grassland areas. Potential habitat destruction in Blue Swallow breeding areas is also a Very High sensitivity feature.*

11 CONCLUSIONS AND FURTHER RECOMMENDATIONS

In the terms of reference for this report received from the CSIR, it was specifically stated that the sensitivity delineation should be undertaken in the context of all electricity grid infrastructures including transmission lines, distribution lines and substations. The implication of this was that electrocution as a source of mortality had to be taken into account in the risk assessment, because the vast majority of bird electrocutions happen on the smaller distribution structures, and not the large transmission structures[96]. It was assumed that future distribution infrastructure could potentially be a source of electrocution mortality. However, the Eskom Land and Biodiversity Standard (2012) states that "all designs of new power lines and supporting infrastructure for power generation must be evaluated for the risk it could pose to wildlife and no design which has a high risk, or a record of it causing mortalities to wildlife, shall be used." It was further assumed that Eskom might not be the only entity building power lines in future; therefore it cannot automatically be assumed that all future distribution pole designs will be electrocution friendly. However, should this assumption be wrong, and Eskom continues to build the vast majority of future distribution lines, it could be argued that electrocution of birds has effectively been eliminated as a source of mortality on future distribution lines. It might therefore be a useful exercise to repeat this analysis without electrocution, as it may have a significant impact on the outcome of the analysis, in that it may reduce the risk rating of some of the habitat classes.

There are currently no accepted best practice guidelines for the investigation and assessment of potential impacts of electricity infrastructure on avifauna. The methods and level of investigation that is required are left up to the individual avifaunal specialist. There is a strong need for a set of best practice guidelines to be compiled to standardise methodology, along the lines of the best practice guidelines which was developed for the assessment of impacts of wind energy developments on avifauna[97].

It is understood that DEA are acting to reduce the assessment requirements for any electricity grid infrastructure development inside of the corridors from and EIA to a Basic Assessment. This will be done by utilising provisions within NEMA. Currently the construction of facilities or infrastructure for transmission or distribution of electricity with a capacity >275KV outside of an urban area or industrial complexes requires a full EIA to be undertaken. Therefore if gazetted successfully developments of this type within the corridor will no longer require a full EIA, but rather a BA. It is important to note that the level of investigation required for avifaunal impacts are not governed by the size of the line, because the impacts associated with power lines often have little to do with the size of the line, e.g. as pointed out above, distribution lines are far more dangerous from an electrocution perspective than transmission lines. Whether the avifaunal investigations form part of an EIA or a BA is irrelevant for the avifaunal investigation process. The minimum standards of the latter are determined by the envisaged impacts, not the legal process. Even though the present report does not offer many immediate opportunities to directly streamline the development authorisation process, the findings still have considerable worth for both DEA and the industry. By highlighting and mapping the avian sensitivities within each corridor at this scoping level, the SEA offers developers early clarity on the bird-related obstacles they are likely to encounter at any given location within each of the corridors. Hence there is greater certainty in pursuing development options, and less likelihood of unexpected and costly delays. The value of this indirect streamlining function should not be underestimated.

96 Lehman, R.N., Kennedy, P.L. & Savidge, J.A. 2007. The state of the art in raptor electrocution research: a global review. Biological Conservation 136: 159-174.
97 See Jenkins A R; Van Rooyen C S; Smallie J J; Anderson M D & Smit H A. 2011. Best practice guidelines for avian monitoring and impact mitigation at proposed wind energy development sites in southern Africa. Endangered Wildlife Trust and Birdlife South Africa.

12 APPENDIX 1: HABITAT CLASSES AND SENSITIVITY FEATURE RATINGS

Feature sensitivity score range

0-10 =Low
11 – 80 =Medium
81 – 160 =High
161 – 240 =Very High

Corridor	Biome	Sensitivity feature class	Sensitivity score	Sensitivity
Western	Fynbos	Bare	0	Low
Western	Fynbos	Cultivated commercial fields rainfed	30	Medium
Western	Fynbos	Cultivated commercial pivots	30	Medium
Western	Fynbos	Cultivated orchards	0	Low
Western	Fynbos	Cultivated subsistence	0	Low
Western	Fynbos	Cultivated vines	0	Low
Western	Fynbos	Grassland	48	Medium
Western	Fynbos	Industrial	0	Low
Western	Fynbos	Low shrubland	34	Medium
Western	Fynbos	Plantations	8	Low
Western	Fynbos	Shrubland fynbos	34	Medium
Western	Fynbos	Spp Nest sites	241	Very High
Western	Fynbos	Steep slopes incl cliffs	44	Medium
Western	Fynbos	Thicket /Dense bush	0	Low
Western	Fynbos	Urban (500m buffer)	0	Low

Corridor	Biome	Sensitivity feature class	Sensitivity score	Sensitivity
Western	Fynbos	Wetlands and waterbodies (500m buffer)	82	High
Western	Fynbos	Woodland/Open bush	12	Medium
Western	Nama-Karoo	Bare	52	Medium
Western	Nama-Karoo	Cultivated commercial fields rainfed	34	Medium
Western	Nama-Karoo	Cultivated orchards	0	Low
Western	Nama-Karoo	Grassland	52	Medium
Western	Nama-Karoo	Industrial	0	Low
Western	Nama-Karoo	Low shrubland	84	High
Western	Nama-Karoo	Plantations	0	Low
Western	Nama-Karoo	Shrubland fynbos	64	Medium
Western	Nama-Karoo	Spp Nest sites	241	Very High
Western	Nama-Karoo	Steep slopes incl cliffs	44	Medium
Western	Nama-Karoo	Thicket /Dense bush	0	Low
Western	Nama-Karoo	Urban (500m buffer)	0	Low
Western	Nama-Karoo	Wetlands and waterbodies (500m buffer)	62	Medium
Western	Nama-Karoo	Woodland/Open bush	12	Medium
Western	Savanna	Bare	8	Low
Western	Savanna	Grassland	40	Medium
Western	Savanna	Industrial	0	Low
Western	Savanna	Low shrubland	32	Medium
Western	Savanna	Thicket /Dense bush	0	Low
Western	Savanna	Woodland/Open bush	20	Medium
Western	Succulent Karoo	Bare	46	Medium
Western	Succulent Karoo	Cultivated commercial fields rainfed	32	Medium

Corridor	Biome	Sensitivity feature class	Sensitivity score	Sensitivity
Western	Succulent Karoo	Cultivated commercial pivots	32	Medium
Western	Succulent Karoo	Cultivated orchards	0	Low
Western	Succulent Karoo	Cultivated subsistence	0	Low
Western	Succulent Karoo	Cultivated vines	0	Low
Western	Succulent Karoo	Grassland	62	Medium
Western	Succulent Karoo	Industrial	0	Low
Western	Succulent Karoo	Low shrubland	78	High
Western	Succulent Karoo	Plantations	0	Low
Western	Succulent Karoo	Shrubland fynbos	78	High
Western	Succulent Karoo	Spp Nest sites	241	Very High
Western	Succulent Karoo	Steep slopes incl cliffs	44	Medium
Western	Succulent Karoo	Thicket /Dense bush	0	Low
Western	Succulent Karoo	Urban (500m buffer)	0	Low
Western	Succulent Karoo	Wetlands and waterbodies (500m buffer)	92	High
Western	Succulent Karoo	Woodland/Open bush	12	Medium
Northern	Desert	Bare	32	Medium
Northern	Desert	Cultivated commercial fields rainfed	24	Medium
Northern	Desert	Cultivated orchards	0	Low
Northern	Desert	Cultivated vines	0	Low
Northern	Desert	Grassland	72	Medium
Northern	Desert	Industrial	0	Low
Northern	Desert	Low shrubland	72	Medium
Northern	Desert	Plantations	0	Low
Northern	Desert	Shrubland fynbos	72	Medium

Corridor	Biome	Sensitivity feature class	Sensitivity score	Sensitivity
Northern	Desert	Spp Nest sites	241	Very High
Northern	Desert	Steep slopes incl cliffs	48	Medium
Northern	Desert	Thicket /Dense bush	0	Low
Northern	Desert	Urban (500m buffer)	0	Low
Northern	Desert	Wetlands and waterbodies (500m buffer)	36	Medium
Northern	Desert	Woodland/Open bush	10	Low
Northern	Fynbos	Bare	0	Low
Northern	Fynbos	Grassland	24	Medium
Northern	Fynbos	Low shrubland	24	Medium
Northern	Fynbos	Shrubland fynbos	24	Medium
Northern	Fynbos	Woodland/Open bush	4	Low
Northern	Grassland	Bare	0	Low
Northern	Grassland	Cultivated commercial fields rainfed	4	Low
Northern	Grassland	Cultivated commercial pivots	6	Low
Northern	Grassland	Cultivated orchards	0	Low
Northern	Grassland	Cultivated subsistence	0	Low
Northern	Grassland	Grassland	96	High
Northern	Grassland	Indigenous Forest	0	Low
Northern	Grassland	Industrial	0	Low
Northern	Grassland	Low shrubland	88	High
Northern	Grassland	Plantations	0	Low
Northern	Grassland	Steep slopes incl cliffs	28	Medium
Northern	Grassland	Thicket /Dense bush	0	Low
Northern	Grassland	Urban (500m buffer)	0	Low

Corridor	Biome	Sensitivity feature class	Sensitivity score	Sensitivity
Northern	Grassland	Vultures	241	Very High
Northern	Grassland	Wetlands and waterbodies (500m buffer)	90	High
Northern	Grassland	Woodland/Open bush	4	Low
Northern	Nama-Karoo	Bare	40	Medium
Northern	Nama-Karoo	Cultivated commercial fields rainfed	36	Medium
Northern	Nama-Karoo	Cultivated commercial pivots	28	Medium
Northern	Nama-Karoo	Cultivated orchards	0	Low
Northern	Nama-Karoo	Cultivated vines	0	Low
Northern	Nama-Karoo	Grassland	120	High
Northern	Nama-Karoo	Industrial	0	Low
Northern	Nama-Karoo	Low shrubland	120	High
Northern	Nama-Karoo	Plantations	0	Low
Northern	Nama-Karoo	Shrubland fynbos	120	High
Northern	Nama-Karoo	Spp Nest sites	241	Very High
Northern	Nama-Karoo	Steep slopes incl cliffs	28	Medium
Northern	Nama-Karoo	Thicket /Dense bush	0	Low
Northern	Nama-Karoo	Urban (500m buffer)	0	Low
Northern	Nama-Karoo	Wetlands and waterbodies (500m buffer)	96	High
Northern	Nama-Karoo	Woodland/Open bush	10	Low
Northern	Savanna	Bare	0	Low
Northern	Savanna	Cultivated commercial fields rainfed	12	Medium
Northern	Savanna	Cultivated commercial pivots	4	Low
Northern	Savanna	Cultivated orchards	0	Low
Northern	Savanna	Cultivated subsistence	0	Low

Corridor	Biome	Sensitivity feature class	Sensitivity score	Sensitivity
Northern	Savanna	Cultivated vines	0	Low
Northern	Savanna	Grassland	118	High
Northern	Savanna	Indigenous Forest	0	Low
Northern	Savanna	Industrial	0	Low
Northern	Savanna	Low shrubland	118	High
Northern	Savanna	Plantations	0	Low
Northern	Savanna	Spp Nest sites	241	Very High
Northern	Savanna	Steep slopes incl cliffs	28	Medium
Northern	Savanna	Thicket /Dense bush	0	Low
Northern	Savanna	Urban (500m buffer)	0	Low
Northern	Savanna	Vultures	241	Very High
Northern	Savanna	Wetlands and waterbodies (500m buffer)	110	High
Northern	Savanna	Woodland/Open bush	0	Low
Northern	Succulent Karoo	Bare	34	Medium
Northern	Succulent Karoo	Cultivated commercial fields rainfed	32	Medium
Northern	Succulent Karoo	Grassland	76	Medium
Northern	Succulent Karoo	Industrial	0	Low
Northern	Succulent Karoo	Low shrubland	88	High
Northern	Succulent Karoo	Plantations	0	Low
Northern	Succulent Karoo	Shrubland fynbos	88	High
Northern	Succulent Karoo	Spp Nest sites	241	Very High
Northern	Succulent Karoo	Steep slopes incl cliffs	28	Medium
Northern	Succulent Karoo	Thicket /Dense bush	0	Low
Northern	Succulent Karoo	Urban (500m buffer)	0	Low

Corridor	Biome	Sensitivity feature class	Sensitivity score	Sensitivity
Northern	Succulent Karoo	Wetlands and waterbodies (500m buffer)	50	Medium
Northern	Succulent Karoo	Woodland/Open bush	4	Low
International	Forests	Bare	0	Low
International	Forests	Cultivated commercial fields rainfed	0	Low
International	Forests	Cultivated orchards	0	Low
International	Forests	Grassland	4	Low
International	Forests	Indigenous Forest	24	Medium
International	Forests	Low shrubland	4	Low
International	Forests	Plantations	0	Low
International	Forests	Steep slopes incl cliffs	0	Low
International	Forests	Thicket /Dense bush	0	Low
International	Forests	Urban (500m buffer)	0	Low
International	Forests	Wetlands and waterbodies (500m buffer)	0	Low
International	Forests	Woodland/Open bush	0	Low
International	Grassland	Bare	0	Low
International	Grassland	Cultivated commercial fields rainfed	0	Low
International	Grassland	Cultivated commercial pivots	2	Low
International	Grassland	Cultivated orchards	0	Low
International	Grassland	Cultivated subsistence	0	Low
International	Grassland	Grassland	94	High
International	Grassland	Indigenous Forest	8	Medium
International	Grassland	Industrial	0	Low
International	Grassland	Low shrubland	10	Low
International	Grassland	Plantations	0	Low

Corridor	Biome	Sensitivity feature class	Sensitivity score	Sensitivity
International	Grassland	Spp Nest sites	241	Very High
International	Grassland	Steep slopes incl cliffs	88	High
International	Grassland	Thicket /Dense bush	0	Low
International	Grassland	Urban (500m buffer)	0	Low
International	Grassland	Wetlands and waterbodies (500m buffer)	202	Very High
International	Grassland	Woodland/Open bush	2	Low
International	Savanna	Bare	0	Low
International	Savanna	Cultivated commercial fields rainfed	6	Low
International	Savanna	Cultivated commercial pivots	2	Low
International	Savanna	Cultivated orchards	0	Low
International	Savanna	Cultivated subsistence	0	Low
International	Savanna	Grassland	120	High
International	Savanna	Indigenous Forest	8	Medium
International	Savanna	Industrial	0	Low
International	Savanna	Low shrubland	90	High
International	Savanna	Plantations	0	Low
International	Savanna	Spp Nest sites	241	Very High
International	Savanna	Steep slopes incl cliffs	80	Medium
International	Savanna	Thicket /Dense bush	0	Low
International	Savanna	Urban (500m buffer)	0	Low
International	Savanna	Vultures	241	Very High
International	Savanna	Wetlands and waterbodies (500m buffer)	196	Very High
International	Savanna	Woodland/Open bush	2	Low
Eastern	Albany Thicket	Bare	66	Medium

Corridor	Biome	Sensitivity feature class	Sensitivity score	Sensitivity
Eastern	Albany Thicket	Cultivated commercial fields rainfed	44	Medium
Eastern	Albany Thicket	Cultivated commercial pivots	44	Medium
Eastern	Albany Thicket	Cultivated orchards	0	Low
Eastern	Albany Thicket	Cultivated subsistence	0	Low
Eastern	Albany Thicket	Grassland	118	High
Eastern	Albany Thicket	Indigenous Forest	24	Medium
Eastern	Albany Thicket	Industrial	0	Low
Eastern	Albany Thicket	Low shrubland	90	High
Eastern	Albany Thicket	Plantations	0	Low
Eastern	Albany Thicket	Shrubland fynbos	98	High
Eastern	Albany Thicket	Spp Nest sites	241	Very High
Eastern	Albany Thicket	Steep slopes incl cliffs	92	High
Eastern	Albany Thicket	Thicket /Dense bush	0	Low
Eastern	Albany Thicket	Urban (500m buffer)	0	Low
Eastern	Albany Thicket	Vultures	241	Very High
Eastern	Albany Thicket	Wetlands and waterbodies (500m buffer)	84	High
Eastern	Albany Thicket	Woodland/Open bush	16	Medium
Eastern	Fynbos	Bare	32	Medium
Eastern	Fynbos	Cultivated commercial fields rainfed	8	Low
Eastern	Fynbos	Cultivated commercial pivots	8	Low
Eastern	Fynbos	Cultivated orchards	0	Low
Eastern	Fynbos	Cultivated subsistence	0	Low
Eastern	Fynbos	Grassland	76	Medium
Eastern	Fynbos	Indigenous Forest	8	Low

Corridor	Biome	Sensitivity feature class	Sensitivity score	Sensitivity
Eastern	Fynbos	Industrial	0	Low
Eastern	Fynbos	Low shrubland	60	Medium
Eastern	Fynbos	Plantations	0	Low
Eastern	Fynbos	Shrubland fynbos	68	Medium
Eastern	Fynbos	Spp Nest sites	241	Very High
Eastern	Fynbos	Steep slopes incl cliffs	44	Medium
Eastern	Fynbos	Thicket /Dense bush	0	Low
Eastern	Fynbos	Urban (500m buffer)	0	Low
Eastern	Fynbos	Wetlands and waterbodies (500m buffer)	60	Medium
Eastern	Fynbos	Woodland/Open bush	4	Low
Eastern	Grassland	Bare	32	Medium
Eastern	Grassland	Cultivated commercial fields rainfed	76	Medium
Eastern	Grassland	Cultivated commercial pivots	56	Medium
Eastern	Grassland	Cultivated orchards	0	Low
Eastern	Grassland	Cultivated subsistence	36	Medium
Eastern	Grassland	Cultivated sugar cane	0	Low
Eastern	Grassland	Grassland	214	Very High
Eastern	Grassland	Indigenous Forest	32	Medium
Eastern	Grassland	Industrial	0	Low
Eastern	Grassland	Low shrubland	112	High
Eastern	Grassland	Plantations	8	Low
Eastern	Grassland	Spp Nest sites	241	Very High
Eastern	Grassland	Steep slopes incl cliffs	180	Very High
Eastern	Grassland	Thicket /Dense bush	0	Low

Corridor	Biome	Sensitivity feature class	Sensitivity score	Sensitivity
Eastern	Grassland	Urban (500m buffer)	0	Low
Eastern	Grassland	Vultures	241	Very High
Eastern	Grassland	Wetlands and waterbodies (500m buffer)	240	Very High
Eastern	Grassland	Woodland/Open bush	14	Medium
Eastern	Indian Ocean Coastal Belt	Bare	24	Medium
Eastern	Indian Ocean Coastal Belt	Cultivated commercial fields rainfed	44	Medium
Eastern	Indian Ocean Coastal Belt	Cultivated orchards	0	Low
Eastern	Indian Ocean Coastal Belt	Cultivated subsistence	8	Low
Eastern	Indian Ocean Coastal Belt	Cultivated sugar cane	0	Low
Eastern	Indian Ocean Coastal Belt	Grassland	86	High
Eastern	Indian Ocean Coastal Belt	Indigenous Forest	16	Medium
Eastern	Indian Ocean Coastal Belt	Industrial	0	Low
Eastern	Indian Ocean Coastal Belt	Low shrubland	44	Medium
Eastern	Indian Ocean Coastal Belt	Plantations	8	Low
Eastern	Indian Ocean Coastal Belt	Spp Nest sites	241	Very High
Eastern	Indian Ocean Coastal Belt	Steep slopes incl cliffs	84	High
Eastern	Indian Ocean Coastal Belt	Thicket /Dense bush	0	Low
Eastern	Indian Ocean Coastal Belt	Urban (500m buffer)	0	Low
Eastern	Indian Ocean Coastal Belt	Vultures	241	Very High
Eastern	Indian Ocean Coastal Belt	Wetlands and waterbodies (500m buffer)	124	High
Eastern	Indian Ocean Coastal Belt	Woodland/Open bush	0	Low
Eastern	Nama-Karoo	Bare	66	Medium
Eastern	Nama-Karoo	Cultivated commercial fields rainfed	34	Medium
Eastern	Nama-Karoo	Cultivated commercial pivots	34	Medium

Corridor	Biome	Sensitivity feature class	Sensitivity score	Sensitivity
Eastern	Nama-Karoo	Cultivated orchards	0	Low
Eastern	Nama-Karoo	Cultivated subsistence	0	Low
Eastern	Nama-Karoo	Grassland	86	High
Eastern	Nama-Karoo	Industrial	0	Low
Eastern	Nama-Karoo	Low shrubland	82	High
Eastern	Nama-Karoo	Plantations	0	Low
Eastern	Nama-Karoo	Shrubland fynbos	82	High
Eastern	Nama-Karoo	Spp Nest sites	241	Very High
Eastern	Nama-Karoo	Steep slopes incl cliffs	44	Medium
Eastern	Nama-Karoo	Thicket /Dense bush	0	Low
Eastern	Nama-Karoo	Urban (500m buffer)	0	Low
Eastern	Nama-Karoo	Vultures	241	Very High
Eastern	Nama-Karoo	Wetlands and waterbodies (500m buffer)	56	Medium
Eastern	Nama-Karoo	Woodland/Open bush	10	Low
Eastern	Savanna	Bare	0	Low
Eastern	Savanna	Cultivated commercial fields rainfed	44	Medium
Eastern	Savanna	Cultivated commercial pivots	44	Medium
Eastern	Savanna	Cultivated orchards	0	Low
Eastern	Savanna	Cultivated subsistence	12	Medium
Eastern	Savanna	Cultivated sugar cane	0	Low
Eastern	Savanna	Grassland	120	High
Eastern	Savanna	Indigenous Forest	32	Medium
Eastern	Savanna	Industrial	0	Low
Eastern	Savanna	Low shrubland	70	Medium

Corridor	Biome	Sensitivity feature class	Sensitivity score	Sensitivity
Eastern	Savanna	Plantations	8	Low
Eastern	Savanna	Shrubland fynbos	86	High
Eastern	Savanna	Spp Nest sites	241	Very High
Eastern	Savanna	Steep slopes incl cliffs	100	High
Eastern	Savanna	Thicket /Dense bush	0	Low
Eastern	Savanna	Urban (500m buffer)	0	Low
Eastern	Savanna	Vultures	241	Very High
Eastern	Savanna	Wetlands and waterbodies (500m buffer)	126	High
Eastern	Savanna	Woodland/Open bush	4	Low
Eastern	Succulent Karoo	Bare	60	Medium
Eastern	Succulent Karoo	Cultivated commercial fields rainfed	24	Medium
Eastern	Succulent Karoo	Grassland	76	Medium
Eastern	Succulent Karoo	Industrial	0	Low
Eastern	Succulent Karoo	Low shrubland	76	Medium
Eastern	Succulent Karoo	Shrubland fynbos	76	Medium
Eastern	Succulent Karoo	Steep slopes incl cliffs	44	Medium
Eastern	Succulent Karoo	Thicket /Dense bush	0	Low
Eastern	Succulent Karoo	Urban (500m buffer)	0	Low
Eastern	Succulent Karoo	Wetlands and waterbodies (500m buffer)	56	Medium
Eastern	Succulent Karoo	Woodland/Open bush	4	Low
Central	Fynbos	Bare	0	Low
Central	Fynbos	Cultivated commercial fields rainfed	34	Medium
Central	Fynbos	Cultivated commercial pivots	34	Medium
Central	Fynbos	Cultivated orchards	0	Low

Corridor	Biome	Sensitivity feature class	Sensitivity score	Sensitivity
Central	Fynbos	Cultivated vines	0	Low
Central	Fynbos	Grassland	60	Medium
Central	Fynbos	Industrial	0	Low
Central	Fynbos	Low shrubland	42	Medium
Central	Fynbos	Plantations	0	Low
Central	Fynbos	Shrubland fynbos	46	Medium
Central	Fynbos	Spp Nest sites	241	Very High
Central	Fynbos	Steep slopes incl cliffs	44	Medium
Central	Fynbos	Thicket /Dense bush	0	Low
Central	Fynbos	Urban (500m buffer)	0	Low
Central	Fynbos	Wetlands and waterbodies (500m buffer)	82	High
Central	Fynbos	Woodland/Open bush	12	Medium
Central	Grassland	Bare	0	Low
Central	Grassland	Cultivated commercial fields rainfed	10	Low
Central	Grassland	Cultivated commercial pivots	22	Medium
Central	Grassland	Cultivated orchards	0	Low
Central	Grassland	Cultivated subsistence	0	Low
Central	Grassland	Grassland	108	High
Central	Grassland	Industrial	0	Low
Central	Grassland	Low shrubland	82	High
Central	Grassland	Plantations	0	Low
Central	Grassland	Spp Nest sites	241	Very High
Central	Grassland	Steep slopes incl cliffs	64	Medium
Central	Grassland	Thicket /Dense bush	0	Low

Corridor	Biome	Sensitivity feature class	Sensitivity score	Sensitivity
Central	Grassland	Urban (500m buffer)	0	Low
Central	Grassland	Vultures	241	Very High
Central	Grassland	Wetlands and waterbodies (500m buffer)	142	High
Central	Grassland	Woodland/Open bush	10	Low
Central	Nama-Karoo	Bare	72	Medium
Central	Nama-Karoo	Cultivated commercial fields rainfed	32	Medium
Central	Nama-Karoo	Cultivated commercial pivots	32	Medium
Central	Nama-Karoo	Cultivated orchards	0	Low
Central	Nama-Karoo	Cultivated vines	0	Low
Central	Nama-Karoo	Grassland	114	High
Central	Nama-Karoo	Industrial	0	Low
Central	Nama-Karoo	Low shrubland	104	High
Central	Nama-Karoo	Plantations	0	Low
Central	Nama-Karoo	Shrubland fynbos	102	High
Central	Nama-Karoo	Spp Nest sites	241	Very High
Central	Nama-Karoo	Steep slopes incl cliffs	44	Medium
Central	Nama-Karoo	Thicket /Dense bush	0	Low
Central	Nama-Karoo	Urban (500m buffer)	0	Low
Central	Nama-Karoo	Vultures	241	Very High
Central	Nama-Karoo	Wetlands and waterbodies (500m buffer)	126	High
Central	Nama-Karoo	Woodland/Open bush	12	Medium
Central	Savanna	Bare	0	Low
Central	Savanna	Cultivated commercial fields rainfed	10	Low
Central	Savanna	Cultivated commercial pivots	14	Medium

Corridor	Biome	Sensitivity feature class	Sensitivity score	Sensitivity
Central	Savanna	Cultivated orchards	0	Low
Central	Savanna	Cultivated subsistence	0	Low
Central	Savanna	Grassland	120	High
Central	Savanna	Indigenous Forest	0	Low
Central	Savanna	Industrial	0	Low
Central	Savanna	Low shrubland	98	High
Central	Savanna	Plantations	0	Low
Central	Savanna	Spp Nest sites	241	Very High
Central	Savanna	Steep slopes incl cliffs	76	Medium
Central	Savanna	Thicket /Dense bush	0	Low
Central	Savanna	Urban (500m buffer)	0	Low
Central	Savanna	Vultures	241	Very High
Central	Savanna	Wetlands and waterbodies (500m buffer)	130	High
Central	Savanna	Woodland/Open bush	14	Medium
Central	Succulent Karoo	Bare	52	Medium
Central	Succulent Karoo	Cultivated commercial fields rainfed	28	Medium
Central	Succulent Karoo	Cultivated commercial pivots	28	Medium
Central	Succulent Karoo	Cultivated orchards	0	Low
Central	Succulent Karoo	Grassland	70	Medium
Central	Succulent Karoo	Industrial	0	Low
Central	Succulent Karoo	Low shrubland	58	Medium
Central	Succulent Karoo	Shrubland fynbos	66	Medium
Central	Succulent Karoo	Spp Nest sites	241	Very High
Central	Succulent Karoo	Steep slopes incl cliffs	44	Medium

Corridor	Biome	Sensitivity feature class	Sensitivity score	Sensitivity
Central	Succulent Karoo	Thicket /Dense bush	0	Low
Central	Succulent Karoo	Urban (500m buffer)	0	Low
Central	Succulent Karoo	Wetlands and waterbodies (500m buffer)	50	Medium
Central	Succulent Karoo	Woodland/Open bush	4	Low

13 APPENDIX 2: EXAMPLE OF SPECIES RATING TABLE

WESTERN CORRIDOR	Habitat_class	Habitat sensitivity score	Sensitivity	African Marsh-Harrier	African Marsh-Harrier_coll	African Marsh-Harrier_disp	African Marsh-Harrier_sum	African Marsh-Harrier_RDs	African Marsh-Harrier_score
Biome				African Marsh-Harrier_Elec					
Fynbos	Bare	0	Low	0	0	0	0	8	0
Fynbos	Cultivated orchards	0	Low	0	0	0	0	8	0
Fynbos	Cultivated subsistence	0	Low	0	0	0	0	8	0
Fynbos	Cultivated vines	0	Low	0	0	0	0	8	0
Fynbos	Industrial	0	Low	0	0	0	0	8	0
Fynbos	Thicket /Dense bush	0	Low	0	0	0	0	8	0
Fynbos	Urban (500m buffer)	0	Low	0	0	0	0	8	0
Fynbos	Plantations	8	Low	0	0	0	0	8	0
Fynbos	Woodland/Open bush	12	Medium	0	0	0	0	8	0
Fynbos	Cultivated commercial fields rainfed	30	Medium	0	0	0	0	8	0
Fynbos	Cultivated commercial pivots	30	Medium	0	0	0	0	8	0
Fynbos	Low shrubland	34	Medium	0	0	0	0	8	0
Fynbos	Shrubland fynbos	34	Medium	0	0	0	0	8	0
Fynbos	Steep slopes incl cliffs	44	Medium	0	0	0	0	8	0
Fynbos	Grassland	48	Medium	0	0	0	0	8	0
Fynbos	Wetlands and waterbodies (500m buffer)	82	High	0	2	2	4	8	32
Fynbos	Spp Nest sites	241	Very High	Default score very high	Default score very high	Default score very high	Default score very high	Default score very high	Default score very high
Nama-Karoo	Cultivated orchards	0	Low	0	0	0	0	8	0
Nama-Karoo	Industrial	0	Low	0	0	0	0	8	0
Nama-Karoo	Plantations	0	Low	0	0	0	0	8	0
Nama-Karoo	Thicket /Dense bush	0	Low	0	0	0	0	8	0
Nama-Karoo	Urban (500m buffer)	0	Low	0	0	0	0	8	0
Nama-Karoo	Woodland/Open bush	12	Medium	0	0	0	0	8	0
Nama-Karoo	Cultivated commercial fields rainfed	34	Medium	0	0	0	0	8	0

WESTERN CORRIDOR Biome	Habitat_class	Habitat sensitivity score	Sensitivity	African Marsh-Harrier African Marsh-Harrier_Elec	African Marsh-Harrier_coll	African Marsh-Harrier_disp	African Marsh-Harrier_sum	African Marsh-Harrier_RDs	African Marsh-Harrier_score
Nama-Karoo	Steep slopes incl cliffs	44	Medium	0	0	0	0	8	0
Nama-Karoo	Bare	52	Medium	0	0	0	0	8	0
Nama-Karoo	Grassland	52	Medium	0	0	0	0	8	0
Nama-Karoo	Wetlands and waterbodies (500m buffer)	62	Medium	0	0	0	0	8	0
Nama-Karoo	Shrubland fynbos	64	Medium	0	0	0	0	8	0
Nama-Karoo	Low shrubland	84	High	0	0	0	0	8	0
Nama-Karoo	Spp Nest sites	241	Very High	Default score very high	Default score very high	Default score very high	Default score very high	Default score very high	Default score very high
Savanna	Industrial	0	Low	0	0	0	0	8	0
Savanna	Thicket /Dense bush	0	Low	0	0	0	0	8	0
Savanna	Bare	8	Low	0	0	0	0	8	0
Savanna	Woodland/Open bush	20	Medium	0	0	0	0	8	0
Savanna	Low shrubland	32	Medium	0	0	0	0	8	0
Savanna	Grassland	40	Medium	0	0	0	0	8	0
Succulent Karoo	Cultivated orchards	0	Low	0	0	0	0	8	0
Succulent Karoo	Cultivated subsistence	0	Low	0	0	0	0	8	0
Succulent Karoo	Cultivated vines	0	Low	0	0	0	0	8	0
Succulent Karoo	Industrial	0	Low	0	0	0	0	8	0
Succulent Karoo	Plantations	0	Low	0	0	0	0	8	0
Succulent Karoo	Thicket /Dense bush	0	Low	0	0	0	0	8	0
Succulent Karoo	Urban (500m buffer)	0	Low	0	0	0	0	8	0
Succulent Karoo	Woodland/Open bush	12	Medium	0	0	0	0	8	0
Succulent Karoo	Cultivated commercial fields rainfed	32	Medium	0	0	0	0	8	0
Succulent Karoo	Cultivated commercial pivots	32	Medium	0	0	0	0	8	0
Succulent Karoo	Steep slopes incl cliffs	44	Medium	0	0	0	0	8	0
Succulent Karoo	Bare	46	Medium	0	0	0	0	8	0
Succulent Karoo	Grassland	62	Medium	0	0	0	0	8	0
Succulent Karoo	Low shrubland	78	High	0	0	0	0	8	0

WESTERN CORRIDOR Biome	Habitat_class	Habitat sensitivity score	Sensitivity	African Marsh-Harrier African Marsh-Harrier_Elec	African Marsh-Harrier_coll	African Marsh-Harrier_disp	African Marsh-Harrier_sum	African Marsh-Harrier_RDs	African Marsh-Harrier_score
Succulent Karoo	Shrubland fynbos	78	High	0	0	0	0	8	0
Succulent Karoo	Wetlands and waterbodies (500m buffer)	92	High	0	1	2	3	8	24
Succulent Karoo	Spp Nest sites	241	Very High	Default score very high	Default score very high	Default score very high	Default score very high	Default score very high	Default score very high

STRATEGIC ENVIRONMENTAL ASSESSMENT FOR ELECTRICITY GRID INFRASTRUCTURE IN SOUTH AFRICA

Appendix C.3

Terrestrial and Aquatic Biodiversity Scoping Assessment Report

Simon Todd, Donovon Kirkwood, Kate Snaddon & Justine Ewart-Smith
Freshwater Consulting Group

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TABLES

FIGURES

1 SPECIALIST CV

Simon Todd

Profession: Ecological Consultant (ECOSOL GIS & Simon Todd Consulting)

SACNASP registered as a Professional Natural Scientist, (Ecology) No. 400425/11.

- Specialisation: Plant & Animal Ecology
- Years of Experience: 18 Years

Skills & Primary Competencies

- Research & description of ecological patterns & processes in Nama Karoo, Succulent Karoo, Thicket, Arid Grassland, Fynbos and Savannah Ecosystems.
- Ecological Impacts of land use on biodiversity
- Vegetation surveys & degradation assessment & mapping
- Long-term vegetation monitoring
- Faunal surveys & assessment.
- GIS & remote sensing
- Conducted a large number of fauna and flora specialist assessments distributed widely across South Africa, including a large number of wind energy facilities. Projects have ranged in extent from <50 ha to more then 50 000 ha.
- Involved in all phases of wind energy development, from ecological prefeasibility studies to pre-construction walk-through.
- Widely-recognized ecology specialist. Published numerous peer-reviewed scientific publications based on various ecological studies across the country. Past chairman of the Arid Zone Ecology Forum and current executive committee member.
- Extensive experience in the field and exceptional level of technical expertise, particularly with regards to GIS capabilities which is essential with regards to producing high-quality sensitivity maps for use in the design of final project layouts.
- Strong research background which has proved invaluable when working on several ecologically sensitive and potentially controversial sites containing some of the most threatened fauna in South Africa.
- Published numerous research reports as well as two book chapters and a large number of papers in leading scientific journals dealing primarily with human impacts on the vegetation and ecology of the arid and semi-arid parts of South Africa.
- Maintain several long-term vegetation monitoring projects distributed across Namaqualand and the Karoo.
- Guest lecturer at two universities and have also served as an external examiner.

Tertiary Education:

- 1992-1994 – BSc (Botany & Zoology), University of Cape Town
- 1995 – BSc Hons, Cum Laude (Zoology) University of Natal
- 1996-1997- MSc, Cum Laude (Conservation Biology) University of Cape Town

Employment History

1997 – 1999 – Research Scientist (Contract) – South African National Biodiversity Institute. 2000-2004 – Specialist Scientist (Contract) - South African National Biodiversity Institute. 2004-2007 – Senior Scientist (Contract) – Plant Conservation Unit, Department of Botany, University of Cape Town. 2007 Present – Senior Scientist (Associate) – Plant Conservation Unit, Department of Botany, University of Cape Town. 2007-Present – Independent Ecological Consultant and Sole Proprietor of Simon Todd Consulting.

Donovan Kirkwood

Profession: Ecological Consultant

SACNASP registered as a Professional Natural Scientist, (Ecology)

- Specialisation: Plant & Animal Ecology
- Years of Experience: 18 Years

Skills and Primary Competencies

- Academic training as ecologist in Cape, savanna and forest ecosystems with Ph.D. research focused on population ecology and vegetation description, including formal floristic survey and analysis. Sampling and experimental design, statistical analysis and reporting.
- Five years as Regional Ecologist Scientific Services, CapeNature, providing expert support for all aspects of conservation management and planning at local and organisational scales, guiding off-reserve land-use and supporting protected area expansion planning and implementation.
- Biodiversity focussed mapping, processing and spatial analysis using GIS (ArcGIS and QGIS). Lead developer of Western Cape Biodiversity Framework, integrating multiple systematic conservation plans and land-cover layers into a single province-wide Critical Biodiversity Area map with uniform appearance and guideline framework.
- Six years as specialist sustainability and Environmental Planner including conservation planning role:
    - Specialist support to tourism development, including regional strategy and business analysis, consideration of alternatives and mitigation at whole reserve and site scale, and input into green architecture and practical infrastructure needs in locations without sewerage or water services, where durability and reliability in remote locations is paramount.
    - Developing the in-house framework for evidence-based reserve sensitivity analysis and zonation (i.e. identifying environmental risk, site selection and mitigation), and guiding tourism product development.
- Strategy developer and spatial planner for 2010 Western Cape Protected Area Expansion Plan. Developed new approach, matching a tight portfolio of sites to limited agency resources, and allowing for uncertainty inherent in transactions targeting multiple contiguous properties.
- Author of various training manuals on control of Invasive Plant Species.

Tertiary Education

- Ph.D. (Botany/Ecology) 2003 University of Cape Town
- B.Sc. Hons. (Botany) 1993 University of Cape Town.

- B.Sc. (Botany & Zoology majors) 1992 University of Cape Town

Employment history

1992 – 2002: Lecturer, Teaching Assistant & Research Assistant, University of Cape Town. 2000 – 2001: Agricultural consultant/farm manager, Chart Farm. 2002: Field biologist, Amazon. 2003 – 2008: Regional ecologist, CapeNature. 2008 – 2010: part-time Consultant. 2008 – 2014: Ecological Planner, CapeNature. 2014 – present: Independent consultant.

Kate Snaddon (Freshwater Consulting Group)

Profession: Freshwater Ecological Consultant

SACNASP registered as a Professional Natural Scientist, (Ecology) No. 400225/06.

- Specialisation: Freshwater Ecology
- Years of Experience: 20 Years

Skills & Primary Competencies

Kate has 20 years of experience in the field of freshwater ecology (both as a researcher and consultant) and general environmental consulting. Her specialist skills lie in the areas of:

- Freshwater macroinvertebrate collection and identification;
- SASS5 biomonitoring;
- Wetland mapping and delineation;
- Conservation planning for the aquatic environment;
- Management and implementation of ecological monitoring and research programmes;
- Assessment of impacts of anthropogenic interference in freshwater ecosystems, and
- Urban river and wetland rehabilitation.
- Kate has worked extensively in the City of Cape Town and the Western Cape. She has published over 70 specialist freshwater ecological consultancy reports, 3 Water Research Commission reports, 2 chapters in international books, and 8 scientific papers.

Tertiary Education:

- B.Sc., Majoring in Zoology (with Distinction), University of Cape Town, 1989
- B.Sc. (Hons), Zoology (with Distinction),.University of Cape Town, 1990
- M.Sc, Zoology (with Distinction), University of Cape Town, 1998

Employment History

March 2003 – present Freshwater Ecological Consultant, The Freshwater Consulting Group, Cape Town; July 2000 - October 2002 Sustainable Business Solutions team, PricewaterhouseCoopers, London, UK; March 1995 - March2000, part-time basis Freelance ecological consultant, Cape Town ; January 1996 - January 2000: Research Officer on Water Research Commission Project; February 1991 - August 1992: Research Assistant, Freshwater Research Unit, University of Cape Town.

Justine Ewart-Smith (Freshwater Consulting Group)

Profession: Freshwater Ecological Consultant

- Specialisation: Freshwater Ecology
- Years of Experience: 18 Years

Skills & Primary Competencies

Fifteen years' experience, both nationally and internationally in various aspects of aquatic ecology, including specialist input into: Research on the ecology of periphyton, largely benthic algae in Western Cape River systems but also abroad, particularly that of the Peruvian Andes; aquatic macroinvertebrate and hydraulic biotope components of Ecological Reserve Determinations for riverine systems; Ecological input into the development of the National Water Resource Classification system for South Africa; management and development of a database for the collation of bio-monitoring data on a national scale (Rivers Database); Rehabilitation of riverine systems and assessment pre- and post-construction; Biological assessment and monitoring of water quality and the ecological integrity of rivers and wetlands for Environmental Impact Assessments (EIAs) and situation assessments; Conservation of aquatic ecosystems; Development of a wetland classification system for the National Wetland Inventory; Use of Geographic Information Systems (GIS) for relevant spatial data analyses; Viability of various development options for water resources. My involvement ranges from research and specialist ecological input to overall project co-ordination and management. My regional experience includes: South Africa, Lesotho, Kenya, Peru and the United Arab Emirates

Tertiary Education:

PhD from the University of Cape Town (UCT) in Zoology (Freshwater Ecology) 2012

MSc from the University of Cape Town (UCT) in Zoology (Marine Ecology) 1998

BSc (Hons) in Zoology from UCT (with distinction). 1994

BSc UCT Zoology and Environmental & Geographical Science (with distinction) 1993

Employment History

Present: Co-director and researcher with the Freshwater Research Centre. 2009 – present: Member and Aquatic Ecosystem Consultant, Freshwater Consulting Group. 2007 - 2009 Scientific Officer in the Freshwater Research Unit, UCT researching periphyton dynamics in rivers, Member and Aquatic Ecosystem Consultant, Freshwater Consulting Group. 2002 to 2008: Member and Aquatic Ecosystem Consultant, Freshwater Consulting Group. Occasional Lecturer (community ecology of freshwater ecosystems), University of Cape Town. 1998 to 2002: Aquatic Ecosystem Consultant, Southern Waters Ecological Research and Consulting. 1994 to 1998: Researcher, Marine Biology Research Institute, UCT. 1993 to 1994:Research Assistant, Marine Biology Research Institute, UCT.

2 SPECIALIST DECLARATION

I, ... Kate Snaddon.............................., as the appointed independent specialist hereby declare that I:

- act/ed as the independent specialist in this application;
- regard the information contained in this report as it relates to my specialist input/study to be true and correct;
- do not have and will not have any financial interest in the undertaking of the activity, other than remuneration for work performed;
- have and will not have any vested interest in the proposed activity proceeding;
- have disclosed any material information that have or may have the potential to influence the objectivity of any report or decisions base thereon; and
- am aware that a false declaration is an offence in terms of regulation 71 of GN No. R. 543.

Signature of the specialist:

Name of company: Freshwater Consulting Group

Professional Registration (incl number): 2007/064216/23

Date: 20th July 2015

3 ABBREVIATIONS AND ACRONYMS

CBA	Critical Biodiversity Area
CESA	Critical Ecological Support Area
CSIR	Council for Scientific and Industrial Research
DAFF	Department of Agriculture, Forestry and Fisheries
DEADP	Department of Environmental Affairs and Development Planning
DEAT	Previous Department of Environmental Affairs and Tourism
DEA	Department of Environmental Affairs
DLA-CDSM	Department of Land Affairs' Chief Directorate: Surveys and Mapping
DWA	Department of Water Affairs
DWS	Department of Water and Sanitation (post 2013)
ECPAES	Eastern Cape Protected Area Expansion Strategy
EGI	Electrical Grid Infrastructure
EIS	Ecological Importance and Sensitivity
EMPr	Environmental Management Programme
ESA	Ecological Support Area
FA	Wind and Solar SEA Focus Area (SIP 8)
GA	General Authorisation, according to Water Act (1998)
HGM	Hydrogeomorphic unit
NBA	National Biodiversity assessment 2011
NPAES	National Protected Area Expansion Strategy
NFEPA	National freshwater ecosystem priority areas
PA	Protected Area - statutory
PES	Present Ecological State
SA	South Africa
SANBI	South African National Biodiversity Institute
SIP	Strategic Integrated Projects
VEG	Vegetation
WAR	Water Allocation Reform
WULA	Water Use Licence Application

4 TERMS OF REFERENCES (TORS)

4.1 Background and Details of the Project

The National Department of Environmental Affairs (DEA) has embarked on a process of identifying ways to act swiftly, streamline and shorten the environmental authorisation process for major infrastructure build programmes in South Africa. In particular, the DEA is looking to facilitate the efficient roll out of Strategic Integrated Projects (SIPs) lead by the Presidential Infrastructure Coordinating Committee and detailed in the National Infrastructure Plan.

As part of this process, the Department of Environmental Affairs (DEA), mandated by Ministers and Members of the Executive Council (MinMec), commissioned the Council for Scientific and Industrial Research (CSIR) in January 2014 to undertake a Strategic Environmental Assessment (SEA) linked to SIP 10: Electricity Transmission and Distribution for all. The SEA is titled national Department of Environmental Affairs Electricity Grid Infrastructure Strategic Environmental Assessment. The aim of the SEA is to identify suitable routing corridors that will enable the efficient and effective expansion of key strategic transmission infrastructure designed to satisfy national transmission requirements up to the 2040 planning horizon. The CSIR is teaming up with Eskom and the South African National Biodiversity Institute (SANBI) to deliver on project outputs.

Upon gazetting of the corridors, it is envisaged that the environmental authorisation process for transmission infrastructure[1] will be streamlined in specific areas identified through the SEA process as being less sensitive to the negative impacts of electricity grid infrastructure development. This should incentivise Eskom and other potential transmission infrastructure developers to plan and develop in less sensitive areas.

The SEA process also provides a platform for coordination between the various authorities responsible for issuing authorisations, permits or consents and thereby will further contribute to a more streamlined environmental authorisation process.

The preliminary corridors (the starting point of the SEA) were identified by Eskom and are based on the results of a detailed Eskom Strategic Grid Plan Study. The Study considered a number of possible future generation and load scenarios and in so doing identified the need for five national transmission infrastructure corridors to facilitate the balancing of South Africa's electricity supply and demand needs up 2040.

The corridors are:

1. The Eastern Corridor
2. The Western Corridor
3. The Northern Corridor
4. The Central Corridor
5. The International Corridor

The SEA then undertook a corridor refinement process to determine optimal placement of the five (5) 100km wide corridors by considering key constraints (Phase I) and opportunities (Phase II) for electricity transmission level infrastructure development.
Phase I involved a wall to wall nation-wide sensitivity delineation assessment to determine areas where electricity grid infrastructure is likely to have an impact on the environment (environmental constraints)

[1] Including associated infrastructure such as transmission substations and distribution lines.

and areas where the environment is likely to have an impact on electricity grid infrastructure (engineering constraints). The full extent of South Africa was then graded and mapped for environmental and engineering sensitivity, indicating areas to be avoided (Very High sensitivity), to areas which are sensitive for various reasons (High-Medium sensitivity), to areas which demonstrate no sensitivity (Low sensitivity). The outputs of Phase I are a 'wall to wall' environmental constraints map and 'wall to wall' engineering constraints map.

Phase II involved a review of national, provincial and local government development plans as well as detailed consultation with government and industry to determine areas of future bulk demand for electricity and or transmission level infrastructure. Key strategic demand areas were identified and mapped.

The Eskom Preliminary corridors are illustrated in Figure 3.1 below.

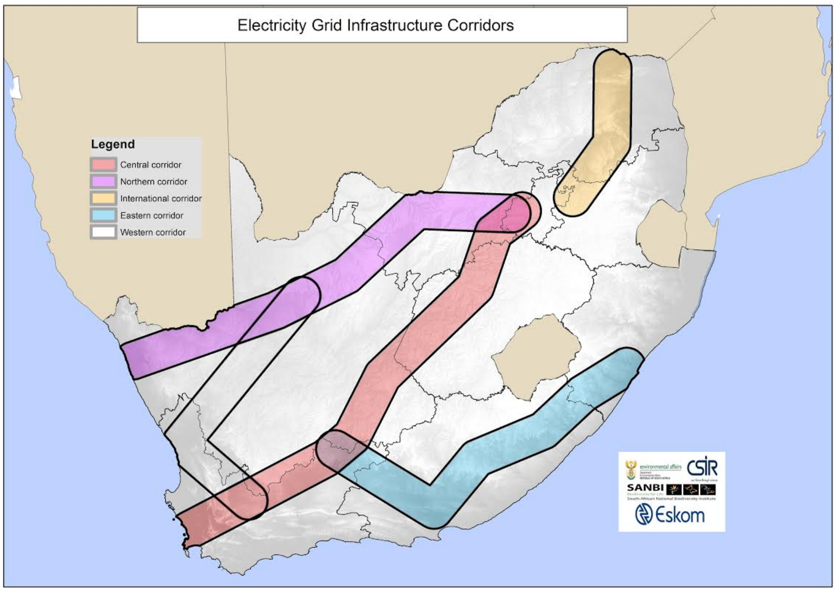


Figure 170-1: Eskom preliminary corridors

4.2 Scope of Work

The appointed supplier is required to review and interrogate the draft environmental constraints map with respect to features linked to terrestrial and aquatic biodiversity. The appointed supplier will be required to identify any gaps in information, and based on the findings of the assessment, produce an updated four-tiered terrestrial and aquatic biodiversity sensitivity map for each corridor.

The study methodology developed as part of this project will inform future SEA-level biodiversity specialist assessment methodologies.

The South African National Biodiversity Institute (SANBI) and the national Department of Water Affairs and Sanitation (DWA) have reviewed this RfP. The assessment will be undertaken in close collaboration with SANBI and DWA to ensure that the outcomes of the study are accepted by these authorities and will be taken into consideration during future authorisation and commenting in the pre-assessed areas. It is recommended that the supplier meet with appropriate representatives from these departments as part of conducting this assessment.

Given that the terrestrial and aquatic biodiversity assessment will need to identify and consider terrestrial as well as aquatic resources and sensitivities, the bidder may consider using a team of relevant and experienced specialists.

The following should as a minimum be consulted as part of the study:

- The latest Systematic Biodiversity Plans relevant to the study area, including its input layers where applicable, as well as relevant the land-use and impact assessment guidelines associated with these Plans that are applicable to the study areas.
    - E.g. the National Freshwater Ecosystem Priority Areas, and its associated implementation manual: Driver A, Nel JL, Snaddon K, Murray K, Roux DJ, Hill L, Swartz ER, Manuel J and Funke N. 2011. **Implementation Manual For Freshwater Ecosystem Priority Areas**. Report to the Water Research Commission. WRC Report No. 1801/1/11

- The National Biodiversity Assessment 2011, including its spatial layers (specifically layers that were not used for the environmental constraints map, but that are relevant at a finer scale:
    - Driver A, Sink KJ, Nel JL, Holness S, Van Niekerk L, Daniels F, Jonas Z, Majiedt P, Harris L and Maze K. 2012. **National Biodiversity Assessment** 2011: And assessment of South Africa's Biodiversty and Ecosystems. Synthesis Report. South African National Biodiversity Institute and Department of Environmental Affairs, Pretoria,

- The latest species information available to the study area, in particular (but not limited to)
    - The Red List of Plants, including its spatial datasets (which are available from SANBI at a point locality level):
        - STRELITZIA 25: Red Data List of South African Plants D. Raimondo, L. Van Staden, W. Foden, J.E. Victor, N.A. Helme, R.C. Turner, D.A. Kamundi & P.A. Manyama (eds) (2009)
        -

- The Red List of Butterflies, including its spatial datasets (which are available from SANBI at a point locality level):
    - Mecenero et al. (eds). 2013. Conservation Assessment of Butterflies of South Africa, Lesotho and Swaziland: Red List and Atlas. Animal Demography Unit, University of Cape Town.

- The Atlas and Red List of the Reptiles of South Africa, Lesotho and Swaziland, including its spatial datasets (which are available from SANBI at a point locality level):
    - Suricata 1: Atlas and Red List of the Reptiles of South Africa, Lesotho and Swaziland. Michael F. Bates, William R. Branch, Aaron M. Bauer, Marius Burger, Johan Marais, Graham J. Alexander and Marienne S. de Villiers (eds).2014.

- Fine-scale spatial biodiversity information that may not have been included in a systematic biodiversity plan.

The aim of the assessment is to:

1. Describe for each corridor the habitats and species likely to be present and their relative sensitivity with respect to electricity grid infrastructure.

2. Through a review of the draft environmental constraints map together with the sourcing additional information, develop a consolidated aquatic and terrestrial biodiversity sensitivity map of all sensitivity features (layers) identified for each of the corridors.
3. Describe what additional information and level of assessment is required in each sensitivity category) before an authorisation with respect to terrestrial and aquatic biodiversity should be considered. This should be done separately for each corridor and/or sections of the corridor; and
4. Assess the corridors in terms of the potential impacts of electricity grid infrastructure and their habitats, taking cognizance of the relative sensitivity of these habitats, and outline proposed management actions to enhance benefits and avoid/reduce/offset negative impacts.

It is important to note that the outputs from this study will form the basis of a planning document for electricity grid infrastructure development in the corridors. The aim of the planning document will be to inform and focus further terrestrial and aquatic project level assessment with respect to electricity grid infrastructure development in the corridors (i.e. serve as a scoping exercise).

The key deliverables and reporting requirements include:

- Study methodology;
- Data sources with metadata;
- Assumptions, limitations, confidence estimates;
- A description of each corridor area in terms species and habitats present;
- An indication of whether a reserve determination has been undertaken and indicate if and where general water use authorisation is available in each corridor;
- Identify opportunities and areas of Generation Water Use authorisation and possible accelerated license approval;
- A description of the likely effects that electricity grid infrastructure will have on priority species and their habitats in each corridor. This should include an assessment of the relative value of the area and should include an outline of the confidence in these predictions;
- Identify and report key aquatic and terrestrial sensitivities (features) within each of the corridors, making use of datasets made available through the draft environmental constraints map and additional information sourced by the specialist[2].
- Develop an approach for classing each sensitivity feature according to a four- tiered sensitivity rating system i.e. Very High, High, Medium or Low[3].
- Provide the assessment criteria and assumptions used to determine sensitivity ratings for each sensitivity feature;
- Develop a GIS based four-tiered consolidated sensitivity map of all sensitivity features identified through the assessment showing the location and spatial extent for each sensitivity feature and associated buffering, if any, for each of the corridors. The sensitivity rating should be illustrated according to the following coloration scheme: Dark Red/Very High, Red/High, Orange/Medium, Green/Low[4].
- A guideline on the interpretation and implementation of the four tier maps as well as permit requirements (where applicable) for each corridor. This section should also make recommendations on requirements for additional terrestrial and aquatic biodiversity specialist studies (if any) within the different tiers of sensitivity specialist before an authorisation can be considered.

[2] The sensitivity delineation should be undertaken in the context of all electricity grid infrastructures including transmission lines, distribution lines and substations.
[3] Sensitivities should be graded in relation to the ability to apply mitigation measures.
[4] Where available, standardised and recognised sensitivity mapping methodologies should be used to determine sensitivities for each feature for each of the corridors.

- Recommendations should be focused around the objective of streamlining without compromising environmental protection. This information will be incorporated into a Development Protocol that will ultimately govern development in the corridors; and
- General comments and discussion for each corridor on the nature of key potential impacts and proposed mitigation.

5 BACKGROUND

The National Department of Environmental Affairs (DEA) has embarked on a process of identifying ways to act swiftly, streamline and shorten the environmental authorisation process for major infrastructure build programmes in South Africa. The Council for Scientific and Industrial Research (CSIR) and South African National Biodiversity Institute (SANBI) have been commissioned to undertake a Strategic Environmental Assessment of the electricity transmission and distribution corridors, linked to SIP 10: Electricity Transmission and Distribution for all. The aim of the SEA is identify suitable routing corridors that will enable the efficient and effective expansion of key strategic transmission infrastructure designed to satisfy national transmission requirements up to the 2040 planning horizon. The SEA aims to guide the location of infrastructure towards areas of less sensitivity, while also allowing the streamlining of the environmental authorisation process within these areas.

Five national transmission infrastructure corridors have been identified by Eskom and refined through an initial constraints analysis. The corridors are:

- The Eastern Corridor;
- The Western Corridor;
- The Northern Corridor;
- The Central Corridor, and
- The International Corridor.

The Freshwater Consulting Group (FCG) and its sub-consultants undertook a scoping level pre-assessment of the terrestrial and aquatic biodiversity components of the final corridors, the results of which informed a biodiversity sensitivity analysis and map for each corridor. The team was also asked to provide guidance on the interpretation and implementation of the resulting biodiversity sensitivity maps, and recommendations for environmental authorisation processes and for specialist terms of reference for impact assessments within the corridors.

6 APPROACH AND METHODOLOGY

6.1 Study methodology

6.1.1 Input spatial data

A desktop approach using only existing data sets was used to assess the sensitivity of terrestrial and aquatic biodiversity features in the five final transmission corridors identified through the initial constraints analysis.

A spatial data package containing relevant national and regional biodiversity layers was provided by SANBI and the CSIR. This database was supplemented with additional data sets identified by the project team and in consultation with provincial conservation planners at the 2015 Biodiversity Planning Forum (June 2015).

National biodiversity datasets covering all corridors at the same level of detail were supplemented with higher confidence or more spatially accurate fine-scale or regional data wherever available, thus providing maps with a higher confidence level than the national cover. A full list of datasets used for the generation of the sensitivity maps can be found in Section 2.2.2

Only data of adequate confidence and spatial precision relative to site-scale land-use planning was used. Although some data sets are coarser, and field verification at site scale is essential, all raster processing was at 30m x 30m resolution to match the 2013-2014 National land cover (released 2015, © www.geoterraimage.com) and provide outputs useful down to 1:10,000 scale.

6.1.2 Sensitivity analysis and selection of routes and footprints

All spatial data sets (GIS maps) containing biophysical features relevant to the corridors were compiled, and each unique feature scored on the same simple four-tier system to indicate its sensitivity to impacts associated with electrical grid infrastructure construction, operation and maintenance: *low, medium, high,* and *very high*. In addition, areas with no sensitive features and no remaining natural habitat were excluded from final data sets. These areas should be considered as a subset of lowest sensitivity locations, i.e. *very low*.

Lowest sensitivity is equivalent to lowest impact to and mitigation required for the nature and scale of development associated with grid infrastructure. For all features, the highest (very high) sensitivity, and therefore highest impact and mitigation requirements for grid infrastructure identifies features that should be avoided at all costs during infrastructure planning and design, and potentially requiring greatest effort and cost for minimising and/or mitigating unavoidable impact.

Integration of multiple input features for the purposes of overview maps and as a planning aid was typically done by a simple maximum score approach for any combination of features, such that only the highest individual sensitivity of all input features was reflected in a summary output layer. This provided a simple and intuitive “bottom line” sensitivity map with an easy to interpret delineation of less and more sensitive areas.

Where there are very few sensitive features, a manual route selection approach could be adequate to support selection of transmission routes and built footprints that minimise overall biodiversity impacts equivalent to high and permanent, global scale negative environmental impacts.

A manual approach cannot however differentiate sites with multiple sensitive features, nor provide useful guidance where there are large areas of multiple very sensitive features that must be traversed.

We cannot emphasize enough that attempting route selection that detours around highest sensitivity features identified by a maximum score approach, especially using a visual inspection and manual route selection, cannot properly minimise overall route impacts.

It is strongly recommended that during initial planning phase, overall route impacts are minimised by use of a least cost path planning approach where all features of varying sensitivities are accounted for. This is globally accepted as the best approach to identify linear infrastructure routes that minimise both cost and overall environmental impacts. Suitable tools are available in all GIS software, and methodologies are well known. An excellent description of approaches, including application for electrical grid planning can be found at http://www.innovativegis.com/basis/mapanalysis/topic19/topic19.htm

Fortunately, the four-tier sensitivity mapping approach used here is ideal for preparation of a cost surface for least-cost path route selection. Separate component data sets can be weighted appropriately and summed.

For preparation of a biodiversity feature costs surface, the overall maximum score summary layer could be used. However, we feel that at least species data sets should be summed additively.

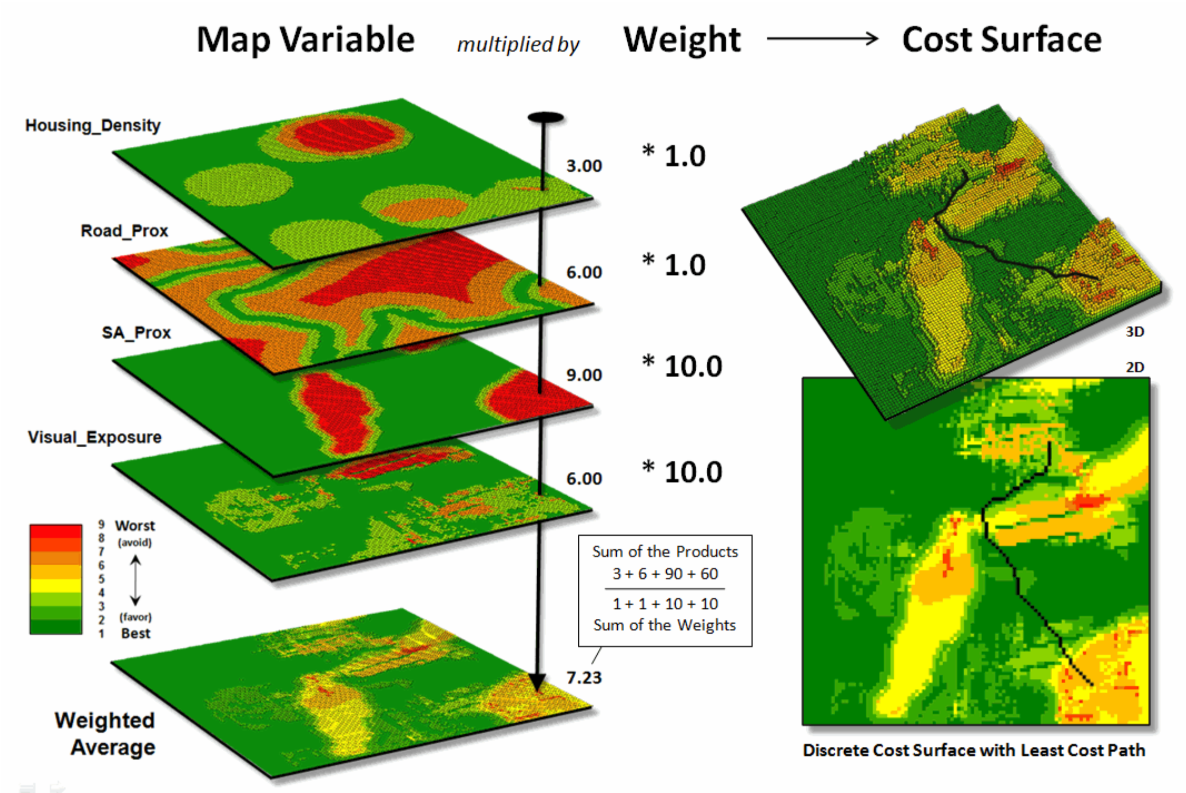


Table 6.1. An example of least cost route selection from http://www.innovativegis.com/basis/mapanalysis/topic19/topic19.htm Approaches to straighten route sections are also available and described here.

In summary, we recommend the use of a maximum score map as requested at the initiation workshop for feature representation and inspection, but still recommend a summed score + least cost path approach for actual route selection, especially where traversing sensitive features is unavoidable.

6.1.3 Water Use and Environmental Authorisation

The final section of the study provides recommendations for the interpretation and implementation of the sensitivity maps, and for streamlining the water use and environmental authorisation processes required for the design, construction and operation of EGI in the corridors. Terms of reference for biodiversity specialist input are also provided in Section 18.

7 DATA SOURCES

7.1 Overview of spatial data types and key aggregated EGI sensitivity layers.

Table 7.1 Overview of spatial data types and key summary layers.

Summary layer	Data type	Source/s & extent/s
Terrestrial Habitat	Protected Areas, and PA expansion areas	National, database and analysis, supplemented with regional and local data
	Ecosystem Status	Best available from National, regional & local systematic assessments
	Land Cover / remaining natural extent	National land cover, supplemented by various regional data sets differentiating areas with no natural habitat (e.g. artificial water bodies and wetlands).
	Conservation Plans / Critical Biodiversity Areas	Multiple provincial, regional and local systematic assessments
	Forest areas – natural indigenous forest	DAFF National forest mapping, supplemented by SA Vegetation Map 2009 and National Land Cover 2013-14.
	Thicket areas – natural Albany thicket habitats	Pristine, and dense thicket areas from STEP Eastern Cape mapping and National Land Cover 2013-14.
Aquatic	Wetlands – mapping & classification for buffering rules	National wetland mapping supplemented by available regional and local data sets.
	Rivers – mapping & classification for buffering rules	National NFEPA rivers.
Species of conservation concern	Plants	SANBI TSP national locality records
	Reptiles	SANBI composite national locality records: only Geometric Tortoise used. Other reptile species of concern are broadly considered and described in the Corridor Descriptions
	Bats	NOT included, most records in EWT national important roost sites data confirm to very coarse grid, not suitable to map EGI sensitivity.
	Butterflies	NOT included, National locality records not suitable to map EGI sensitivity
	Mammals, other	NOT included, spatial data for highly restricted threatened / endemic species not available
	Birds	NOT included here. Separate specialist assessment
Topography / Physical	Slope steepness / vulnerability to erosion.	Derived from national digital elevation model (DEM)

7.2 List of data sources used and/or consulted

7.2.1.1 Aquatic

Table 7.2 Summary of aquatic data used in the study, indicating their source, description and use.

Data set	Source and date of publication	Data Description
Aquatic National Datasets		
NFEPA wetlands	Nel J.L., Driver A., Strydom W., Maherry A., Petersen C., Roux D.J., Nienaber S., van Deventer H, Smith-Adao LB and Hill L. (2011). Atlas of Freshwater Ecosystem Priority Areas in South Africa: Maps to support sustainable development of water resources. WRC Report No. TT 500/11, Water Research Commission, Pretoria	This layer codes Wetland Freshwater Priority Areas (FEPAs), wetland ecosystem types and condition on a national scale. The delineations were based largely on remotely-sensed imagery and therefore did not include historic wetlands lost through drainage, ploughing and concreting.
NFEPA rivers	Nel J.L., Driver A., Strydom W., Maherry A., Petersen C., Roux D.J., Nienaber S., van Deventer H, Smith-Adao LB and Hill L. (2011). Atlas of Freshwater Ecosystem Priority Areas in South Africa: Maps to support sustainable development of water resources. WRC Report No. TT 500/11, Water Research Commission, Pretoria	The layer provides river condition, river ecosystem types and free-flowing river information that were used in deriving Freshwater Ecosystem Priority Areas (FEPAs) for river ecosystems. It used the 1:500 000 river GIS layer available from DWS.
NFEPA sub-catchments	Nel J.L., Driver A., Strydom W., Maherry A., Petersen C., Roux D.J., Nienaber S., van Deventer H, Smith-Adao LB and Hill L. (2011). Atlas of Freshwater Ecosystem Priority Areas in South Africa: Maps to support sustainable development of water resources. WRC Report No. TT 500/11, Water Research Commission, Pretoria	Sub-quaternary catchments classified according to the FEPA rivers they contain.
NFEPA groundwater recharge	Nel J.L., Driver A., Strydom W., Maherry A., Petersen C., Roux D.J., Nienaber S., van Deventer H, Smith-Adao LB and Hill L. (2011). Atlas of Freshwater Ecosystem Priority Areas in South Africa: Maps to support sustainable development of water resources. WRC Report No. TT 500/11, Water Research Commission, Pretoria	High groundwater recharge areas are sub-quaternary catchments where groundwater recharge is three times higher than the average for the related primary catchment. Data consulted
Strategic Water Source Areas	Jeanne Nel, Christine Colvin, David Le Maitre, Janis Smith and Imelda Haines (2013). South Africa's Strategic Water Source Areas. CSIR Report no. CSIR/NRE/ECOS/ER/2013/0031/A	Strategic Water Source Areas are those quaternary catchments that supply a disproportionate amount of runoff to geographical areas of interest. The data are expressed as the % contribution of runoff to the country's water supply. Those catchments contributing more than 50% of supply are considered to be strategic water source areas. This dataset was used for corridor descriptions.

Data set	Source and date of publication	Data Description
Level 1 river ecoregions	Kleynhans *et al.* (2005) A level 1 river ecoregional classification system for South Africa, Lesotho and Swaziland. Department of Water Affairs and Forestry.	The country is divided into 31 Level 1 ecoregions, based on physiography, climate, rainfall, geology, natural vegetation. This dataset was used for corridor descriptions.
NFEPA wetveg groups	Nel, J.L., Murray, K.M., Maherry, A.M., Petersen, C.P., Roux, D.J., Driver, A., Hill, L., Van Deventer, H., Funke, N., Swartz, E.R., Smith-Adao, L.B., Mbona, N., Downsborough, L. and Nienaber, S. (2011). Technical Report for the National Freshwater Ecosystem Priority Areas project. WRC Report No. K5/1801.	A GIS layer of wetland vegetation groups used to classify wetlands according to Level 2 of the national wetland classification system (SANBI 2010), which characterises the regional context within which wetlands occur. This dataset was used for corridor descriptions, and for determination of wetland types.
Ramsar sites	RAMSAR Sites Information Services www.ramsar.wetlands.org (accessed June 2015)	Polygon data for the 22 Wetlands of International Importance in South Africa.
Aquatic Regional Datasets		
City of Cape Town wetlands map	Ewart-Smith, JL, Snaddon, K., Ractliffe, SG, Dallas, HF, Ollis, DJ and Ross-Gillespie, V. (2008) Revised wetland GIS cover for the city of cape town. Phase 4: cape peninsula, city centre, northern and eastern extremities and the complete city wetlands map	Wetlands mapped off aerial photography, using rivers and waterbodies data as additional informants.
CAPE fine-scale wetland maps	Job, N., Snaddon, K., Day, L., Nel, J. And Smith-Adao, L. (2008) C.A.P.E. fine-scale planning project: aquatic ecosystems of the Sandveld-Saldanha planning domain. Job, N., Snaddon, K., Day, L., Nel, J. And Smith-Adao, L. (2008) C.A.P.E. fine-scale planning project: aquatic ecosystems of the Upper Breede planning domain.	Wetlands were mapped using SPOT5 imagery and aerial imagery. A large proportion of wetlands were ground-truthed in the field.
KZN wetland map	Scott-Shaw, C.R. and Escott, B.J. (Eds) (2011) KwaZulu-Natal Provincial Pre-Transformation Vegetation Type Map – 2011. Unpublished GIS Coverage [kznveg05v2_1_11_wll.zip], Biodiversity Conservation Planning Division, Ezemvelo KZN Wildlife, P. O. Box 13053, Cascades, Pietermaritzburg, 3202.	Wetland map was extracted from the KZN vegetation type map by Fahiema Daniels, SANBI.
Mpumulanga Highveld wetland map	SANBI, no publication, mapping done between August 2013 and September 2014	Wetland delineations were based on tracking wetlands on Spot 5 imagery within the Mpumalanga Highveld boundary supported by Google Earth, 1:50 000 contour lines, 1:50 000 river lines, exigent data, and NFEPA wetlands. This focuses on updating previously mapped wetlands in three major steps which are desktop digitizing, field ground-truthing and mapped data reviewing.

Data set	Source and date of publication	Data Description
Free State wetland map	Collins, N.B. 2015 Provincial Biodiversity Plan Free State. Draft Ver. 1.2 March 2015. Unpublished project report. Department of economic, small business development, tourism and environmental affairs Free State Province (DESTEA).	Compilation of wetland as input into Free State Provincial Biodiversity Plan, provides additional mapped and modelled wetland areas cf. NFEPA wetlands. No indication of polygon source so all treated as lower confidence than NFEPA data.
Wind and Solar SEA wetlands data	CSIR, National Wind and Solar PV SEA Specialist Report -Terrestrial and Aquatic Biodiversity. Mapped in 2014 by Kate Snaddon, Justine Ewart-Smith and Nancy Job	NFEPA wetlands were edited, using SPOT5 and Google Earth imagery, and expert review.

7.2.1.2 Terrestrial

Table 7.3 Summary of terrestrial data used in the study, indicating their source, description and use.

Data set	Source/s and date of publication	Data Description
Terrestrial: National / National Composited Datasets		
Protected Areas	SANBI Protected Area protected areas database beta version June 2015, based on 2013 DEA PA database. Supplemented with in-process of transfer and proclamation areas from major Dassenberg Conservation Corridor initiative in the Western Cape, data provided by CapeNature and City of Cape Town DCCP partnership June 2015.	Protected Areas – formal and de-facto, used for all corridors
National Protected Areas Expansion Strategy 2010	NPAES focus areas 2010 data set downloaded May 2015 www.bgis.sanbi.org DEAT (2008) The National Protected Area Expansion Strategy 2008-2012: A framework for Implementation. South African National Biodiversity Institute, National Department of Environmental Affairs and Tourism.	NPAES focus areas layer indicates likely large future protected areas, where direct and visual impacts of EGI would compromise PA value.
Land cover / Extent of natural habitat	South African National Land Cover 2013-2014, 72 class data set www.geoterraimage.com, DEA open license used to derive natural vs not natural habitat classes. Updated with: • Mpumalanga Biodiversity Sector Plan 2014 land cover • National agricultural field boundaries 2007-2013 (DoA), including old fields • NFEPA 2011 artificial wetlands	Land cover for South Africa, classified and updated to show extent of remaining natural or near natural vegetation. Natural vegetation used to mask other data sets to show only remaining extent, e.g. of Threatened Ecosystems, Plant species records. Also used to derive additional areas of specific sensitive habitats: • Forest areas • Dense thicket areas within Albany Thicket Biome
South African Vegetation Map 2009	Mucina, L. & Rutherford, M.C. (eds) 2009. The Vegetation of South Africa, Lesotho and Swaziland (electronic version / shapefile). South African National Biodiversity Institute, Pretoria., Version date January 2012	South African National vegetation map used for all corridors for determining vegetation endemism, additional vegetation sensitivity and sensitive biomes.

Data set	Source/s and date of publication	Data Description
Threatened Ecosystems of South Africa	Western Cape: Ecosystem status assessment of Western Cape units of Vegetation of SA 2009 using best available compilation of habitat condition data at August 2013, unpublished data G. Pence / CapeNature. Rest of SA (Excluding W Cape): Department of Environmental Affairs (2011). National list of ecosystems that are threatened and in need of protection. Government Gazette No. 34809, Notice No. 1002, 9 December 2011. Based on Vegetation of SA 2006. Criterion D1 listed ecosystems were excluded.	Gazetted or best current assessment of threatened ecosystems used in all corridors
DWAF Indigenous Forest Patches 2005	Systematic conservation planning for the forest biome of South Africa. Approach, methods and results of the selection of priority forests for conservation action. DWAF October 2005	Compilation and description of all forest patches in South Africa by D. Berliner. Used for all corridors if present.
Terrestrial: Regional Datasets		
City of Cape Town Biodiversity Network 2015	City of Cape Town Biodiversity Branch. Version distributed 1 June 2015.	Mapping of fine scale ecosystem status and Critical Biodiversity Areas for the City of Cape Town
Western Cape Biodiversity Framework 2014	Pence, G.Q. 2014 Western Cape Biodiversity Framework 2014 Status Update: Critical Biodiversity Areas of the Western Cape. Unpublished CapeNature Project Report.	CBA & ESA maps covering Western Cape
Hantam Municipality data, CAPE Fine Scale Planning 2010	Pence, G.Q. 2010 CAPE Fine Scale Plans Critical Biodiversity Areas of the Western Cape. Unpublished CapeNature Project data.	CBA maps for Hantam Municipality, Northern Cape
Namakwa District Biodiversity Sector Plan 2008	Desmet P. & Marsh A. (2008) Namakwa Biodiversity Sector Plan. Conservation International.	CBA maps Namakwa District Municipality Northern Cape
Gauteng C-Plan V3.3 March 2014	GDARD (2014): Technical Report for the Gauteng Conservation Plan (Gauteng C-Plan v3.3). Gauteng Department of Agriculture and Rural Development: Nature Conservation Directorate.	CBA Maps for Gauteng Province
Mpumalanga Biodiversity Sector Plan 2014	MTPA. 2014. Mpumalanga Biodiversity Sector Plan Handbook. Compiled by Lötter M.C., Cadman, M.J. and Lechmere-Oertel R.G. Mpumalanga Tourism & Parks Agency, Mbombela (Nelspruit).	Landcover indicating natural habitat and Critical Biodiversity Maps for Mpumalanga
Free State Provincial Biodiversity Plan 2015	Collins, N.B. 2015 Provincial Biodiversity Plan Free State. Draft Ver. 1.2 March 2015. Unpublished project report. Department of economic, small business development, tourism and environmental affairs Free State Province (DESTEA).	CBA maps Free State Province
Limpopo Conservation Plan v2 2013	Desmet, P. G., Holness, S., Skowno, A. & Egan, V.T. (2013) Limpopo Conservation Plan v.2: Technical Report. Contract Number EDET/2216/2012. Report for Limpopo Department of Economic Development, Environment & Tourism (LEDET) by ECOSOL GIS	CBA maps Limpopo Province
North West Biodiversity Assessment 2008	Desmet, Skowno & Schaller (2008) Biodiversity Assessment of North West, NWDACE.	CBA maps North West Province

Data set	Source/s and date of publication	Data Description
Eastern Cape Biodiversity Conservation Plan 2007	Berliner D. & Desmet P. (2007). Eastern Cape Biodiversity Conservation Plan: Technical Report. Department of Water Affairs and Forestry Project No 2005-012, Pretoria.	CBA maps for Eastern Cape Province NB: used with modified CBA classification cf. other plans due age of plan, lack of systematic target based approach and resulting extensive CBA coverage.
Baviaanskloof Mega Reserve Project 2008	Skowno, A. (2008) Baviaanskloof Mega-Reserve Biodiversity Assessment Version 3 14 May 2008. Unpublished Wilderness Foundation Project Report.	Eastern Cape / Eastern Corridor - small portion. Delineates more focussed and target driven CBAs within study area than broader E Cape CBAs
Nelson Mandela Bay Conservation Assessment 2009	Stewart, W. 2009 Final Conservation Assessment and Plan for the Nelson Mandela Bay Municipality. SRK Project Number 367380/5.	CBA Maps for Nelson Mandela Bay metro
Addo Mainstreaming Project CBA Map	Skowno, A.L. & Holness, S.D. (2012) Addo Mainstreaming Project - Updated CBA maps & technical report. SANParks.	Addo District Bioregional Plan in Eastern Cape Data reviewed but NOT used as it is derived from other Terrestrial and Aquatic datasets adequately represented in this EGI analysis, including the 2007 E Cape Conservation Plan, in which original CBA class categories were discarded.
KwaZulu Natal Terrestrial Systematic Conservation Plan 2010	Dr Boyd Escott, Tamsyn-Claire Livingstone, Bheka Nxele, Dr Jean Harris, Debbie Jewitt 2012 Draft Document describing the Conservation Planning Terms for the EKZNW Spatial Planning Products Version 1.0. Ezemvelo KZN Wildlife	Terrestrial and Aquatic CBA Maps for KwaZulu Natal Province
STEP thicket degradation map	Cowling, R.M., Lombard, A.T., Rouget, M., Kerley G.I.H., Wolf T., Sims-Castley, R., Knight, A., Vlok, J.H.J., Pierce, S.M., Boshoff, A.F. & Wilson, S.L. 2003. A conservation assessment for the Subtropical Thicket Biome. *Terrestrial Ecology Research Unit Report* No 43. 106 pp. Appendices 80 pp. University of Port Elizabeth, South Africa. (see www.bgis.sanbi.org)	Pristine sensitive Albany Thicket patches in Eastern Cape / Eastern Corridor
Eastern Cape Protected Areas Expansion Strategy	Skowno, A., Holness, S., Jackelman, J. and P. Desmet (2012) Eastern Cape Protected Area Expansion Strategy, Eastern Cape Parks and Tourism Agency, East London.	High scoring areas in the EPAES analysis may be used to supplement the CBA information for the Eastern Corridor

7.2.1.3 Species

Table 7.4 Summary of species data used in the study, indicating their source, description and use.

Data	Source and date of publication	Data Description
Species Datasets		
Plants - SANBI Threatened Species Programme records	Unpublished SANBI TSP database at May 2015	Plant point records with IUCN threat status and spatial precision. Assessment criteria only available for Western Cape.
Reptiles	Unpublished SANBI database at May 2015.	Reptile point records with IIUCN threat status and spatial precision. Only Geometric Tortoise data were used.
Bat roost localities	Bat roost point location GIS data with indication of roost size (<500 or >500) supplied by EWT, dated July 2014	NOT used due to no spatial precision information and majority of points arranged in grid clearly indicating that majority of points are either quarter degree centroids or similar source not useable for any land use planning.
Butterflies	Unpublished SANBI database at May 2015.	NOT used due to poor spatial precision of data and unavailability of data to indicate any species with restricted enough area of occupancy such that EGI infrastructure would pose a risk to global population. Species of concern were however extracted for each corridor section and are described in the Corridor Descriptions.

7.2.1.4 Topography (slope)

Table 7.5 Summary of topography data used in the study, indicating source, description and use.

Data	Source and date of publication	Data Description
Physical/Topography: National Datasets		
Digital Elevation Model SRTM	NASA and US National Geospatial-Intelligence Agency (NGA) Shuttle Radar Topography Mission (SRTM) 1 Arc-Second Global data set. See https://lta.cr.usgs.gov/SRTM1Arc. Downloaded from http://earthexplorer.usgs.gov/ 10 June 2015.	Approximately 25m resolution Digital Elevation Model used to derive slope classes. Also used to derive hillshade overlay.

8 ASSUMPTIONS AND LIMITATIONS

Limitation	Included in the scope of this study	Excluded from the scope of this study	Assumption
Accuracy and completeness of existing datasets	*Only existing, published datasets used with limited desk top verification*	*Field verification of datasets, and extensive local expert consultation*	*Reasonable accuracy of data layers used.* *Field verification will take place on a site by site basis linked to development proposals.*
This is a desktop assessment of biodiversity sensitivity based largely on existing datasets, with some expert review and input from the consultant team. Some of these existing datasets were refined and or modified for this project. However even desktop based verification or mapping of additional features is impossible at the scale of the study area. As such, the primary limitation of the study is the lack of ground truthing and wider expert consultation. Fortunately, areas where biodiversity feature mapping and Critical Biodiversity Area planning tend to be extremely poor, most notably for the Nama-Karoo biome and large parts of the Northern and Eastern Cape Provinces, are also areas where habitats are relatively intact, such that impacts of the type and scale contemplated in this study are unlikely to impact unknown very high or high sensitivity habitat types. Species data sets are almost never comprehensive, and although they are helpful to identify known occurrences of species of special concern that would be vulnerable to EGI development, the absence of records should not be construed to indicate that no species of concern are present, and proposed development locations must always be surveyed in field, in the appropriate season, by experienced specialists. The available information used to derive the sensitivity maps is at a relatively coarse scale. As such, the sensitivity maps are best used to guide development at scales of approximately 1:10 000 and higher. At finer scales, there are likely to be locally sensitive features present. The presence of such features does not invalidate or compromise the value of the SEA and the current study, but simply implies that some level of specialist input is required to identify and map such features so that they can be avoided at a local level by the development footprint if necessary (see Section 18). The confidence level assigned to the rivers and wetlands maps are a guide to the extent to which aquatic features should be checked against satellite and/or aerial imagery, at the very least, or through in-field ground-truthing (see Section 18).			

9 RELEVANT REGULATORY INSTRUMENTS

Table 9.1 Summary of the legislation that is relevant to the study and which has implications for infrastructure development in South Africa.

Instrument	Key objective
International	
Ramsar Convention (The Convention of Wetlands of International Importance (1971 and amendments)	Protection and conservation of wetlands, particularly those of importance to waterfowl and waterfowl habitat. South Africa is a signatory to the Ramsar Convention and is thus obliged to promote the conservation of listed wetlands and the 'wise management' of all others.
National	
National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004)	The National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004) provides for listing threatened or protected ecosystems, in one of four categories: critically endangered (CR), endangered (EN), vulnerable (VU) or protected. Activity 12 in Listing Notice 3 (Government Notice R546 of 2010) relates to the clearance of 300 m2 or more of vegetation, within Critical Biodiversity Areas.
National Environmental Management Act (Act 107 of 1998).	The National Environmental Management Act of 1998 (NEMA), outlines measures that....”prevent pollution and ecological degradation; promote conservation; and secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.” Of particular relevance to this assessment is Chapter 1(4r), which states that sensitive, vulnerable, highly dynamic or stressed ecosystems, such as coastal shores, estuaries, wetlands, and similar systems require specific attention in management and planning procedures, especially where they are subject to significant human resource usage and development pressure.
NEMA EIA 2014 regulations (Government Gazette 38282 (December 2014)	These regulations provide listed activities that require environmental authorisation prior to development because they are identified as having a potentially detrimental effect on natural ecosystems, including freshwater ecosystems. Different sorts of activities are listed as environmental triggers that determine different levels of impact assessment and planning required. The regulations detail the procedures and timeframes to be followed for a basic or full scoping and environmental impact assessment.
The National Forests Act (Act 84 of 1998)	The objective of this Act is to monitor and manage the sustainable use of forests. In terms of Section 12 (1) (d) of this Act and GN No. 1012 (promulgated under the National Forests Act), no person may, except under licence: • Cut, disturb, damage or destroy a protected tree; or • Possess, collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree or any forest product derived from a protected tree.
National Water Act (Act 36, 1998)	This act provides the legal framework for the effect and sustainable management of water resources. It provides for the protection, use, development, conservation, management and control of water resources as a whole. Water use pertains to the consumption of water and activities that may affect water quality and condition of the resource such as alteration of a watercourse. Water use requires authorisation in terms of a Water use licence (WULA) or General Authorisation (GA), irrespective of the condition of the affected watercourse.

Instrument	Key objective
General Authorisation 399 (March 2004) in terms of Section 29 of the Water Act	Provides thresholds for general authorisations relating to taking, storing and discharging water.
General Authorisation 1199 (December 2009) in terms of Section 29 of the Water Act – to be updated within the next year	Provides conditions for general authorisation of non-consumptive water uses pertaining to Section 21 (c) (impeding or diverting flow in a watercourse) and (i) (altering the bed and banks of a watercourse) of the Water Act.
Conservation of Agricultural Resources Act (CARA, Act 43 of 1983).	Key aspects include legislation that allows for: Section 6: Prescription of control measures relating to the utilisation and protection of vleis, marshes, water sponges and water courses. These measures are described in regulations promulgated in terms of the Act, as follows; Regulation 7(1): Subject to the Water Act of 1956 (since amended to the Water Act 36 of 1998), no land user shall utilise the vegetation of a vlei, marsh or water sponge or within the flood area of a water course or within 10 m horizontally outside such flood area in a manner that causes or may cause the deterioration or damage to the natural agricultural resources. Regulation 7(3) and (4): Unless written permission is obtained, no land user may drain or cultivate any vlei, marsh or water sponge or cultivate any land within the flood area or 10 m outside this area (unless already under cultivation).
Provincial	
Nature and Environmental Conservation Ordinance (Ordinance 19 of 1974; amended in 2000).	This ordinance is applicable in the Western Cape, Eastern Cape, Northern Cape and parts of the North West Province. This ordinance provides measures to protect the natural flora and fauna, as well as listing nature reserves in these provinces This ordinance was amended in 2000 to become the Nature Conservation Laws Amendment Act. Lists of endangered flora and fauna can be found in this act.

10 IMPACT CHARACTERISATION

In order to understand the potential impacts and identify sensitive features that may be affected by power lines, it is important to consider and characterise the nature and extent of impacts associated with grid infrastructure development and in particular the high capacity lines relevant to the current study. The most obvious feature of transmission infrastructure is its linear nature. Allied to this is the limited ability of the line to be deviated in order to avoid potentially sensitive features. Given the long length of most power lines, it is inevitable that they will encounter sensitive features along their route. As such, detailed planning of power line alignment is a critical aspect of reducing power line impacts, as once the alignment has been decided; there is little scope for significantly adjusting the route. Due to their high construction cost as well as transmission losses, there is strong pressure on power line alignments to be as short and efficient as possible. The end result of this is that they often traverse areas far from existing development and must frequently include rugged and mountainous terrain were potential impacts can be significantly higher than on open plains.

Potential impacts related to the construction and operation of grid infrastructure development include the direct loss of biodiversity within the development footprint, loss of habitat for fauna, habitat degradation due to alien plant invasion or land degradation, impacts on broad–scale ecological processes due to habitat loss and fragmentation and loss of habitat within sensitive listed ecosystems which may impact future conservation options. Even if infrastructure footprints do not encroach into sensitive ecosystems, these habitats can be significantly transformed through hydrological and water quality changes, or topographical alteration (e.g. infilling, flattening) required to accommodate development in close proximity to, for instance, wetlands or rivers. More detail on the impacts expected to impact on aquatic ecosystems is provided in Appendix 1.

Besides the destruction of habitat or damage to sensitive ecosystems during construction, a number of construction-related activities can significantly impact on the integrity of these habitats through pollution of surface water and increased noise due to human presence and activities. Impacts associated with the operational phase of development are largely caused by maintenance activities that involve clearing or trimming of natural wetland or riparian vegetation.

The different components of transmission infrastructure and their relationship with impact generating activities can be characterised as follows:

- **Pylons:** Each pylon has a footprint of up 1ha that is disturbed during construction. This is required in order to excavate and fill the foundations of the pylon as well as assemble and then raise the pylon on-site. This translates to a footprint of approximately 166 ha per 100 km of 765 kV power line.
- **Vegetation clearing and management in power line servitudes:** Vegetation management or lack thereof is one of the main impact sources associated with power lines. Although Eskom has a policy and guidelines in this regard[5], they do not provide an explicit framework for actual clearing need, method and widths, and the in field approaches are not consistent. It is therefore impossible to quantify this impact here as a result. Where trees are present[6] or where there is a risk that fire could cause shorting of lines, vegetation beneath the power lines may need to be cleared[7]. The

[5] Eskom Document number 32-247, revision date May 2007 *Environmental Procedure: Procedure for vegetation clearance and maintenance within overhead power line servitudes and on Eskom owned land*

[6] Section 2.1 a) "Trees growing to a height in excess of the horizontal distance of that tree from the nearest conductor which are identified as a risk to safe operation of the power line shall be treated and prevented from growing in such a manner as to endanger the line should they fall." See also Annex B of the same document.

[7] See Annex C: Vegetation clearing requirements for power lines.

guidelines indicate that a minimum of an 8m strip shall be cleared below 33kV and lower lines, with type of clearing not specified, except that a 5m access route cut close to the ground if required, and any regrowth should be cut to 50mm of ground. For larger than 33kV lines, the specification is to be determined by EIA and EMPr on a case by case basis. In practise, even trees may be tolerated beneath the power lines in places. But in other areas, vegetation is regularly mowed or cleared to within as little as 20cm of the ground even in short vegetation, and ecosystems with no fire risk (see e.g. Figure 2.8). Where aliens are cleared beneath the power line, this can have beneficial impacts, but there are also situations where disturbance encourages alien invasion beneath the lines. As the extent of clearing can be up to 60m wide for a 765kV power line, this can potentially generate up to 600ha of impact per 100 km of power line. The post-construction management of the power line footprint is potentially the major impact associated with power line infrastructure in general. Large areas may be unnecessarily cleared leading to a high cumulative habitat loss and impact along power line servitudes. The alternative, where appropriate evidence-based management is applied, and clearing is only applied where it genuinely poses a risk, would greatly reduce negative impact and could result in potentially positive effects in many areas.

- **Access Roads:** An access road is required for construction as well as maintenance of a power line. This is generally around 4 m wide during construction and may become a simple two-track during operation of the power line. The initial disturbance footprint of such roads is approximately 40ha per 100km of power line, but is sensitive to the exact width of the road as well as the habitat as roads on steep or uneven terrain create more disturbance due to the cut and fill that is usually required in order to make the site accessible for heavy vehicles. Where roads are not subsequently managed or rehabilitated, especially where construction does not follow best practice for water and erosion management, serious ongoing erosion and associated incremental habitat degradation will result.

- **Substations:** Transmission and distribution substations are required. These may be long distances apart, but can generate a relatively large local impact as they may be up to 70 ha in extent and usually also require borrow pits, construction camps, temporary lay down areas etc. during construction. As construction can take more than a year, they also generate a lot of vehicle traffic during construction, which can cause a lot of ancillary impact.

- **Construction Activities:** During construction there is a lot of noise generated by construction activities, which may deter some fauna from the affected areas. In addition, construction requires temporary lay-down areas, construction camps, quarries and batching plants, all of which increase the development footprint. In rugged terrain, cement is mixed on-site using smaller portable equipment brought in by road, while in extreme situations helicopters may also be used to bring materials to site. Construction proceeds relatively rapidly however and is usually completed within an area within a matter of weeks. Clearing of vegetation for construction can have long-term negative consequences of high significance when this occurs in sensitive habitats.

Figure 10.1 Construction of the 765 kV Kappa-Omega power line, near to where the line crosses the N7, illustrating the activities and some indication of the level of disturbance created during construction. There are also a large number of vehicles for transporting the construction crew outside of the picture, and which also create some impact.

Figure 10.2 The Kappa-Omega 765 kV line east of Ceres, showing the construction of the new line adjacent to the existing 400 kV line. Although the existing access road has been used, it has been upgraded for the construction, but does not have any erosion control structures present. The impact of clearing under the existing 400 kV line is clearly visible and illustrates the large scale of the clearing compared to the extent of the road. It is clear that the clearing is not just directly below and line and for the access road, but has occurred for the whole corridor.

11 CORRIDOR DESCRIPTION

In this section, the different features which characterize each of the corridors are briefly described, with particular reference to sensitive features and species which may be affected by the development of grid infrastructure. For the terrestrial environment, we have delineated a number of different ecoregions which define broad areas with a similar environment. At a broad scale, these correspond largely to the different biomes, but in some areas, these interdigitate or form complex mosaics, and in these instances, the combination of biomes which characterise some areas has also been used. The terrestrial ecoregions that we have used are depicted below, in

Figure 11.1. Ideally we could develop point locations or fine-scale habitat maps for each species of concern, however the available data does not allow for such detailed mapping and attempting to do so would result in large errors of omission and compromise the precautionary principle. Therefore, it is prudent to adopt a habitat approach at least for the majority of species except for those which have been specifically investigated and for which accurate distribution data is available.

The descriptions provided below are intended to provide a brief overview of each corridor and it is not possible or that useful to attempt to provide in-depth coverage of every feature of potential concern within the corridors. The different bioregions and corridor zones indicated below are very broad and indicate at a broad level what the major issues of concern are likely to be. However, they do not reflect local features or specific species with restricted distributions that may be present and it is largely up to the specialists involved in the authorisation process to identify and map such species and habitats. A variety of photographs are included for each section of corridor for illustration and description purposes and these have generally been taken near to existing substations and power lines as this is likely to be where new power lines will also need to be constructed.

Lists of the vegetation types, mammals, reptiles, amphibians, butterflies, wetlands and river types in each of the corridors are provided in Appendices 2 - 7.

11.1 EGI Corridor Overview

A summary of the proportion of each corridor within each of the biomes of South Africa is contained in Table11.2. The majority of the corridors are within the Savannah, Grassland and Nama Karoo Biomes, with less than 10% of the corridors within each of the Succulent Karoo and Fynbos Biomes. However, this does translate in an equivalent manner into potential impact as the ecosystems such as Nama Karoo are relatively species poor and contain few listed species or ecosystems compared to fynbos or grassland. A graphic summary of the relative sensitivity of the different sections of the corridors is provided below in Figure 11.3, for mammals, reptiles, frogs, butterflies and vegetation. Although there are some areas that repeatedly come out as high sensitivity for all groups, there are also several sections that are sensitive to a particular group, which relates to the specific features and attributes of that area. The broad factors driving these patterns include high levels of transformation within the grassland and fynbos biomes, and the presence of specific features within certain sections of the transmission corridors which harbour high levels of species of concern including mountains such as the Soutpansberg in the International Corridor and forest and/or wetlands in the Eastern Corridor.

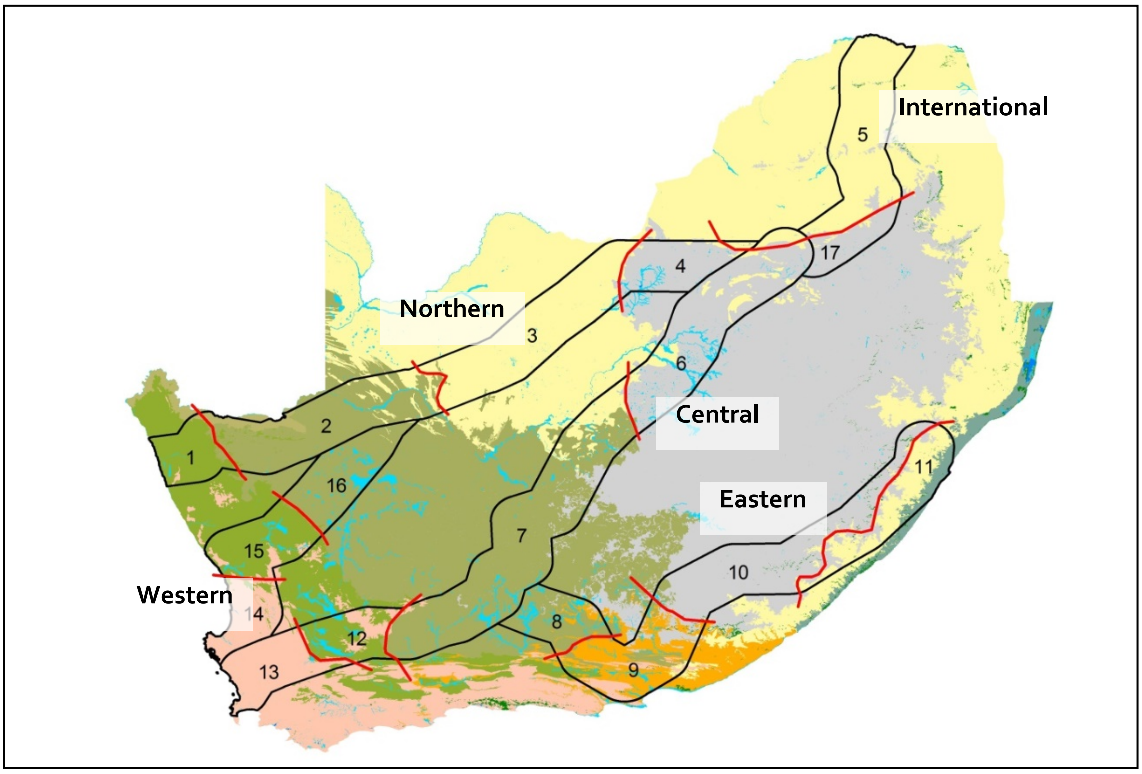


Figure 11.1 Terrestrial ecoregions that were used to define different sections of the corridors in order to summarize the features of each corridor.

Table11.2 Proportion of each corridor within each of the biomes of South Africa.

Biome	Central corridor	Eastern corridor	International corridor	Northern corridor	Western corridor	Total
Albany Thicket Biome	0.00	14.55	0.00	0.00	0.00	**3.33**
Azonal Vegetation	4.29	2.81	0.27	1.59	5.12	**2.95**
Desert Biome	0.00	0.00	0.00	3.03	0.00	**0.73**
Forests	0.00	0.61	0.22	0.00	0.00	**0.17**
Fynbos Biome	13.87	3.00	0.00	0.15	25.25	**7.79**
Grassland Biome	27.61	49.69	22.39	13.79	0.00	**25.69**
Nama-Karoo Biome	39.01	13.75	0.00	29.43	37.22	**26.42**
Savanna Biome	9.11	14.83	77.11	41.53	0.22	**24.78**
Succulent Karoo Biome	6.10	0.75	0.00	10.47	32.18	**8.15**
Total	100	100	100	100	100	100

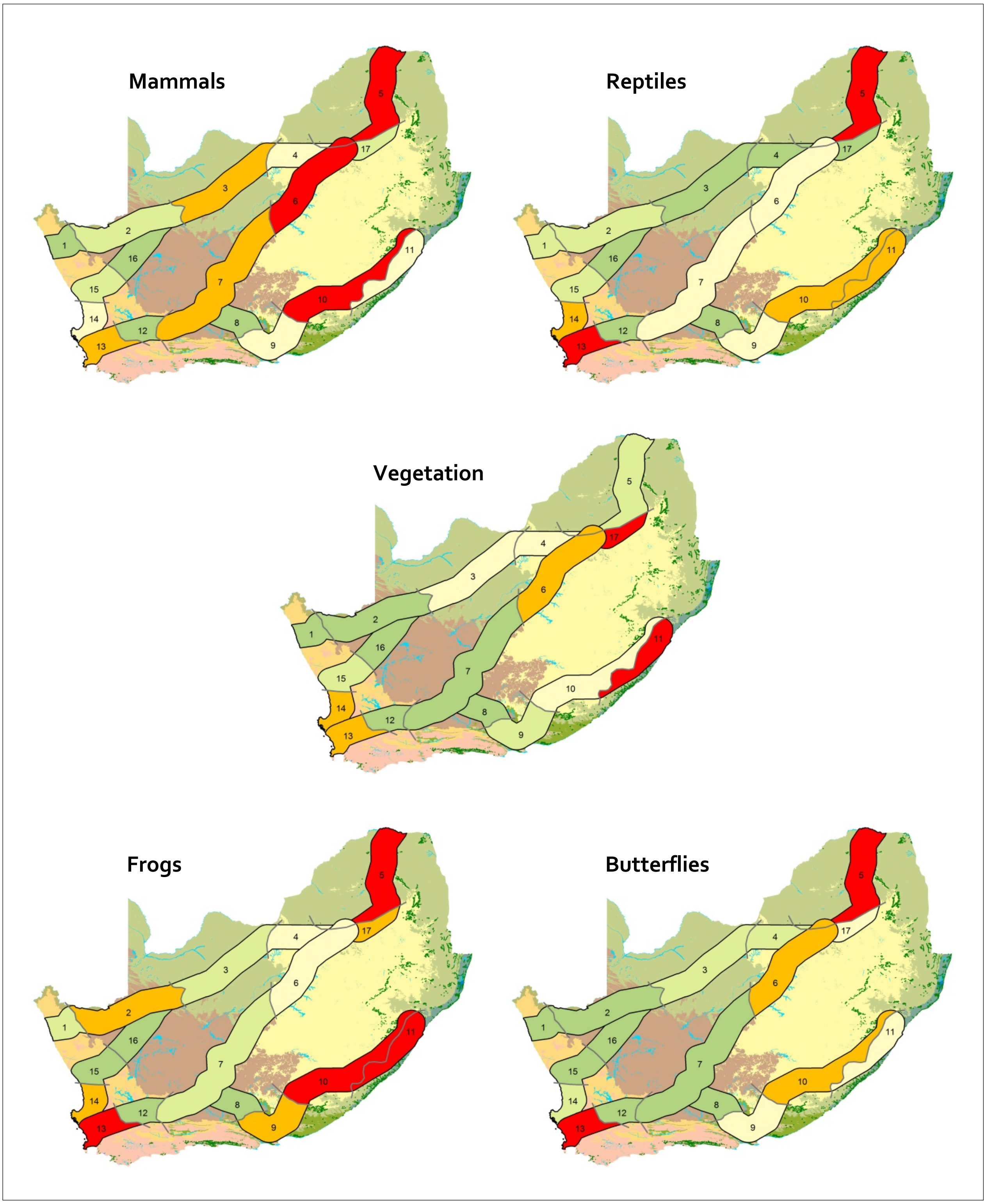


Figure 11.3 Summary of the relative sensitivity of the different sections of the corridors, for mammals, reptiles, frogs, butterflies and vegetation. Sensitivity is calculated as a combination of diversity and threat status and is indicated from high in red through to low in green.

11.2 Western Corridor

<u>Terrestrial</u>

Vegetation & Ecosystems

The Western Corridor occupies three biomes; Fynbos in the south, succulent karoo in the central parts and Bushmanland in the east. The majority of features of concern are however located within the western half of the corridor and once the corridor leaves the winter rainfall region, there are few species or features of concern present. At a broad level, more or less the entire corridor within the fynbos biome section can be considered to be within a sensitive environment, while within the Succulent Karoo, there is the Bokkeveld Escarpment which is a recognised centre of diversity and endemism. There are also relatively high numbers of listed species and sensitive or restricted habitats present on the Knersvlakte north of Vanrhynsdorp. In the east, pans are a characteristic feature of the area, but can generally be avoided.

Dominant vegetation types include Bushmanland Basin Shrubland, Bushmanland Arid Grassland, Hantam Karoo and Leipoldtville Sand Fynbos. Of which the latter and Cederberg Sandstone Fynbos are the most important listed species of the corridor, with an additional four listed vegetation types present which occupy from 1-3% of the area. Swartland Shale Renosterveld is of greatest concern and listed as Critically Endangered. However, very little of this vegetation type remains and while remnants should all be considered no-go areas, they are of such small extent that they do not pose a significant constraint on power line development provided that they are appropriately considered at the route planning stage.

Fauna

The area is relatively depauperate of mammals and of the 12 listed species recorded in the area, two are conservation-dependent ungulates and 6 are bats. Of the four remaining species, none have a high restricted distribution or would be highly vulnerable to impact. Although it is not in the ADU database as it is so infrequently encountered, the area is also home to van Zyls' Golden Mole which is Endangered and restricted to a small area of sandveld east of Lambert's Bay. The area does however have a high diversity of reptiles including 12 listed species which are mostly associated with coastal sands or rocky outcrops in the sandveld. These are mostly threatened by habitat loss and transformation for intensive agriculture and the threat posed by power line development is moderate to low provided that the vegetation beneath the power line is appropriately managed. The area includes three listed frog species, none of which would be particularly vulnerable to power line development due to their habitat preferences. There are three listed butterflies recorded from the area, the Red Hill Copper (NT), Atlantic Skolly (VU) and Wallengren's silver-spotted copper (VU), all three of which have a highly localised distribution, being known from only a few sites. Based on their known localities, these are not likely to be impacted by power line infrastructure, but due diligence should be applied to any power line routes or other infrastructure in the vicinity of the known populations of this species to ensure that they do not experience any habitat loss.

Aquatic Ecosystems

The western corridor stretches across three significant primary catchments and six Level 1 aquatic ecoregions. The primary catchments are the Lower Orange, Olifants-Doring and Berg River catchments. These large river systems are permanently flowing systems, but the majority of the smaller rivers are ephemeral in the Western Corridor.

Populations of several species of threatened fish species find sanctuary in the upper tributaries of the Doring, Olifants, Verlorenvlei and Berg rivers. These include the critically endangered Chubbyhead barb, *Barbus anoplus*, *Barbus calidus* (Vulnerable, and endemic to small streams in the Olifants River catchment), *Barbus serra* (Clanwilliam sawfin, also from the Olifants River system) (endangered), *Labeobarbus capensis (Clanwilliam yellowfish)* (Vulnerable), *Pseudobarbus Verlorevlei* (Verlorenvlei redfin minnow) (Critically endangered), *Austroglanis gilli* (Clanwilliam rock-catfish) (Vulnerable), *Labeo seeberi* (Clanwilliam Sandfish) (Endangered), *Pseudobarbus phlegeton* (Endangered), *Pseudobarbus phlegeton* cf Doring (Fiery redfin) (Critically endangered), and a number of galaxiids including *Galaxias mollus* (Galaxias sp. 'zebratus cf. Mollus'), *Galaxias olifants* (*Galaxias* sp. 'zebratus cf. Olifants') (Vulnerable), *Galaxias slender* (Critically endangered), and *Galaxias slim* (*Galaxias* sp. 'zebratus cf. slim'). These river systems are particularly vulnerable to habitat loss and changes in water quality and quantity.

The wetlands of the Nama Karoo are predominantly depressions – mostly ephemeral to seasonal pans. In the Great Karoo, there are extensive valley-bottom wetlands associated with ephemeral to seasonal rivers. Towards the west coast, the rainfall increases, with the highest precipitation falling in the Cedarberg Mountains.

Seventy-seven wetland types are found in the Western Corridor, with the greatest diversity of types located in the coastal ecoregions (South Western Coastal Belt and the Western Coastal Belt). By far the greatest density and area of wetlands is located in the Nama Karoo ecoregion, in the Nama Karoo Bushmanland vegetation types, which are considered Least Threatened. The greatest area of critically endangered wetland types in the corridor is located in the South Western Coastal Belt and the Western Folded Mountains.

Two Ramsar sites are located on the west coast – these are Verlorenvlei near Elandsbaai, and Langebaan Lagoon in the West Coast National Park. The Cedarberg and Grootwinterhoek Mountains located in the southern corner of the Corridor are Strategic Water Source Areas – defined as areas that contribute a large proportion of their mean annual runoff to water supply – and important groundwater recharge areas.

Tour of Major Terrestrial and Aquatic Features of the Western Corridor

Hopefield Sand Fynbos (VU) near to Aurora Substation. There is already a high density of power lines in this area and cumulative effects are likely to be an issue in this area. The intact fynbos around the substation is probably the largest remaining intact fragment of this vegetation type.

Strip agriculture within Leipoldtville Sand Fynbos (VU) near Graafwater. The majority of fynbos vegetation types along the West Coast have experienced relatively high levels of transformation and generally contain very high levels of local endemic and threatened species.

Verlorenvlei about 20km from the coast at Elandsbay. This is a priority wetland and estuary and the location of crossing points should be carefully considered to minimize additional impacts.

Looking south over the Olifants River from near the Juno substation. The river itself has been heavily impacted by intensive agriculture and is not considered highly sensitive. The abundance of species of conservation concern within the adjacent Namaqualand Strandveld is however relatively high.

Looking along the Helios-Aries 400 kV line, showing the homogenous nature of the Bushmanland Basin Shrubland. There are few rare, endemic or other species of conservation concern within this vegetation type and it is generally low sensitivity apart from occasional pans as illustrated below.

Although bushmanland is generally considered to be low sensitivity, it also contains an extended network of salt pans and so called 'vloere' which occasionally contain water and an abundance of temporary water organisms. Due to the very flat nature of the pans, they are vulnerable to disturbance and the disruption of flow patterns.

Looking towards the Aries substation southeast of Kenhardt, the vegetation is still Bushmanland Basin Shrubland but with a higher proportion of grasses than near to Helios. Although there are few species of conservation concern present, certain protected species such as *Hoodia gordonii* can be common.

11.3 Northern Corridor

<u>Terrestrial</u>

Vegetation & Ecosystems

The Northern Corridor traverses four biomes, from the Succulent Karoo in the west through the Nama Karoo and Savannah in the central sections and ending in the Highveld Grasslands in the east. Only Bushmanland Arid Grassland occupies more than 10% of the corridor, which can be ascribed to the long length of the corridor and the consequent large number of associated habitats and vegetation types. Other significant contributors include Mafikeng Bushveld, Gordonia Duneveld, Western Highveld Sandy Grassland, Kuruman Thornveld, Carletonville Dolomite Grassland and Kalahari Karroid Shrubland. Both Western Highveld Sandy Grassland (CR) and Mafikeng Bushveld (VU) are important listed vegetation types while Vaal-Vet Sandy Grassland and Rand Highveld Grassland are also listed ecosystems which occupy a moderate proportion of the corridor.

The central section of the corridor through the upper Nama Karoo and western Savannah are probably the least sensitive, while the terminal sections at either end contain an abundance of sensitive features. Along the West Coast, sensitive features include areas of Sand Fynbos on the coastal plain, not all of which have been mapped; the dune fields along the coast which have been heavily impacted by diamond mining activities and the *Acacia erioloba* forest west of Komaggas. Although the rocky hills around Springbok are sensitive for both fauna and flora, there are no specific features in this section and it is generally sensitive.

Although bushmanland is generally low sensitivity, the power line corridor passes Aggeneys and Pofadder, where Aggeneys Gravel Vygieveld and Bushland Inselberg Shrubland are sensitive vegetation types which should be avoided as much as possible as they contain a high abundance of species of conservation concern. There are also some areas of calcrete around Aggeneys which are localised habitats with specialised species such as *Titanopsis*. Across Bushmanland through Upington and to Kathu, there are also localised populations of *Lithops* or *Dinteranthus* usually on rocky outcrops and gravel patches associated with vegetation types such as Lower Gariep Broken Veld. Towards Olifantshoek and Kathu the abundance of species of concern declines, but protected trees such as *Acacia erioloba*, *Acacia haematoxylon* and *Boscia albitrunca* can reach high densities which can create significant problems for power line development if the servitudes have to be cleared of woody species. Once the corridors enter the Grassland biome northeast of Kuruman, the issues switch from being largely species specific, to being largely around limiting the further loss of sensitive and listed vegetation types.

Fauna
Not surprisingly, there are a relatively large number of listed mammals recorded from the area, most of which are associated Namaqualand or the Savannah section of the route. Vulnerable species from the Savannah would be the Serval, Ground Pangolin and Southern African Hedgehog. There are however also several listed species from the Namaqualand region including the Dassie Rat from the rocky hills, De Winton's Golden Mole from Port Nolloth, Grant's golden Mole from the coastal plain and the Namaqua dune mole-rat.

Although as many as 141 different reptile species have been recorded from the corridor, this includes only three listed species, the Namib Web-footed Gecko which is restricted to coastal dunes near the Orange River, the Speckled Padloper which occurs in Namaqualand and Good's Gecko which has a restricted distribution along the lower Orange River. Three listed frogs occur in the area, inland there is the Giant Bullfrog while along the coast there is the Desert Rain Frog and the Namaqua Stream Frog in the Kamiesberg. Power line development is likely to have limited impact on these species as the footprint within the favoured habitats would be likely to be low.

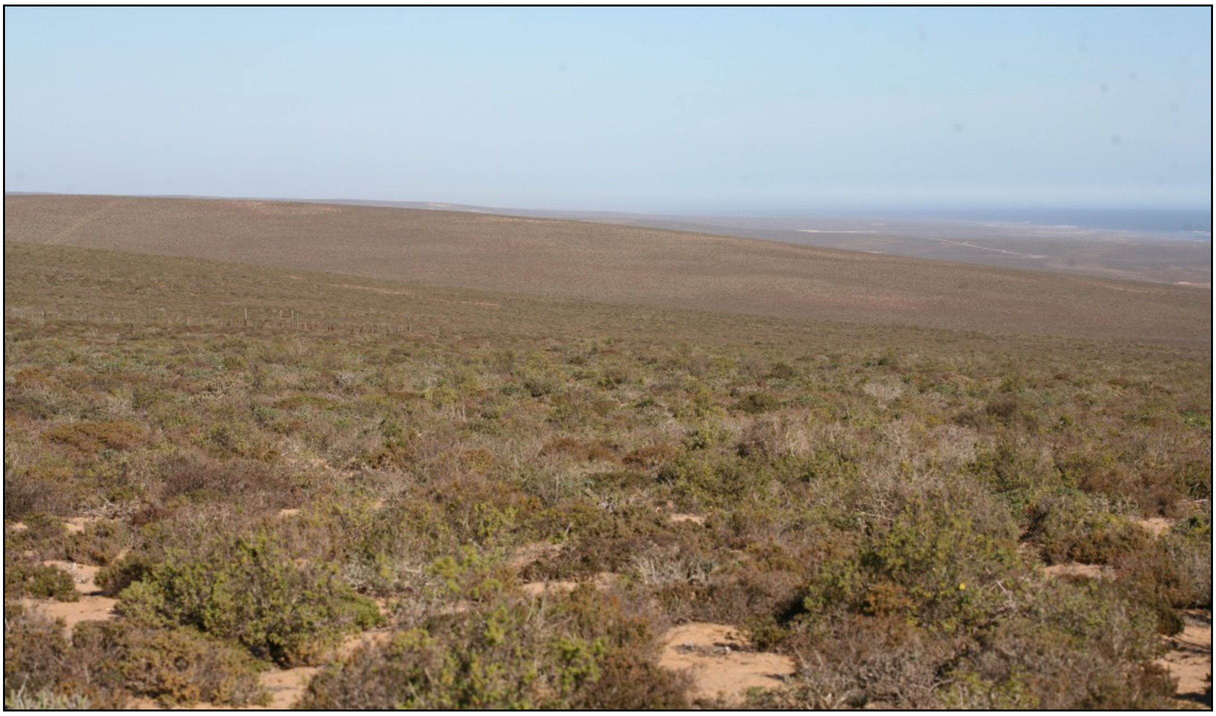
Despite the large size of this corridor, only three listed butterflies, Trimen's opal, Linda's hairtail and the Hilltop hopper have been recorded. This can be ascribed largely to the arid nature of the route and the low diversity of butterflies across most of this area. Trimen's opal is restricted to the coastal dunes around Port Nolloth, while Linda's hairtail is known from only two locations, one of which is within the Witsand Nature Reserve and the other towards Postmasburg. The Hilltop hopper occurs at the eastern terminal margin of the corridor from Carletonville to Lydenburg, but is relatively widespread compared to the other species.

Aquatic Ecosystems
The Corridor crosses four significant primary catchments – the Lower Orange, Buffels, Limpopo and Vaal River catchments. Several sub-catchments along the Lower Orange River in the Orange River core ecoregion, are known fish sanctuaries for the protection of the Namaqua barb (*Barbus hospes*). Other fish sanctuaries in the Northern Corridor are located in the Limpopo, Vaal and Orange River sub-catchments, protecting the Goldie Barb "north" (*Barbus* sp. '*pallidus* cf. north') (Vulnerable), the Marico Barb (*Barbus motebensis*) (Vu;nerable and endemic to rivers in the Limpopo River catchment.

Along the west coast, several sub-catchments in the Buffels River catchment are considered river FEPAs, due to the good to pristine conditions of the ephemeral rivers and streams in this area.

There are 94 wetland types scattered across the Northern Corridor, giving an indication of the diverse range of conditions across the region. By far the greatest diversity of wetland types, mostly depressions or pans, are found in the Southern Kalahari ecoregion.

Tour of Major Terrestrial and Aquatic Features of the Northern Corridor



The coastal plain near Gromis substation is dominated largely by Namaqualand Strandveld, but there are some patches of Namaqualand Sand Fynbos also present, not all of which have been mapped but which contain an abundance of listed or local endemic species.

Namaqualand Klipkoppe Shrubland near Springbok, contains a high diversity of plants and animals, but is still about 95% intact and is not threatened.

Bushmanland Arid Grassland east of Springbok. Dominated by *Stipagrostis brevifolia*, with occasional *Parkinsonia africana*, these grasslands are generally not highly sensitive.

Bushmanland Sandy Grassland in the Koa River Valley near Aggeneys, with the Gamsberg in the background. These grasslands are home to a number of endemic species including the Red Lark, while the Bushmanland Inselberg Shrubland and Aggeneys Gravel Vygieveld associated with the hills, contain an abundance of listed and endemic species and should be avoided as much as possible as many of the species of concern are extremely localised.

Bushmanland Arid Grassland Near to the Paulputs Substation. There are now several PV and CSP power plants in this area. The rocky areas are considered significantly more sensitive than the surrounding plains.

The Orange River Valley northwest of Paulputs substation, with a high density of *Aloe dichotoma* as well as numerous quartz outcrops frequently containing species of conservation concern. Although this area falls within the power line corridors, options for actual power lines should avoid such areas as much as possible.

The Orange River is the major sensitive feature between Paulputs and Garona Substation, but as the level of transformation from agriculture in this area is high, impacts on natural vegetation are likely to be low, although Lower Gariep Alluvial Vegetation is listed as Endangered.

The landscape near Kathu left and right showing the vegetation clearing under the power line near to the Ferrum Substation. As protected species such as *Acacia erioloba* and *Boscia albitrunca* can be very common in this area, clearing under the power lines is a significant issue in this area.

Stella Bushveld north of Vryburg, dominated by *Acacia erioloba* as well as *Terminalia sericea* and *Dichrostachys cinerea*. The high density of Acacia erioloba and the need to clear beneath the power line, results in a high potential impact through vegetation types such as Stella Bushveld which are dominated by large woody species.

Carletonville Dolomite Grassland west of Lichtenburg and the Watershed substation. Although Carletonville Dolomite Grassland is not listed and is still approximately 75% intact, neighbouring vegetation types such as Western Highveld Sandy Grassland (CR) and Vaal Vet Sandy Grassland (EN) and listed and vulnerable to further habitat loss.

11.4 International Corridor

Terrestrial

Vegetation & Ecosystems

The majority of this corridor falls within the Savannah Biome, with about 22% also within the Grassland Biome. The corridor includes 5 listed vegetation types, three from the Grassland and two from the Savannah Biome, all of which are listed as Vulnerable. Of these Rand Highveld Grassland is by far the most extensive and comprises over 10% of the corridor. There are lesser but still significant amounts of Eastern Highveld Grassland and Springbokvlakte Thornveld within the corridor. Non-listed vegetation types which are important include Makhado Sweet Bushveld, Central Sandy Bushveld and Musina Mopane Bushveld which each occupy 12-15% of the corridor.

The Soutpansberg is one of the major ecological features of this corridor and apart from the scenic value of the area, it is also biologically diverse and is centre of endemism for several groups. Blouberg is also to the west and falls slightly within the corridor, leaving a narrow corridor only about 15km wide for power lines to pass through this area. The existing Dendron-Soutpan/Soutpan-Venetia route is likely to be preferable to the route over the mountains north of Louis Trichardt. The Strydpoortberge section of the Lebombo mountains and adjacent Wolkberg area to the south is also a sensitive area that should be avoided by passing any lines through this area to the northeast of these features.

Fauna

In terms of mammals, this corridor includes a large number of listed species, however a significant proportion of these are large conservation dependent antelope and carnivores which occur in managed populations and are not of concern for this assessment. Vulnerable species would include the three golden mole species which are also localised habitat specialists vulnerable to disturbance and habitat loss. The Rough-haired Golden Mole is listed as Critically Endangered and occurs in moist grassland areas from Kwa-Zulu Natal to Mpumalanga, but is extremely secretive and very few recent records exist and it may have become extinct across large parts of its former range. The Robust Golden Mole occurs at the eastern margin of the corridor in Mpumalanga and is known only from the Steenkampsberge in the Belfast and Dullstroom districts. Juliana's Golden Mole is known from three populations, Pretoria, Nylstroom and Pretoriuskop in Kruger National Park. The Pretoria population is the only one which falls within the study area, but has been severely impacted by urbanisation. Although it was not listed in the ADU database, Gunning’s Golden Mole Neamblysomus gunning occurs within the corridor and is known from only the Woodbush Forest and Agatha Forest Reserve along the eastern margin of the corridor. Due to the large number of listed fauna associated with such forest patches, all indigenous forest areas within the corridors should be considered high sensitivity and avoided. Many of the other listed mammals including Brown Hyena, Ground Pangolin, Southern African Hedgehog and Honey Badger are relatively widespread species which occur at low density and would not be particularly vulnerable to EGI development.

The abundance of listed reptiles is also particularly high with ten listed species recorded from this area. Several of these are however associated with the Southpansberg which is an area of high reptile endemism and diversity. The Woodbush area near Haenertsburg along the eastern margin of the corridor is also an important area and home to the Woodbush Legless Skink as well as Methuen's Dwarf Gecko. Two listed frog species are known from this area, of which the Giant Bullfrog is probably of greatest concern but associated with pans which are generally sensitive and should be avoided in general due to their ecological significance.

Aquatic Ecosystems

Two main river systems flow across the International Corridor – the Sand River in the Limpopo River primary catchment, and the Olifants River. There are no significant fish sanctuaries in this Corridor, but there is a large number of Upstream Management Areas in the northern half of the Corridor. Most of the rivers in the Corridor are permanent or seasonal.

There are 74 wetland types in the Corridor, most of which are located in the Eastern Bankenveld ecoregion. The Corridor is dominated by valley-bottom wetlands, associated with the permanent or seasonal streams and rivers of the region. A surprisingly large proportion of the wetland types (72%) are considered critically endangered.

The Ramsar wetland Blesbokspruit is partly located in the western corner of the International Corridor, and the Verloren Vallei Nature Reserve is another Ramsar site in this corridor.

Musina Mopane Bushveld near the Venetia Substation, dominated by species such as Mopane *Colophospermum mopane*, Marula *Sclerocarya birrea*, *Commiphora glandulosa*, *Grewia bicolor* and occasional Baobab trees *Adansonia digitata*. Although the rocky inselbergs are generally considered highly sensitive the major impacts on the plains are largely associated with avifauna and terrestrial mammals.

11.5 Central Corridor

Terrestrial

Vegetation & Ecosystems

The Central Corridor runs near the length of the country and includes significant amounts of Fynbos, Succulent Karoo, Nama Karoo and Grassland. As it is more than 1300 km long, it is little surprise that it includes a large number of vegetation types and fauna. Dominant vegetation types include Northern Upper Karoo, Vaal-Vet Sandy Grassland and Gamka Karoo, but it is important to note that given its long length that large extents of many vegetation types occur within the corridor, but only the broadest types are able to contribute significant proportions. Listed vegetation types of significance include Vaal-Vet Sandy Grassland, Swartland Shale Renosterveld and Rand Highveld Grassland. As previously mentioned, the conservation status of Swartland Shale Renosterveld is very high, but as the vegetation type is heavily transformed and fragmented, further impact can usually be easily avoided with proper route planning.

The lowlands in general from Cape Town to the Cape Fold Mountains are heavily transformed and while the remnant vegetation fragments usually belong to the listed vegetation types, there are large amounts of transformed agricultural land where the impacts of transmission infrastructure would be low. Crossing the mountains into the interior is problematic and there are few places available where power lines can be routed to avoid crossing these mountains. As the mountains are steep, usually undisturbed fynbos, the impacts of disturbance in these areas can be high. The corridor then traverses the Tanqua Karoo before entering the Roggeveld Mountains, both of which contain an abundance of species of concern. There are quartz and gravel patches in the Tanqua Karoo which are home to various listed and endemic dwarf succulents such as *Tanquana* and *Didymaotus*. The Roggeveld is a known centre of plant endemism and is also a NPAES focus area which relates to the poor conservation status of the area, the rugged topography which is seen to offer a climate change buffering role and the low levels of development which characterise the area. As there are already several existing 400kV lines through this area, any new lines should strive to follow a similar route and minimise the overall levels of disturbance and habitat loss through the Roggeveld.

The plains of the Gamka Karoo through to Beaufort West are relatively low sensitivity apart from the Nuweveldberge along the northern margin of the corridor. From Beaufort West to De Aar the corridor traverses a typical karoo landscape with plains interrupted by mountains, ridges and inselbergs. Although there are relatively few listed species recorded along this section, it is also very poorly known and there are numerous locally important habitats and features present. In many instances, the existing power lines are routed directly over the mountains and the roads created during construction are not maintained thereafter with the result that extensive erosion problems often develop, leaving the roads impassable and large dongas propagating down the mountainside.

Hydra substation represents a central distribution point and from here northwards, the density of transmission infrastructure increases significantly. From De Aar to Luckhoff the vegetation is dry karroid grassland with occasional areas of savannah, with overall low levels of transformation. From here northwards the vegetation consists of grassland and savannah with significantly higher levels of transformation and a number of listed vegetation types as a result. In this area, there is also the pan veld with an abundance of pans which hold water for several weeks or even months during wet years. These are important for temporary water organism such as fairy shrimps, as well as flamingos, waders and other waterfowl as well as the listed Giant Bullfrog. The final section of the corridor towards Gauteng has experienced high levels of transformation and the majority of grassland vegetation present have experienced high levels of habitat loss and are listed as a result.

Fauna

As many as 32 listed mammals are known from this corridor, but this does include a number of conservation dependent ungulates and carnivores as well as 11 bat species. Of particular concern would be the Riverine Rabbit, restricted to alluvial floodplains of the central karoo. The rivers through the Tanqua Karoo, Roggeveld and Great Escarpment from Sutherland to Victoria West all potentially contain this species. As this species is listed as Critically Endangered impact to the alluvial vegetation associated with this species should be avoided. Many of the listed species typical of the interior of the country such as the Brown Hyena, Ground Pangolin, Honey Badger, Southern African Hedgehog and African White-tailed Rat occur at a low density over large parts of the corridor. As most of these are mobile species, they would avoid disturbance, but in the long-term, power lines are not likely to generate highly significant impacts on these species. With regards to many of these species it is important to note that the dominant driver of their abundance is land use and veld condition and the presence of power lines or substations in an area is a very secondary impact on their local populations.

The number of listed reptiles is also relatively high and includes 15 different species, of which the Geometric Tortoise is of particular concern. This species is restricted to fragments of renosterveld in the Swartland and vulnerable to fires, predation and habitat loss. Within the grasslands of the Free State, there is also the Sungazer or Giant Girdled Lizard which has suffered from habitat loss. This species usually lives in colonies and is also vulnerable to illegal collection. Therefore activities which result in further habitat loss or increase access to areas where this species is present are likely to generate a negative impact on this species. Within the Karoo, there is the Karoo Padloper which is not likely to be vulnerable to direct impacts from power line infrastructure, but may be impacted by vehicles during construction or illegal collection. A number of the listed reptile species are associated with the Strandveld and Fynbos of the Western Cape peninsula and West Coast including Cape Sand Snake, Cape Dwarf Chameleon, Bloubergstrand Dwarf Burrowing Skink, Kasner's Dwarf Burrowing Skink, Gronovi's Dwarf Burrowing Skink and Black Girdled Lizard. These species are usually associated with specific habitats and impact to these species can be minimised through specialist input where required.

Although there is a relatively high number of listed frog species from within this area, many of these are restricted habitat specialists that would not be likely to be impacted, including the Table Mountain Ghost Frog, Panther Toad, Cape Platanna, Landroskop Moss Frog, Lightfoot's Moss Frog and Micro Frog. The Cape Rain Frog, Rose's Toadlet, Marsh Frog and Cape Caco have a slightly wider distribution and would potentially be impacted. It is only the Giant Bullfrog which occurs in the karoo, grassland and savannah biomes that is not a Western Cape endemic.

Aquatic Ecosystems

The Central Corridor traverses several primary catchments, including the Berg River in the west, the southern extent of the Olifants-Doring River catchment, the northern extent of the Gouritz River catchment, the Lower Orange and Vaal River catchments. Apart from a cluster of fish sanctuaries in tributaries of the upper Olifants River in the Western Cape, there are few known fish populations across the Corridor.

The Corridor supports a diverse array of wetland types, with 187 types across the corridor. Most of these are ephemeral depressions located in the Nama Karoo and Southern Kalahari ecoregions. There is also a large number of valley-bottom and floodplain wetlands in the Bushveld Basin, Drought Corridor and South Western Coastal Belt. Two Ramsar wetlands are located in the Central Corridor – these are the recently signed False Bay Nature Reserve in the City of Cape Town, and Blesbokspruit in Mpumalanga.

__Tour of Major Terrestrial and Aquatic Features of the Central Corridor__

The Swartland has been heavily impacted by transformation for intensive agriculture and large intact remnants of renosterveld such as this Critically Endangered Swartland Shale Renosterveld near Moorreesburg are rare and further disturbance to these areas should be avoided.

The Komsberg Substation in the Roggeveld, showing the newly constructed 765kV line next to the existing older 400kV line. This area is a generally sensitive environment due to the high abundance of plant species of conservation concern as well as the presence of sensitive fauna such as the Critically Endangered Riverine Rabbit *Bunolagus monticularis* in the wider area.

Looking towards the Droerivier substation, with the Nuweveldberge of the Karoo National Park in the background and the Gamka River, with dense *Acacia karoo* in the middle ground. The Gamka Karoo vegetation type is not highly sensitive, but there are sensitive features present in the area including the escarpment and larger drainage systems such as the Gamka River.

Eastern Upper Karoo near the Gamma Substation, showing the existing 400kV lines in the distance. This area is generally low sensitivity, but there are some sensitive features present such as drainage lines which may harbor Riverine Rabbits.

Northern Upper Karoo at the Hydra Substation, looking north along some of the power line routes. The rocky hills, especially those of doleritic origin consist of Besemkaree Koppies Shrubland, which is considered more sensitive than the surrounding plains, which generally have few species of concern.

Western free State Clay Grassland at the Beta Substation. This is not a highly sensitive vegetation type, but it is important to differentiate this vegetation type from Vaal-Vet Sandy Grassland as the two are not very accurately mapped in the Vegmap. There may also be some sensitive features present, such as areas with large trees as pictured right, which in this picture are largely *Olea europea* subsp. *africana*.

Vaal Vet Sandy Grassland (EN) at the Perseus Substation. Less than 36% of this vegetation type remains, largely as a result of transformation for croplands. Although further loss of the vegetation type should be avoided as much as possible, it contains relatively few species of conservation concern.

11.6 Eastern Corridor

Terrestrial

Vegetation & Ecosystems

The Eastern Corridor includes a complex mixture of vegetation types associated with the Indian Ocean Coastal Belt and the deep valleys of the east coast. This is a high diverse area that has largely been poorly sampled, with the result that most desktop studies are likely to underestimate the diversity of this area. The diversity of the area is illustrated by the fact that no single vegetation type occupies more than 8% of the corridor. Important vegetation units include Drakensberg Foothill Moist Grassland, Ngongoni Veld, Eastern Lower Karoo, Midlands Mistbelt Grassland, Tsomo Grassland, Sundays Thicket, Eastern Valley Bushveld, East Griqualand Grassland, Mthatha Moist Grassland, Great Fish Thicket, Queenstown Thornveld, Indian Ocean Coastal Belt and KwaZulu-Natal Coastal Belt. Of these, Ngongoni Veld, Midlands Mistbelt Grassland, Mthatha Moist Grassland and KwaZulu-Natal Coastal Belt are all listed as Vulnerable. In the arid interior, the vegetation types have been little transformed, but thicket has been impacted by overgrazing in many areas and the escarpment areas within the corridors near Graaff Reinet, Somerset East, Bedford and Adelaide (Katberg) should all be considered sensitive and contain high levels of diversity. The 'elbow' of the route towards Port Elizabeth includes several areas of significance including the Elandsberge, Groot Winterhoek and Suurberg Mountain ranges. From Queenstown the corridor enters the higher rainfall grasslands of the Ciskei and Transkei which include many indigenous forest patches and falls within the Pondoland centre of diversity and endemism. Many of the forest and grassland vegetation types of this are listed due to their limited extent and high levels of transformation. The forest patches in particular can be singled out as being universally significant and power line routes should strive to avoid impacting intact forest patches.

Fauna

Although the listed mammal count for this corridor is relatively high, this includes a lot of introduced and conservation dependent species. Species of potential concern would be Oribi and Serval associated with intact grassland and Blue Duiker and Blue (Somango) Monkey associated with forest patches. There are also 8 listed bat species known from this area, which are not likely to be highly impacted by power line development, although some are known to occasionally collide with power lines. Diversity of reptiles is high and includes 14 listed species of which the Durban Dwarf Burrowing Skink and Elandsberg Dwarf Chameleon are of highest concern. Many of the other species are associated with intact grasslands and have relatively wide distributions. This corridor has the highest frog diversity and includes 13 species of conservation concern. Both Hewitt's Ghost Frog and the Mistbelt or Ngongoni Moss Frog are listed as Critically Endangered. Hewitt's Ghost Frog is restricted to only four rivers of the Elandsberge near Hankey Eastern Cape, while the Ngongoni Moss Frog is restricted to a small area around in Kwa-Zulu Natal. A number of the other listed species are associated with moist high elevation grasslands of mountain ranges or forests including the Amatola Toad, Hogsback Frog, Longtoed Tree Frog, Kloof Frog and Stiped Caco. Impact to frog habitats is clearly a concern in the high elevation or mountainous parts of this corridor.

Aquatic Ecosystems

Stretching from east to west, the Eastern Corridor traverses 10 primary catchments covering nine different ecoregions. A relatively large proportion of the eastern corridor falls within the South Eastern Uplands ecoregion, including the uMngeni and Mzimvubu primary catchments. Within the uMngeni catchment, five sub-catchments are considered fish sanctuaries, largely for the protection of the Natal catfish (*Amphilius natalensis*). Eight quaternary catchments in the Mzimvubu catchment are rated as fish sanctuaries for the protection of the Amatole barb (*Barbus amatolicus*) (Vulnerable).

One quaternary in the north is classified as a fish sanctuary for the protection of the critically endangered Chubby Head Barb (*Barbus anoplus*). By contrast, numerous quaternary catchments within the Great Fish Catchment further west are classified as river FEPAs, fish support areas or upstream management areas. Also, 14 quaternary catchments within is catchment of the eastern corridor are identified as fish sanctuaries for the protection of the Eastern Cape Rocky (*Sandelia bainsii*). At the western extent of the eastern corridor, four quaternaries within the Gamtoos River catchment are important for the protection of the small scale redfin (*Pseudobarbus asper*) and are highlighted as fish sanctuaries for this endangered species.

The eastern half of the Eastern Corridor has a high density of Strategic Water Source Areas located in the mountainous and coastal regions of the Eastern Cape and Kwazulu-Natal.

Approximately six quaternary catchments covering more than half of the South Eastern Coastal Belt within the eastern corridor are classified as fish sanctuaries for the protection of the endemic Goldie Barb (*Barbus pallidus*) found in these rivers of this area. Sixteen quaternary catchments are classified as fish sanctuaries within the Southern Folded Mountains, because they support populations of the endangered Eastern Cape Redfin (*Pseudobarbus afer*).

There are 117 wetland types in total, and most of the wetland types in the Eastern Corridor are channelled valley-bottom wetlands, associated with the many streams and rivers in this region.

Tour of Major Terrestrial and Aquatic Features of the Eastern Corridor

Eastern Lower Karoo near to Aberdeen, with the Camdeboo mountains in the background. The plains are moderately to low sensitivity, while the hills and mountains are higher sensitivity.

The Swartwatersberg and surrounding moutains near Somerset East in the Eastern Cape should be considered highly sensitive due to their high diversity of habitats and fauna and flora species. The lower plains consist of Albany Broken Veld, while the middle slopes are Kowie Thicket with Suurberg Quartzite Fynbos and Surrberg Shale Fynbos higher up the slopes, with unmapped grassland on the summits and Forest in the valleys.

Albany Broken Veld between Cookhouse and Riebeek East, showing the invasion of the areas under the power line by alien *Opuntia* due to targeted seed dispersal by crows which roost in the pylons.

Bedford Dry Grassland at the Poseidon Substation, although these grasslands have moderate diversity, the surrounding landscape is very diverse and a wide array of habitats are present, which results in high overall diversity of many faunal groups.

12 SENSITIVITY MAP APPROACH AND METHODS

Please refer to Section *7.2* for details of data sets mentioned below. For brevity, detailed source data citations will not be repeated. Additional references consulted are listed in Section 20. For an overview of data sets and input data sensitivity ratings described below, see Appendix 8 – Data AND Sensitivity Scoring Overview.

12.1 General

The general approach for all data sets was as follows:

- Reviewed original data sets to identify spatial data feature attributes that allowed defensible application of 4-tier classification of sensitivity to EGI.
- Where multiple datasets were merged or grouped to extend or supplement coverages, effort was made to provide consistent cross-walking of feature classes used for sensitivity scoring and recommendations. As far as possible, sensitivity classification was consistent with accepted national approaches and frameworks, e.g. for gazetted or equivalent ecosystem threat status, or land-use recommendations of Critical Biodiversity Area maps / recognised Bioregional Plans
- All data sets were reviewed to check for and resolve obvious errors. Most frequent errors were overlapping or duplicated polygons and other topological errors, which are common in conservation sector data sets. Self-overlapping features were resolved where this could result in processing or output errors.
- All data sets were clipped to extent to EGI Corridors, although initial processing may have included a buffer of corridors where data processing would be affected by features just outside the corridor, e.g. species point records used to derive "hotspots".

12.1.1 Software

ESRI 2011 ArcGIS Desktop: Release 9.3 and 10.0 Redlands, CA: Environmental Systems Research Institute.

12.1.2 Projections / Coordinate Systems

All source vector data was projected to the specified Albers coordinate system before processing:

Projection	Albers
Central Meridian	24
Upper Parallel	-24
Lower Parallel	-33
Datum Name	WGS 1984
Prime meridian	Greenwich

Raster data sets are **not** provided in the specified Albers coordinate system, but are provided in the UTM35N coordinate system of, and snapped to the extent of, the 2013-2014 national land cover (© GeoTerraImage, open licence provided by DEA 2015). Use of that data set's original UTM35N coordinate system is necessary to avoid the resampling degradation and up to 15-20m shifts that could be caused by projecting to Albers. If reprojecting raster data is required for integration with other teams' data, this is best done by choosing a single raster resolution and extent to snap to, in order to minimise data degradation to all data sets.

12.1.3 EGI Sensitivity data updated into sources

Most underlying features have the following attribute appended

Attribute field name	Values	Description
BioPhySens	Low / Medium / High / Very high	4-tier BioPhysical Sensitivity to EGI
BPSens_val	1 / 2 / 3 / 4	Numeric score of BioPhysical Sensitivity for calculations when combining multiple layers
NoClearSns	Low / Medium / High / Very high	4-tier BioPhysical Sensitivity to EGI **where no clearing of servitude below lines is done – intended for high level planning and impact assessment only**
NoClearVal	1 / 2 / 3 / 4	Numeric score for no clearing option

13 TERRESTRIAL HABITAT

The biodiversity sector has a consistent and accepted land-use planning framework and key data sets that provide a wall-to-wall coverage that can inform appropriate land-use. The National Vegetation map series provide an excellent surrogate for habitat units for which habitat retention thresholds have been set. Many areas have excellent fine-scale (approx. 1:10 000 or better) Critical Biodiversity Area (CBA) maps, derived from target-driven, systematic conservation planning exercises, and linked to appropriate land-use recommendations (see e.g. Government Gazette No. 32006 16 March 2009 Guideline regarding the Determination of Bioregions and the Preparation and Publication of Bioregional Plans).

Fortunately, areas where vegetation and biodiversity feature mapping and Critical Biodiversity Area planning tend to be extremely poor, most notably for the Nama-Karoo biome and large parts of the Northern and Eastern Cape Provinces, are also areas where habitats are relatively intact, such that impacts of the type and scale contemplated in this study are unlikely to impact unknown very high or high sensitivity habitat types.

Because clearing of vegetation below power lines is inconsistently applied, and we believe the extent of clearing could be dramatically reduced (see discussion in sections 2.5 and 7), two scoring scenarios were developed for Terrestrial features and combined Terrestrial summary layer:

1. **Normal clearing vegetation management** scenario assuming that clearing of all vegetation in servitude of at least 16m and up to a width of 60m is likely, and/or that no procedures are in place to ensure that sensitive habitats within servitudes will be protected from clearing.
2. **No clearing vegetation management** scenario, assuming that procedures are put in place that guarantee that no clearing of vegetation beyond a minimum required for access will occur, with non-fire-prone vegetation left completely intact, and EGI construction methods or other mitigation implemented in naturally fire-driven ecosystems that permit natural fire regimes. In this scenario it is assumed that the limited local extent of footprints associated with pylons and access roads for EGI is compatible with many Critical Biodiversity Areas, and presence of EGI may even support habitat management and act to reduce the likelihood of other development that could result in outright habitat loss. The result is down rated sensitivity ratings for certain features.

Lower sensitivity potentially associated with no-clearing enforcement is not considered to apply to sensitive aquatic, species, or slope features, all of which are highly vulnerable and sensitive to all impacts associated with EGI.

13.1 Land cover (Natural areas)

Although these data were not directly translated to sensitivity scores, this was a key input to most terrestrial and species sensitivity maps, so approach and methodology is treated separately here to prevent repetition.

The very recently released 2013-2014 National Land Cover (© www.geoterraimage.com 2015, DEA open licence) was used as the primary coverage. This product over-represents remaining natural habitat compared to previous biodiversity assessments such as the National Biodiversity Assessment 2011 (Driver *et al* 2011). While this provides an appropriately precautionary approach, higher confidence additional known natural and non-natural areas were updated into this layer from:

- Mpumalanga Province extent was replaced with Mpumalanga Biodiversity Sector Plan 2014 land cover
- City of Cape Town natural areas supplemented with CBA areas from the City of Cape Town Biodiversity Network (version released May 2015)
- Non-natural areas from various provincial agricultural field boundary data sets (2007-2013, Department of Agriculture), including old fields
- Non-natural areas from NFEPA 2011 artificial wetlands, including dams.

The following classes from the 72 class National Land Cover 2013-2014 (GeoTerraImage / DEA open licence) were treated as natural:

Value	Class_name
1	Water seasonal
2	Water permanent
3	Wetlands
4	Indigenous Forest
5	Thicket /Dense bush
6	Woodland/Open bush
7	Grassland
8	Shrubland fynbos
9	Low shrubland
41	Bare none vegetated

All other classes were treated as not natural / transformed. Class 41, “Bare none vegetated”, was problematic. The class is most extensive in Succulent Karoo and Nama-Karoo Biomes, and while it does represent mostly natural habitats, examination of this class over aerial imagery suggests that it also includes areas of highly degraded habitats. It is therefore important that EGI planning in these biomes should provide for specialist input to preferentially locate footprints and access impacts away from pristine condition habitat into poorer condition areas, where possible.

13.2 Protected Areas

The DEA National Protected Area data set (SANBI’s slightly updated draft version at 01/04/2015) was supplemented with additional known in-process of proclamation and *de facto* protected areas from the Riverlands – Pella Nature Reserve Protected Area Expansion Initiative[8]. This area, now referred to as the

[8] http://www.wwf.org.za/what_we_do/tablemountainfund/media/news/?5841/TMFDassenberg

Dassenberg Coastal Catchment Partnership (DCCP), is immediately north of Koeberg Power Station, and the planned Sterrekus substation.

Although not explicitly updated into the protected area data set, protected area data reflected in the various CBA data sets would also be reflected in the final composited Terrestrial and Biodiversity layers.

Datasets	Feature type	Buffer (m)	EGI Biodiversity sensitivity	down rated Sensitivity if NO CLEARING
DEA National Protected Area database ver 01042015 + CapeNature/CoCT DCCP info in-process or de facto PAs May 2015 + Any equivalent PAs indicated in fine scale conservation plans	Forest Act PAs	0	Very high	Very high
	Local NR	0	Very high	Very high
	Marine PA	0	Very high	Very high
	Mountain Catchment	0	High	Medium
	National Botanical Gardens	0	Very high	Very high
	Protected Environment	0	High	High
	Provincial NR	0	Very high	Very high
	Special NR	0	Very high	Very high
	National Parks	0	Very high	Very high
	Private Nature Reserves (declared after 2008)	0	High	High
	Private Nature Reserves (declared pre-2008)	0	Medium	Medium
	equivalent to Provincial or National (incl. Contract)	0	Very high	Very high
National Protected Area Expansion Strategy 2010	NPAES 2010 focal areas	0	Medium	Medium

Data sources are reflected in the composited vector data protected area shape file:

Attribute field name	Description
TYPE	Protected Area type
NPAES15	Declaration date/type including de facto
SOURCE	Data /information source
OWNER	Land owner
Type2	Protected Area Type secondary
SENS_BP_clear	Biophysical Sensitivity with clearing under power line servitude
SENS_BP_noclear	Biophysical Sensitivity with NO clearing under power line servitude

Processing:

- Compiled current DCCP protected area data layer from various data layers provided by City of Cape Town and CapeNature, updated attributes for type and source;

- Erased Protected Areas already reflected in DEA PA database version 04/2015 from the DCCP layer to prevent duplication of polygons;
- Merged DCCP and SANBI PA data, preserving type and source attributes from both data sets, and
- Added attributes for sensitivity rating and scoring.

13.3 Ecosystem Conservation Status and Critical Biodiversity Area maps

Most recent conservation plans differentiate irreplaceable or near irreplaceable Critical Biodiversity Areas (CBAs) from best design CBAs. Irreplaceable biodiversity features that result in irreplaceable CBAs must persist at that location in order to meet biodiversity targets. No alternative sites with these features are available that could be substituted to meet targets should the irreplaceable feature be lost. Typically, any loss of habitat or ecological function within these sites must be avoided at all costs. Best design features however, do have alternative locations where targets for feature/s could be met, although these are likely to be less optimal, less spatially efficient, worse habitat condition and/or less ecologically functional. Although still considered highly sensitive, because this is not the last or only place that biodiversity feature/s can be retained, some loss of habitat would have a slightly lower impact than for an irreplaceable feature.

For conservation planning domains that do not differentiate irreplaceable and best design CBA's and for areas where conservation planning is outdated, incomplete or non-existent, ecosystem status can be used to derive or update sensitivity.

Sensitivity rating was thus applied to a combined Ecosystem Status x CBA type data layer (masked to remaining natural habitat):

Datasets	Feature type	Buffer (m)	EGI Biodiversity sensitivity	down rated Sens if NO CLEARING
Best available ecosystem threat status status (excluding Criterion D1): Western Cape - Pence 2013 A1 criterion assessment from compiled landcover Rest of SA - 2011 Gazetted Threatened Ecosystems All reliable provincial and district CBA maps.	Critically Endangered Any natural	0	Very high	Very high
	Any ecosystem status CBA Irreplaceable(CBA 1)	0	Very high	Very high
	Endangered CBA best design (CBA 2) or unknown	0	Very high	Very high
	Endangered ESA / E.Cape CBA best design CBAs / other natural	0	Very high	High
	Vulnerable and Least Threatened CBA best design (CBA 2) or unknown		High	Medium

Datasets	Feature type	Buffer (m)	EGI Biodiversity sensitivity	down rated Sens if NO CLEARING
	Vulnerable and Least Threatened ESA / E.Cape CBA best design CBAs / other natural	0	Low	Low
	Degraded and No Natural ANY, including CBA 1 & 2	0	Very low	Very low

13.3.1 Ecosystem status data

The great majority of A1 criterion (habitat loss) threatened ecosystems occur are in the Cape Floristic Region, mostly within the Western Cape Province, and this has also been where most National Vegetation Map updates have been done ((“The Vegetation of South Africa, Lesotho and Swaziland (shapefile).” 2009) vs (*The Vegetation of South Africa, Lesotho and Swaziland (Book & CD).* 2006). A recent 2013 updated A1 criterion Ecosystem Status assessment based on best available composited fine scale habitat condition mapping (Pence 2013, unpublished data) adds significant additional threatened habitat and was used for the extent of the Western Cape.

For the rest of South Africa the gazetted 2011 threatened ecosystems were used, excluding any listed in terms of the D1 (threatened plant species) criterion, as threatened plants are explicitly mapped as sensitive features here.

13.3.2 CBA Layers

Generic concept crosswalking CBA types:

EGI CBA type	EGI sensitivity value	Description
CBA 1	4	CBAs clearly differentiated as CBA 1 or irreplaceable features
CBA 2 / unknown	3	CBAs listed as best design sites, or where plan did not differentiate between CBA 1 and CBA 2 types
ESA	2	Ecological Support Areas (ESAs) or Critical ESAs (CESAs)
Other natural	1	Natural areas not selected as CBAs or ESAs

Note that EGI four-tier sensitivity value is provided in source vector data sets, but is modified in combination with Ecosystem Status as per previous table. Unlike all other layers, CBA and Ecosystem Status sensitivity were not combined using by deriving the maximum score of both layers for each cell.

ESAs and Other Natural areas were maintained as separate classes in processing, but provided with identical sensitivity ratings, as EGI is considered to be compatible with most plans’ guidelines for ESAs which emphasise maintenance of ecological connectivity and function rather than retention of pristine habitat. I.e. ESAs are not considered more sensitive to EGI than Other Natural vegetation, as connectivity and animal movement that typically drive identification of these areas as ESAs would be unlikely to be significantly negatively impacted by EGI. ESAs on farm lands and natural areas may be critical for bird species such as Blue Crane that would be vulnerable to new EGI , but these species’ requirements are represented in a separate specialist avifaunal analysis.

Conservation plan or Bioregional Plan Critical Ecological Support Areas were sometimes reclassified as CBA 2 or ESA depending on context (see individual plan information below), with ESAs in highly sensitive areas treated as CBA2. In the Eastern Cape CBA2 features for conservation plans did not conform to current norms for systematic, target driven planning and in mostly intact natural landscapes, were treated as equivalent to ESAs for the purposes of EGI sensitivity.

ESA and Other Natural not explicitly included except where this is likely to add more accurately mapped remaining natural habitat cf. NLC2013-14.

Processing:

- Individual CBA layers were scored as below, converted to raster and mosaicked to a single coverage using maximum value of all features for any overlapping areas.
- CBA type/value was combined with Ecosystem status to derive sensitivity as per the previous table above.

CBAs – City of Cape Town

CBA_Catego	CBA_Name_	EGI_CBA	BioPhySens	BPSens_val	NoClearSns	NoClearVal
Protected: In Perpetuity	Protected Area proclaimed in perpetuity	PA	Very high	4	Very high	4
Protected: Not In Perpetuity	Protected Area proclaimed for a limited period	PA	Very high	4	Very high	4
Conservation Area	Protected Area that is not yet proclaimed	PA	Very high	4	Very high	4
CBA 1a	Irreplaceable Core Flora Site	CBA1	Very high	4	Very high	4
CBA 1b	Irreplaceable High & Medium Condition Site	CBA1	Very high	4	Very high	4
CBA 1c	Minset High & Medium Condition site	CBA1	Very high	4	Very high	4
CBA 1d	Irreplaceable Consolidation Site	CBA1	Very high	4	Very high	4
CBA 1e	Connectivity Site	CBA2	High	3	Medium	2
CBA 2	Restorable Irreplaceable Site	CBA2	High	3	Medium	2
CESA	Unselected Natural Vegetation Site of Conservation Significance	CBA2	High	3	Medium	2
OESA	Transformed Site of Conservation Significance	ESA	Medium	2	Low	1
Other Natural Vegetation	Unselected Natural Vegetation: High/Med/Restorable	Other Nat	Medium	2	Low	1

For the City of Cape Town, the CBA data was mosaicked into the final composite CBA layer after all other data layers had been masked to natural areas (see 4.2.1) as it identified additional natural habitat that would have otherwise been masked out.

CBAs – Western Cape Biodiversity Framework 2014

NEW_CAT	EGI_CBA	BioPhySens	BPSens_val	NoClearSns	NoClearVal
CBA	CBA unknown	High	3	Medium	2
CBA (known agric landuse)	ESA	Medium	2	Low	1
CBA (potentially rehabilitating agric land)	ESA	Medium	2	Low	1
CBA lost to agric landuse	-	Low	1	Low	1

CBAs – Namakwa District Biodiversity Sector Plan 2008

CBA_TYPE	EGI_CBA	BioPhySens	BPSens_val	NoClearSns	NoClearVal
T1	CBA1	Very high	4	Very high	4
T2	CBA2	High	3	Medium	2

T1 & T2 features overlap, so it was necessary to save these as separate layers for proper display and conversion to raster.
T2 features extend into the Western Cape, but predate more recent and systematic planning in the Western Cape, therefore T2 features were clipped to the Northern Cape provincial boundary.

CBAs – Hantam (NCape extension of CAPE Fine Scale Planning 2010)
Less reliable outputs, but best available information in absence of a conservation plan for the Northern Cape.

Category	EGI_CBA	BioPhySens	BPSens_val	NoClearSns	NoClearVal
Critical Biodiversity Area	CBA unknown	High	3	Medium	2

CBAs – Gauteng C-Plan V3.3 2014

CPLAN_AREA	EGI_CBA	BioPhySens	BPSens_val	NoClearSns	NoClearVal
Protected Area	PA	Very high	4	Very high	4
Irreplaceable Area	CBA1	Very high	4	Very high	4
Important Area	CBA2	High	3	Medium	2
Ecological Support Area	ESA	Medium	2	Low	1

CBAs – Mpumalanga Biodiversity Sector Plan 2014

CBA_level2	EGI_CBA	BioPhySens	BPSens_val	NoClearSns	NoClearVal
Protected Areas	PA	Very high	4	Very high	4
CBA Irreplaceable	CBA1	Very high	4	Very high	4
CBA Necessary	CBA2	High	3	Medium	2
ESA Landscape corridor	ESA	Medium	2	Low	1
ESA Local corridor	ESA	Medium	2	Low	1
Natural	OtherNat	Medium	2	Low	1
Modified	-				
Modified - Old lands	-				

CBAs – Free State Provincial Biodiversity Plan 2015

FINAL	EGI_CBA	BioPhySens	BPSens_val	NoClearSns	NoClearVal
Protected	PA	Very high	4	Very high	4
CBA1	CBA1	Very high	4	Very high	4
CBA2	CBA2	High	3	Medium	2
ESA1	ESA	Medium	2	Low	1
ESA2	ESA	Medium	2	Low	1
Other	OtherNat	Medium	2	Low	1
Degraded	-				

CBAs - Limpopo Conservation Plan v2 2013

Final_cat	CBA	EGI_CBA	BioPhySens	BPSens_val	NoClearSns	NoClearVal
Protected Area	PA	PA	Very high	4	Very high	4
Critical Biodiversity Area 1	CBA1	CBA1	Very high	4	Very high	4
Critical Biodiversity Area 2	CBA2	CBA2	High	3	Medium	2
Ecological Support Area 1	ESA1	ESA	Medium	2	Low	1
Ecological Support Area 2	ESA2	ESA	Medium	2	Low	1
Other Natural Area	ONA	OtherNat	Medium	2	Low	1
No Natural Remaining	NNR	-				

CBAs – North West Biodiversity Assessment 2008

CBA_allnoh	ESA_All	EGI_CBA	BioPhySens	BPSens_val	NoClearSns	NoClearVal
1	1	CBA1	Very high	4	Very high	4
1	2	CBA1	Very high	4	Very high	4
1	0	CBA1	Very high	4	Very high	4
2	1	CBA2	High	3	Medium	2
2	2	CBA2	High	3	Medium	2
2	0	CBA2	High	3	Medium	2
0	1	ESA	Medium	2	Low	1
0	2	ESA	Medium	2	Low	1
0	0	-				

CBAs - Eastern Cape Biodiversity Conservation Plan 2007

CBA	EGI_CBA	BioPhySens	BPSens_val	NoClearSns	NoClearVal
CBA 1	CBA1	Very high	4	Very high	4
CBA 2	ESA	Medium	2	Low	1
CBA 3	ESA	Medium	2	Low	1

The Eastern Cape Biodiversity Conservation Plan does not conform to the current requirements for bioregional plans. Most notably, the Critical Biodiversity Area extent is not constrained to a biodiversity target, and includes a far greater proportion of the landscape than other current plans. While the CBA 1 class can be considered irreplaceable or near irreplaceable, and warrants highest sensitivity, it was not considered reasonable to treat CBA 2 & CBA 3 as High Sensitivity features, and they are therefore mapped to an ESA equivalent sensitivity.

CBAs – Baviaanskloof Mega Reserve Project 2008

The work is primarily intended as a protected area expansion prioritisation, but the following features can be usefully included as equivalent to irreplaceable and best design CBAs:

CBA	Description	EGI_CBA	BioPhySens	BPSens_val	NoClearSns	NoClearVal
CBA1a	100% irreplaceable habitats; restricted RDB plant species; all remaining Critically Endangered habitats; selected river reaches.	CBA1	Very high	4	Very high	4
CBA1b	Best design site (meeting balance of pattern targets); RDB plant species; restricted animal habitats.	CBA2	High	3	Medium	2
CBA2	All remaining Endangered habitats; all remaining forest and wetland habitats; remaining coastal corridor; river reaches supporting selected river reaches; Linkages / corridors	ESA	Medium	2	Low	1
CBA3 *	Sub-quaternary catchments of selected river reaches.	OtherNat	Medium	2	Low	1

CBAs - Nelson Mandela Bay Conservation Assessment 2009

CONSERVATN	EGI_CBA	BioPhySens	BPSens_val	NoClearSns	NoClearVal
PA1	PA	Very high	4	Very high	4
PA2	PA	Very high	4	Very high	4
CBA	CBA unknown	High	3	Medium	2
ESA1	ESA	Medium	2	Low	1
ESA2	ESA	Medium	2	Low	1

CBAs – KwaZulu Natal

TERRESTRIAL CBAs:

PAIRRCD	EGI_CBA	BioPhySens	BPSens_val	NoClearSns	NoClearVal
Ir1	CBA1	Very high	4	Very high	4
001	CBA2	High	3	Medium	2
002	CBA2	High	3	Medium	2
003	CBA2	High	3	Medium	2
004	CBA2	High	3	Medium	2
005	CBA2	High	3	Medium	2

AQUATIC CBAs are broad scale connectivity areas, and therefore best treated as terrestrial ESAs with regard to sensitivity to EGI (all known wetland features are buffered and reflected as highest sensitivity features in the Aquatic section):

Category	EGI_CBA	BioPhySens	BPSens_val	NoClearSns	NoClearVal
Critical Biodiversity Area	ESA	Medium	2	Low	1

13.4 Forest

Forest areas from all the following sources were merged with all areas treated as very high sensitivity to EGI to reflect both the biodiversity sensitivity and the engineering and authorisation challenges of routes with forest habitat.

Category	EGI_CBA	BioPhySens	Buffer	BioPhySens	NoClearSns
SANBI Veg Map 2006 - forests	National	all	0	Very high	Very high
DAFF Forest types	National	all	0	Very high	Very high
land cover 2013-14 GTI DEA open licence	national	class - forest	0	Very high	Very high

13.5 Thicket

Cleared thicket vegetation does not recover to stable vegetated cover. Apart from the direct biodiversity impact, loss or clearing of thicket vegetation will result in soil degradation, erosion and cumulative siltation and water quality impacts on downstream rivers and dams.

Thicket coverage was derived from two sources:

- The pristine thicket class from the STEP Programme thicket habitat and habitat condition mapping from 2002 {Citation}; and
- The Thicket/Dense Bush class in the National Land Cover released 2015, based on Landsat imagery 2013-2014 (GeoTerraImage open licence purchased by DEA), and clipped to the extent of the STEP Albany Thicket habitat types.

Category	BioPhySens	Buffer	BioPhySens	NoClearSns
STEP 2002 Vegetation Mapping: Albany Thicket Biome	Pristine Thicket habitat condition class	0	Very high	High
National land cover 2013-14 GTI DEA open licence	Thicket / Dense Bush landcover class	0	High	Medium

The STEP Pristine thicket class, also a remote sensing product, accurately maps the densest thicket features, although areas transformed since 2002 will not be reflected. The NLC 2013-14 provides a reasonably accurate reflection of additional thicket areas within this domain, and was used to supplement the STEP Pristine Thicket data with areas that can be considered Moderate Sensitivity to Eskom infrastructure.

Processing:

- All layers were clipped to the extent of the following STEP 2002 Thicket Habitat types:

ALBANY THICKET Mosaic Coastal Grassland	GAMTOOS VALLEY THICKET Mosaic Nama Karoo
ALBANY THICKET Mosaic Savanna	GAMTOOS VALLEY THICKET Mosaic Succulent Karoo
ALBANY THICKET Mosaic with Forest & Fynbos	GAMTOOS VALLEY THICKET Mosaic with Arid Fynbos
ALBANY THICKET Mosaic with Grassland	GAMTOOS VALLEY THICKET Mosaic with Fynbos
ALBANY THICKET no Spekboom	GAMTOOS VALLEY THICKET Mosaic with Grassy Fynbos
ALBANY VALLEY THICKET Mosaic with Fynbos	GAMTOOS VALLEY THICKET no Spekboom
ALBANY VALLEY THICKET Mosaic with Grassland	GROOT ARID THICKET Mosaic with Mountain Karoo
ALBANY VALLEY THICKET Mosaic with Mountain Karoo	GROOT ARID THICKET with Spekboom
ALBANY VALLEY THICKET Mosaic with Savanna	GROOT VALLEY THICKET 1 Mosaic with Mountain Karoo
ALBANY VALLEY THICKET Mosaic with Succulent Karoo	GROOT VALLEY THICKET 1 with Spekboom
ALBANY VALLEY THICKET no Spekboom	GROOT VALLEY THICKET Mosaic with Renosterveld & Succulent Karoo
ALBANY VALLEY THICKET with Spekboom	GROOT VALLEY THICKET with Spekboom
ALGOA DUNE Mosaic with Strandveld	KEI VALLEY THICKET Mosaic Savanna
CENTRAL DUNE THICKET	SUNDAYS ARID THICKET Mosaic with Mountain Karoo
EASTERN DUNE THICKET	SUNDAYS ARID THICKET Mosaic with Nama Karoo
ESCARP ARID THICKET with Spekboom	SUNDAYS ARID THICKET no Spekboom
ESCARP THICKET no Spekboom	SUNDAYS ARID THICKET with Spekboom
ESCARP VALLEY THICKET no Spekboom	SUNDAYS THICKET Mosaic with Forest
ESCARP VALLEY THICKET with Spekboom	SUNDAYS THICKET Mosaic with Fynbos
FISH ARID THICKET with Spekboom	SUNDAYS THICKET Mosaic with Grassland
FISH THICKET Mosaic with Grassland	SUNDAYS THICKET no Spekboom
FISH VALLEY THICKET Mosaic with Mountain Karoo	SUNDAYS VALLEY THICKET Mosaic Fynbos
FISH VALLEY THICKET Mosaic with Savanna	SUNDAYS VALLEY THICKET Mosaic Nama Karoo
FISH VALLEY THICKET no Spekboom	SUNDAYS VALLEY THICKET Mosaic Succulent Karoo
FISH VALLEY THICKET with Spekboom	SUNDAYS VALLEY THICKET Mosaic with Forest
GAMTOOS ARID THICKET Mosaic with Succulent Karoo	SUNDAYS VALLEY THICKET Mosaic with Grassland
GAMTOOS ARID THICKET with Spekboom	SUNDAYS VALLEY THICKET Mosaic with Grassy Karoo
GAMTOOS THICKET Mosaic with Coastal Forest	SUNDAYS VALLEY THICKET Mosaic with Renosterveld
GAMTOOS THICKET Mosaic with Forest	SUNDAYS VALLEY THICKET no Spekboom
	SUNDAYS VALLEY THICKET with Spekboom

The pristine thicket class from the STEP Programme thicket habitat and habitat condition mapping from 2002 {Citation} was supplemented by the Thicket/Dense Bush class in the National Land Cover 2013-2014 (©GeoTerraImage open licence from DEA), clipped to the extent of the STEP Thicket habitat types.

Thicket processing:

- Clipped STEP Pristine Thicket class to EGI corridors;
- Clipped NLC2013-14 to EGI corridors, snapped to original coordinates;
- Reclassified NLC2013-14 soThicket/Dense Bush = 1 and all other values =0;

- Spatial Analyst Neighbourhood Statistics majority operation done to remove isolated pixels and slightly consolidate holes and boundaries using a circular 1.5 cell radius;
- Converted NLC2013-14 Nbrmajor raster result to polygon;
- Projected from original UTM35N to Albers coordinate system;
- Clipped resulting Thicket/Dense Bush polygon layer to extent of STEP 2002 Thicket habitat types in table above;
- Updated STEP Pristine Thicket onto NLC2013-14 Thicket/Dense Bush from previous. Update tool replaces underlying features, .i.e. full extent of STEP 2002 Pristine Thicket replaces any underlying feature or blank area, and
- Added attributes for BioPhysical scoring.

14 AQUATIC HABITAT

14.1 Mapping and Typing

Key datasets used were the 2011 NFEPA rivers and wetlands datasets. The NFEPA rivers layer was not edited, as it is a good representation of the important river systems of South Africa. However, there are inaccuracies in the NFEPA wetlands layer, and significant under-mapping of isolated wetlands, such as depressions, seeps and flats, especially in the more arid parts of the country. The national dataset was thus supplemented by local fine-scale data where available. The occurrence of false positives in the NFEPA wetland layer is low, but for all fine-scale wetland mapping domains inspected (with the exception of the City of Cape Town), the NFEPA wetlands layer does map some apparently natural wetlands that are omitted from fine-scale datasets. In most cases, therefore, the various datasets were composited so that all features from underlying datasets are represented. Only in the City of Cape Town were the NFEPA wetlands entirely erased and replaced with the fine-scale wetland mapping. This was due to the high confidence placed in the mapping and ground-truthing of wetlands in the metro.

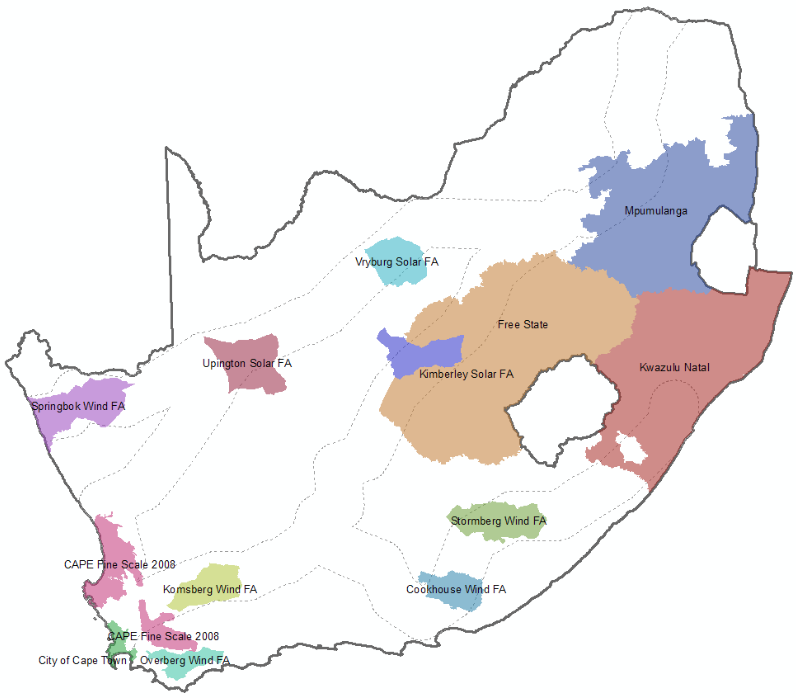


Figure 14.1. Source supplementary data sets. NFEPA wetlands and rivers are not shown; these datasets cover the full extent of the country and therefore all corridors.

Mapping confidence levels were assigned to the various wetlands layers as follows:

Map source:	Confidence level for mapping of polygon:		
	LOW	MEDIUM	HIGH
City of Cape Town wetlands			All (mapped off aerial photographs, some ground-truthed)
CAPE fine-scale wetland maps			All (mapped off aerial photographs, some ground-truthed)
KZN wetlands map	Desktop derived, unknown	SPOT imagery, Afzelia 2010 Umdoni EMF	Estuarine database, original classification
Mpumalanga Highveld wetlands map			All (NFEPA wetlands map was updated through desktop digitizing, field ground-truthing and mapped data reviewing)
NFEPA wetlands layer	All		
Wind and Solar SEA wetlands map	NFEPA wetlands, not edited	Medium confidence in mapping or editing of NFEPA wetland – i.e. needs confirmation through ground-truthing	Wetlands mapped off SPOT5 and Google Earth imagery or NFEPA wetlands checked against SPOT5 and Google Earth.

The NFEPA wetlands layer was edited, within the time and budget constraints of this project, as follows:

1. “Valleyhead seeps” were replaced by “Seeps” (valleyhead seeps are no longer a wetland type, as determined by the National Classification System for Wetlands (Ollis *et al.*, 2013));
2. Checked for self-overlapping polygons using topology rules to ensure that buffering step would provide expected results;
3. Unioned wetlands map with Level 1 Aquatic Ecoregions (Kleynhans *et al.* 2005) to provide additional contextual information for specialists and data summary (ecoregions do not influence sensitivity rating or buffer sizes);
4. Data were extracted from the national dataset within the EGI corridors; this was not done using a Clip operation, but rather through selecting all polygons within EGI corridors plus a 500 m buffer to allow for inclusion of buffers of features just outside corridors, and to address the regulatory zone specified for water use authorisation (see Section 0);
5. Original Classification of wetland types in the original NFEPA dataset was done using DEM-derived slope/type classes, which were not cleaned and so included individual grid cell pixels and associated slivers. These spurious small wetland subdivisions were removed by use of the Eliminate tool, which was run multiple times in two stages – once with features selected of less than 5000m^2 to dissolve spurious wetland polygons into larger adjoining polygons (with longest shared boundary), and again to dissolve adjacent slivers associated with dams and artificial wetlands into the adjoining dam polygon (selection rule: "WETCON" = 'Z2' AND "MAJWETCON" = 'Z3'). Only 9 Z2/Z3 polygons that were not contiguous with other dams remained and were reclassified as artificial (field calculator: [NATART] ‘Artificial’).
6. Erased City of Cape Town fine-scale wetland mapping domain;
7. Added the following attributes to NFEPA (for consistency with fine-scale maps):
    - HGM_TYPE: this is the same as NWCS_L4 if not estuarine. For estuarine, look at WETTYPE;
    - FEPA_TYPE: this is the same as WETTYPE;

- AQUA_SENS: all artificial wetlands become “low”, all others “very high”
- SOURCE: NFEPA wetlands layer (SANBI) 2011
- CONF_MAP: all “low”
- BUFF_ALLSZ: based on rules above
- RAMSAR: have NOT updated to be consistent with fine-scale by adding name of RAMSAR site as existing RAMSAR attribute is adequate for sensitivity rating and buffering ([RAMSAR] = 1 denotes a RAMSAR site).

All fine-scale datasets were edited to some extent, as follows:
City of Cape Town wetlands: Checked for no internally overlapping polygons using topology rules – no cleaning required.
CAPE Fine-scale planning: Checked for no internally overlapping polygons using topology rules – multiple overlap areas merged, these included duplicate identical polygons, and unresolved overlaps between adjacent polygons.

Fine-scale wetland types were updated to cross-walk with NFEPA types as much as possible, to provide an appropriate ecosystem type for the application of the buffer rules (see below). The cross-walk was different for each fine-scale wetlands dataset, but in each case the original classification was converted to a hydrogeomorphic (HGM) type. The tables below match the fine-scale attributes with a comparable HGM type.

Table 14.2 Cross-walk of wetland types in the fine-scale datasets used in this SEA, to a comparable hydrogeomorphic (HGM) unit as used in the NFEPA wetlands map.

City of Cape Town wetlands map			
CLS_1	CLS_2	CLS_3	Comparable HGM type
Estuarine	Permanently open	Estuarine channel	Estuary
		Estuarine depression	Estuary
		River mouth	Estuary
	Temporarily closed	Estuarine channel	Estuary
		Estuarine depression	Estuary
		River mouth	Estuary
Inland	Isolated	Depression linked channel	Depression
		Floodplain	Floodplain wetland
		Isolated depression	Flat
		N/A	Depression
		Seep, channel outflow	Seep
		Seep, no outflow	Seep
	Non-isolated	None	Only one polygon without this attribute - DELETED
		Depression linked channel	Depression
		Floodplain	Floodplain wetland
		Isolated depression	Flat
		Seep, channel outflow	Seep
		Seep, no outflow	Seep
		Valley bottom	Valley-bottom wetland
	Permanently open	Estuarine channel	Estuary

CAPE fine-scale planning wetlands layers			
SYSTEM	**FUNC_1**	**FUNC_2**	**Comparable HGM type**
Estuarine	Estuarine bay	-	Estuary
	Estuarine channel	-	Estuary
	Estuarine depression	-	Estuary
Inland	Depression with channel	-	Depression
	Floodplain	-	Floodplain wetland
	Isolated depression	-	Depression
	River channel	-	Channelled valley-bottom wetland
	Seep with channel	-	Seep
	Seep without channel	-	Seep
	Valley bottom	With channel	Channelled valley-bottom wetland
		Without channel	Unchannelled valley-bottom wetland

Mpumalanga Highveld wetlands	
HGM_Fi	**Comparable HGM type**
Channelled valley-bottom wetland	Channelled valley-bottom wetland
Dam	Dam – NOT NATURAL
Depression	Depression
Floodplain wetland	Floodplain wetland
Seep	Seep
Unchannelled valley-bottom wetland	Unchannelled valley-bottom wetland

KZN wetlands map			
VEG_TYPE	**VEG_STYPE**	**DESIG**	**Comparable HGM type**
Subtropical coastal lagoons	Estuary	Wetland estuary water	Estuary
Marine saline wetlands		Wetland natural	Estuary
KZN Coastal Belt Grassland or Wetland canal		Wetland canal	Alluvial wetland – NOT NATURAL
Alluvial wetland	Subtropical or Temperate Alluvial vegetation	Wetland cultivated	Alluvial wetland
		Wetland dam	Depression – NOT NATURAL
		Wetland floodplain	Floodplain wetland
		Wetland natural	Alluvial wetland
Freshwater wetland	Drakensberg wetlands or Subtropical freshwater wetlands or Eastern Temperate wetlands	Wetland cultivated	Alluvial wetland
		Wetland dam	Depression – NOT NATURAL
		Wetland natural	Alluvial wetland
		Wetland open water	Depression

Artificial wetlands were retained in all wetland datasets, as these are considered an engineering constraint rather than an ecological constraint and, in some cases, these systems do contribute to aquatic or terrestrial biodiversity to a limited extent. Artificial wetlands were not buffered.
All underlying aquatic source data sets are provided to allow querying of the original and updated attributes of any map feature.

14.2 Buffering

All natural and Ramsar wetlands are classified as Very High sensitivity, but varying wetland sensitivity to potential EGI impacts is also reflected by means of a variable buffer size. For this sensitivity analysis, buffers around each wetland and river reach were determined for each corridor based on a set of buffering rules. Buffers represent zones in which construction or habitat degradation would risk direct or indirect impacts on aquatic features and local hydrology. The rules are based on wetland type (HGM type) or river type, Ramsar status, FEPA status (for rivers) and threat status (from the list of nationally threatened ecosystems (Nel & Driver, 2012)), where this information was available. Due to differences in attributes between datasets, buffering could not be consistently applied across all corridors. The tables below provide the buffering rules for all datasets.

Table 14.3 Buffering rules for rivers. CR = critically endangered, EN = endangered, VU = vulnerable; LT = least threatened.

River type:	FEPA status and river type threat status:								
	River or Fish FEPA, Fish Support Area, Fish Corridor			Phase 2 FEPA, Upstream Management Area			None		
	CR, EN	VU	LT	CR, EN	VU	LT	CR, EN	VU	LT
Free-flowing rivers	200	200	200	200	200	200	200	200	200
Foreign (i.e. trans-boundary rivers)	200	200	200	200	200	200	200	200	200
Mountain	100	100	100	100	100	50	100	50	50
Upper foothill	100	100	100	100	100	50	100	50	50
Lower foothill	200	200	200	200	200	50	100	50	50
Lowland river	200	200	200	200	200	100	200	100	100

Table 14.4. NFEPA wetland buffer size rules.

Wetland type	CR, EN	VU	LT	Unknown (NULL/blank)
Artificial/Non-natural wetlands (unless RAMSAR)	0	0	0	n/a
Estuaries	500	n/a	n/a	n/a
Ramsar wetlands	500	500	500	n/a
Channelled and un-channelled valley bottom wetlands	200	200	100	100
Floodplain wetlands				
Seeps				
Depressions and Flats	100	100	50	50

Table 14.5 City of Cape Town wetland buffer size rules

Wetland category or type	Buffer size (m)
Non-natural wetlands (i.e. everything except "Natural and semi-natural" in ANTHRO_TYPE) (unless RAMSAR)	0
Estuaries	500
Ramsar wetlands	500
Valley-bottom wetlands	200
Floodplain wetlands	200
Depressions	100
Seeps	200

Table 14.6 CAPE fine-scale mapping wetland buffer size rules.

Wetland category or type	Buffer size (m)
Estuaries	500
Ramsar wetlands	500
Channelled and un-channelled valley bottom wetlands	200
Floodplain wetlands	200
Depressions and Flats	100
Seeps	200

Table 14.7 Mpumulanga Highveld wetland buffer size rules.

Wetland category or type	CR, EN	VU	LT
Disturbed wetlands, including dams within bigger wetlands[9]	50	50	50
Ramsar wetlands (none present in EGI corridor)	500	500	500
Channelled and unchannelled valley bottom wetlands	200	200	100
Floodplain wetlands	200	200	100
Depressions and Flats	100	100	50
Seeps	200	200	100

Table 14.8 Wind and Solar SEA wetland buffer size rules.

Wetland category or type	CR, EN	VU	LT
Estuaries	500	n/a	n/a
Ramsar wetlands	500	500	500
Channelled and unchannelled valley bottom wetlands	200	200	100
Floodplain wetlands	200	200	100
Depressions and Flats	100	100	50
Seeps	200	200	100

[9] Disturbed and transformed wetlands [WETCON2] = Dam and [NATART] = 0 were visually inspected over imagery and uniformly appear to be disturbed or transformed wetlands, or dams and other artificial features within broader natural or semi-natural wetlands as in the example below. These should all be considered probable Very High sensitivity features that should be strongly avoided for EGI infrastructure, and they are therefore treated as natural features in terms of sensitivity and buffer size. No isolated entirely artificial features appear to be mapped in this dataset.

Table 14.9 Kwazulu-Natal wetland buffer size rules.

Wetland category or type	CR, EN	VU	LT
Non-natural wetlands	0	0	0
Estuaries	500	n/a	n/a
Ramsar wetlands (none within EGI corridors)	500	500	500
Alluvial wetlands (probably channelled and unchannelled valley-bottom wetlands)	200	200	100
Floodplain wetlands	200	200	100
Depressions	100 (zero selected)	100 (zero selected)	50

Buffer width for each source layer is provided in the attribute field [BUFF_ALLSZ]. Given the multiple overlaps that resulted, and the time required to buffer every feature type separately and resolve overlaps, it was not possible to retain any parent polygon attributes in buffer areas. All source data set buffers were combined into a single Wetland buffer layer.

For all sensitive wetlands we considered modifying the buffering rules to halve buffer size for wetlands less than 1 ha, but this led to inconsistent buffering where small polygons were part of a bigger polygon, is likely to be inappropriate where there are wetland clusters, and made little difference to the final buffered layer, as small isolated wetlands make up a tiny proportion of total wetland area.

14.3 Aquatic scoring

Aquatic features were treated differently from most other biophysical features in that all wetlands and river reaches, plus a variable sized buffer (see above), were classified as being of **very high sensitivity**. The only exception was supplementary wetland polygons for the Free State province, which were mapped with low confidence using watercourse probability modelling, and which were classified as being of high sensitivity only, due to the lower confidence placed in the modelling. Verification of aquatic features in this area will allow for confirmation of these features as being of very high sensitivity.

Due to the different approaches of the source layers and value of their attributes in assessing the impacts and mitigation measures appropriate to EGI, the final composited EGI SEA wetland+buffer sensitivity layer could not retain any attribute information other than EGI sensitivity rating. However, input layers are provided with all key attributes as cleaned vector layers clipped to the corridor boundaries.

Artificial wetlands are not sensitive Biophysical features, but were left in as a comprehensive source data set to assist in identifying engineering sensitivity.

The following attribute fields were added to all layers for reference and buffering purposes:

Attribute name	Description
SOURCE	Data source
CONF_MAP	Mapping confidence high/low
FEPA_TYPE	Crosswalk to equivalent FEPA [WETTYPE] classes
RAMSAR	Ramsar name or indication (0=no 1 =yes)
HGM_TYPE	Wetland type
AQUA_SENS	Sensitivity rating
BUFF_ALLSZ	Buffer width to be considered same sensitivity as parent wetland as per rules below
BioPhys_sens	4-class BioPhysical Sensitivity rating

15 SPECIES

Species data sets are almost never comprehensive, and although they are crucial to identify known occurrences of species of special concern that would be vulnerable to EGI development, the absence of records should not be construed to indicate that no species of concern are present, and proposed development locations must always be surveyed in field, in the appropriate season, by experience specialists.

As a general principle, species occurrence records can only be used for land-use recommendations where they are of similar spatial accuracy to the extent of derived sensitive areas, and for species or populations where scale of impacts contemplated would have significant negative impacts or risk for global populations.

15.1 Plants

Plant data from the SANBI Threatened Species Programme include threat status, threat criterion and spatial accuracy. Plants are not mobile, and all known locations of highly threatened (Critically Endangered and Endangered) species, and species with small or highly localised populations (VU, D criteria) are thus highly sensitive to any habitat loss, disturbance or degradation.

All locations of Critically Endangered, Endangered and Vu (D criterion only) with 250m or better spatial precision were therefore included with a 250m buffer as **very high sensitivity** features.

Highly localised threatened plant hotspots were also identified for the same list of species by density analysis, after removing all local duplicate records:

- Areas/grid cells with 1–2 records per km^2 for a 5km search radius were classified as **medium sensitivity**
- Areas/grid cells with 2–8.2 records per km^2 for a 5km search radius were classified as **high sensitivity**

All resulting sensitive areas were clipped to the extent of remaining natural vegetation

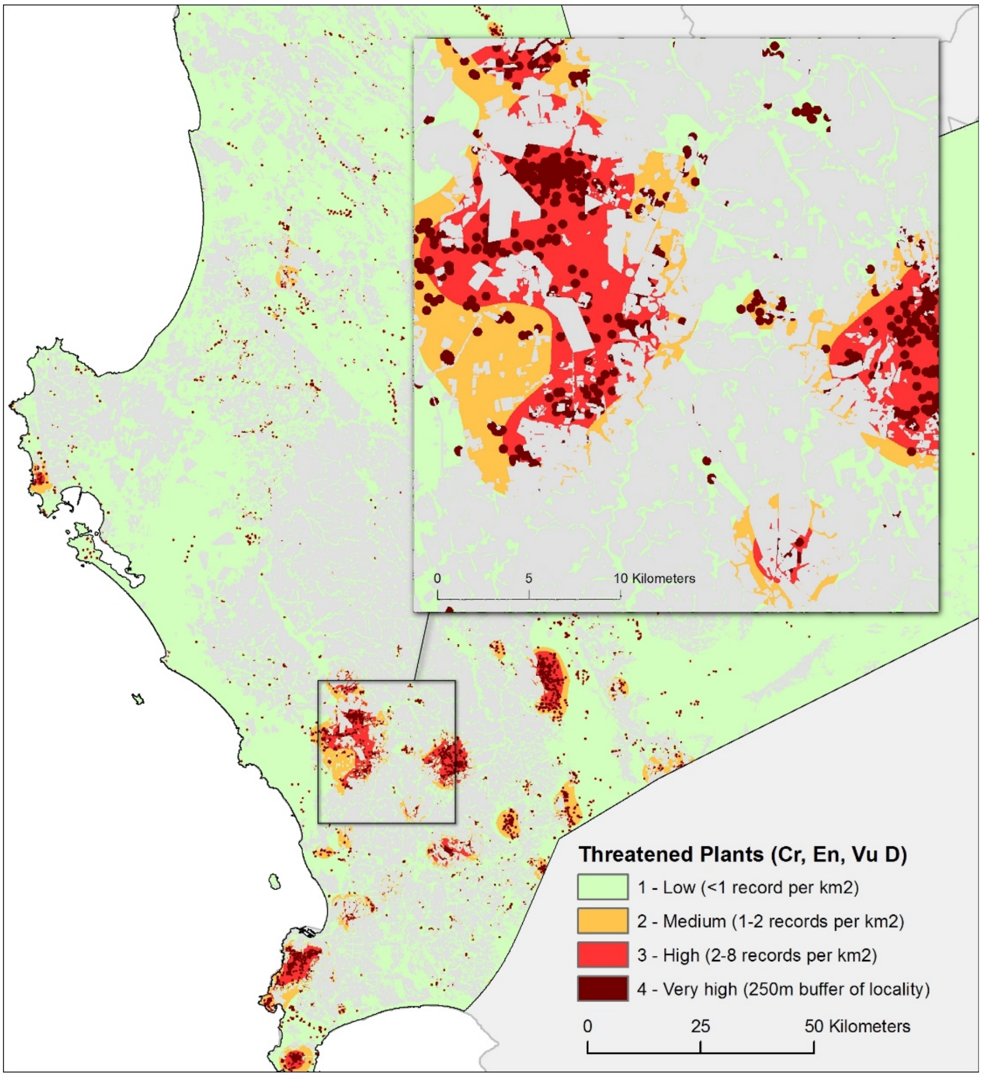


Figure 15.1. Example of species sensitivity outputs from Western Cape where highest number and densities of threatened plant species occur.

15.2 Reptiles (Geometric Tortoise)

From the reptile data set, only the Geometric tortoise *Psammobates geometricus* was considered to have a discrete area of occupancy, restricted enough to delineate as sensitive to EGI. This tortoise is listed by the IUCN as Endangered A1ac, B1+2c (assessed 1996 ver 2.3 www.iucnredlist.org/details/18398/0) , but this assessment is out of date and the species is listed as Critically Endangered by the SARCA 2014 assessment. This species is highly localised to mostly alluvial habitats in the Western Cape and has suffered severe habitat loss. Sensitive areas were therefore identified by filtering occurrence data to include only recent, post 1995 records, with descriptions corresponding to actual record location, i.e. likely spatial accuracy of approximately 1km or better.

Likely habitat for this species was mapped by selecting the full extent of SA Vegetation polygons with 3 or more records, and adding a 2.5km buffer to filtered records.

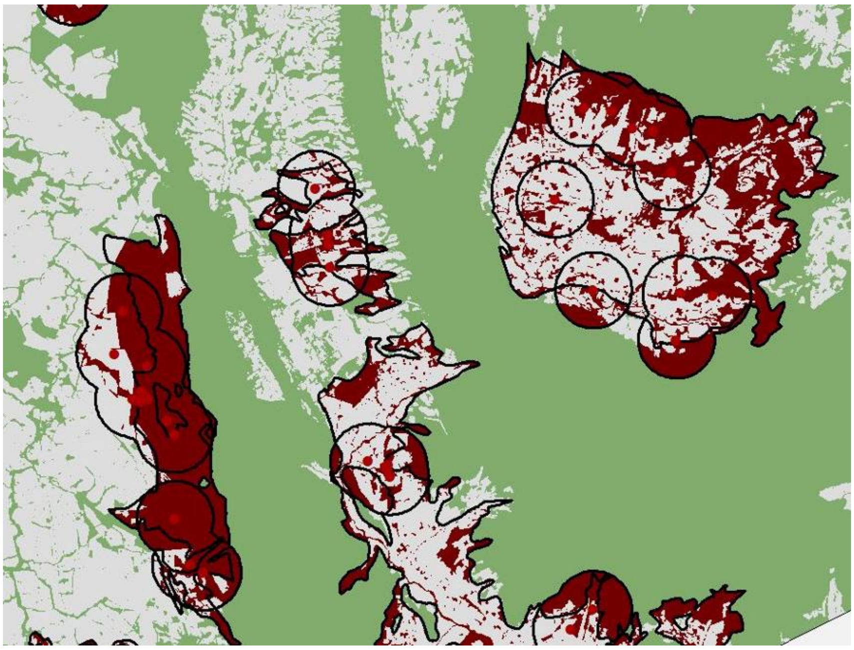


Figure 15.2. Geometric tortoise habitat approach. Selected vegetation polygons and 2.5km buffered records were clipped to extent of remaining natural habitat.

15.3 Mammals (Bats)

Bat roost data were available from EWT, but did not include any attribute indicating spatial precision. Upon inspection most points were clearly centroids of a coarse sample grid, and not useful to identify discrete areas sensitive to EGI. Therefore this data set could not be used to delineate sensitive areas.

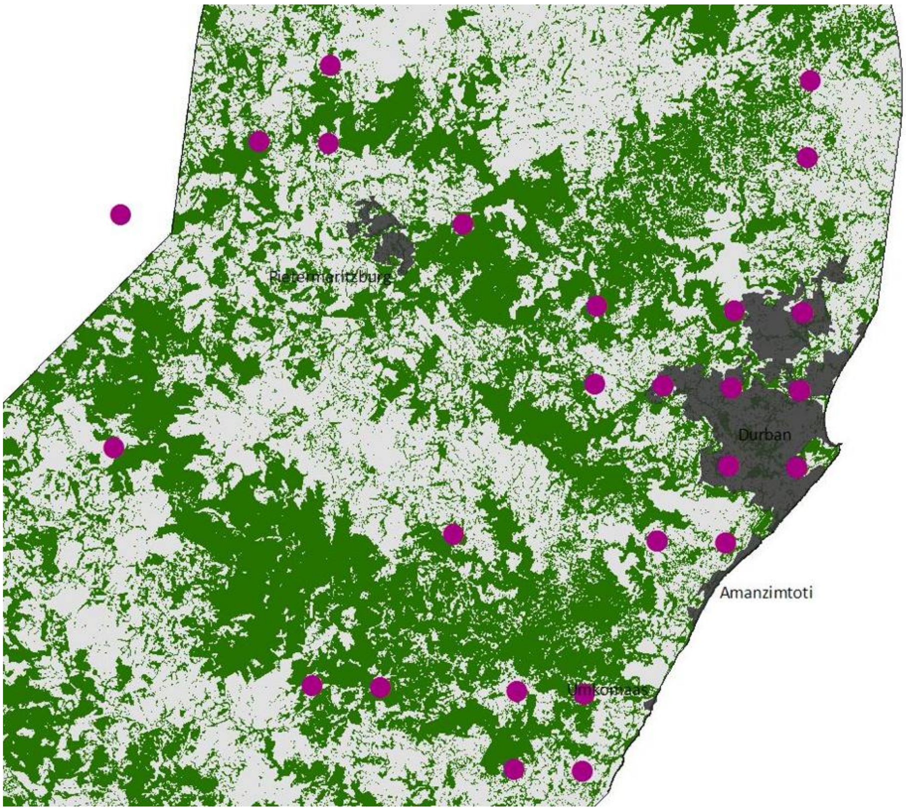


Figure 15.3. Example of bat point data on natural habitat remnants in Eastern Corridor, KZN showing points as regular grid samples, not actual features at scale useful to assessment of sensitivity to EGI.

15.4 Invertebrates

Butterfly occurrence data provided by SANBI did not include any spatial accuracy attributes, or threat criterion indicating species with highly restricted distributions that would be negatively impacted by EGI. In addition, there are very large differences in the sampling intensity across the country and there is a danger that using this data could downgrade the sensitivity of poorly sampled areas or result in sensitive species being overlooked.. These data therefore could not be used.

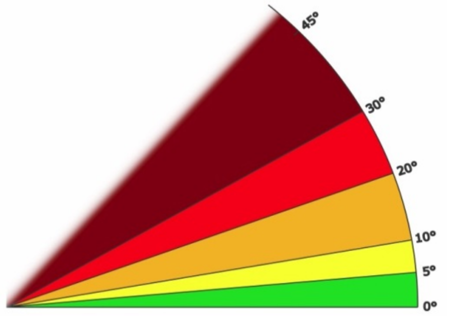
No other invertebrate spatial data with suitable attributes could be sourced within the timeframe and scope permitted by the project. However, the SABCA data from the ADU was extracted for all quarter degree squares within the corridors and summarised according to the different sections of the corridors. The listed species within each section of the corridors is summarized in Annex 6 and it should form part of the specialist studies for authorisation to ascertain if there are any local endemics or listed species within the affected sections of corridor that may be significantly impacted by grid infrastructure development.

16 PHYSICAL / TOPOGRAPHIC (SLOPE)

Slope classes are based on international norms, and derived from a wide survey of international best practise with regard to sensitivity and increased requirements for slope mitigation engineering for roads, trails and other clearing or construction impacts associated with infrastructure.

Inappropriate development on steep slopes can lead to massive erosion features, and where access is required, is typically also associated with ongoing incremental impacts as new roads or trails are created to bypass impassable eroded areas.

Eskom access infrastructure is likely to be particularly problematic, given the infrequent use and lack of regular maintenance.



Four tier sensitivity classes apply to landscape sensitivity to erosion:

SLOPE CLASS	Implication	Recommendation	Mitigation
0° – 10°	Low slopes, less vulnerable to erosion.	Preferentially use these areas.	Road construction and drainage best practice.
10° – 20°	Moderate slopes, at risk from erosion.	Avoid these areas if Low Sensitivity slope routes are feasible or cost effective.	Construction and water runoff management designed prevent erosion. Road shaping, regular water bars, and drains as required to divert rainwater from road. Annual maintenance of permanent unsurfaced roads. Rehabilitation EMPr for temporary access routes.
20° – 30°	Steep slopes, at high risk from erosion	Avoid, and minimise infrastructure within these areas as much as possible.	Permanent access route construction and maintenance to be designed by road engineer and requirements reflected in authorisation EMP. Construction and water runoff management designed prevent erosion: route along contours; cut and fill, road shaping; 10m interval water bars; and drains as required to divert rainwater from road. At least annual maintenance of permanent unsurfaced roads. Rehabilitation EMPr for temporary access routes to include erosion-prevention measures adequate to prevent risk of erosion.
>30°	Very steep slopes, at extreme risk from erosion	Avoid, and minimise infrastructure within these areas, even where alternatives are costly.	Permanent access route construction and maintenance to be designed by road engineer and requirements reflected in authorisation EMP. Construction and water runoff management designed prevent erosion: route along contours; cut and fill; road shaping; 10m interval water bars; and drains as required to divert rainwater from road. At least twice annual maintenance of permanent unsurfaced roads. Rehabilitation EMPr for temporary access routes to include erosion-prevention measures provided by qualified geotechnical specialist, and adequate to prevent risk of erosion.

Slope data are derived directly from the recently released USGS SRTM 1 arc second global Digital Elevation Model (DEM) data set.

Original data are in a 1 arc second unprojected WGS84 coordinate system and cannot be used to calculate slope, therefore the following processing was required to derive four slope sensitivity classes:

- CLIP DEM raster to a 500m buffered polygon of the EGI corridors
- Reproject DEM to a 30m square raster in both Albers and UTM35N using the ArcGIS Project Raster tool, settings: Resampling Technique = Bilinear
- ArcGIS Spatial Analyst tool Slope used to calculate slope snapped to DEM extent and cell size, settings: Output measurement = Degree, Z factor = 1
- Slope raster was reclassified to four classes using breaks 10°, 20°, 30° and 90°

EGI slope sensitivity scoring:

Feature	Feature buffer (m)	EGI biodiversity sensitivity
Slopes of 0° - 10° (0 - 18%)	0	Low
Slopes of 10° - 20° (18 - 36%)	0	Medium
Slopes of 20° - 30° (36 - 58%)	0	High
Slopes of >30° (>58%)	0	Very high

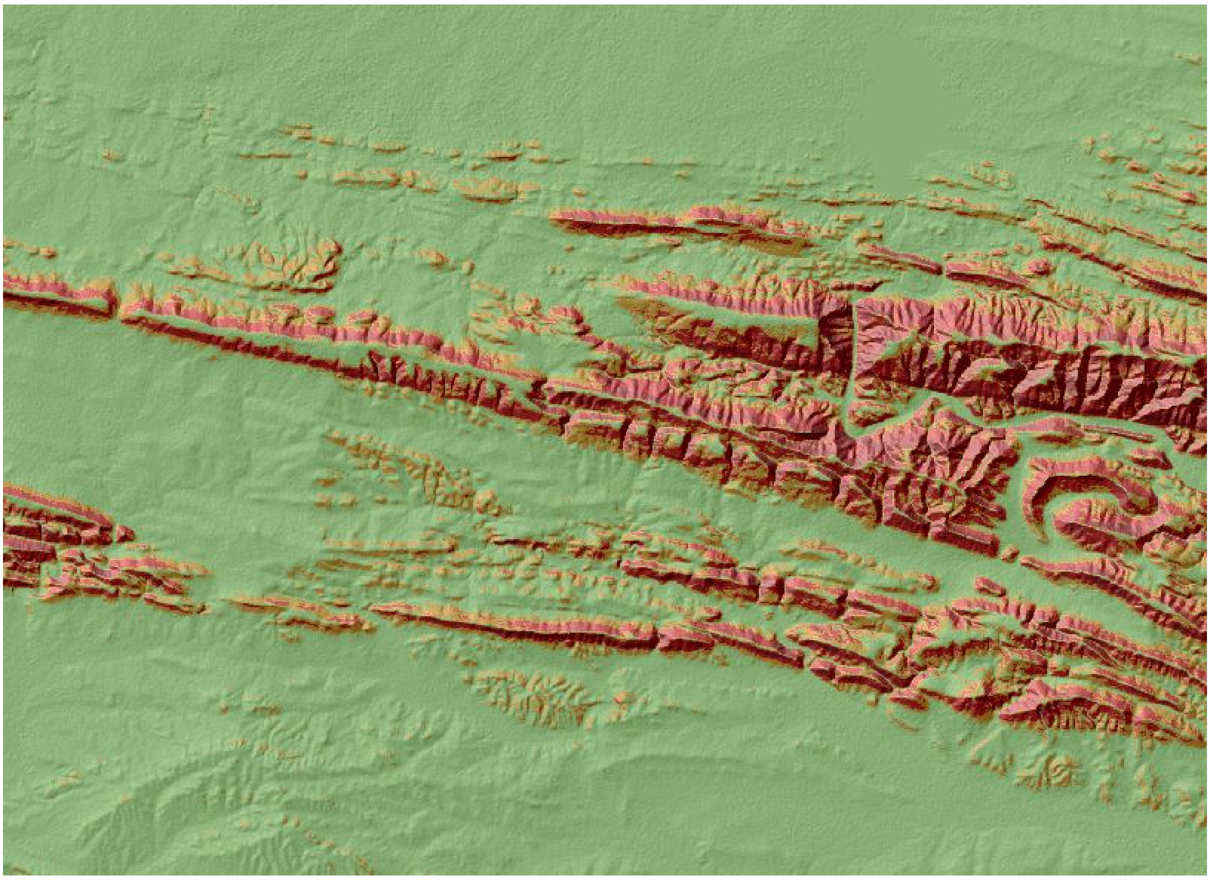


Figure 16.1. Resulting 4 tier slope sensitivity overlaid with hillshade to show relief.

17 AGGREGATED FOUR-TIER SENSITIVITY MAPS

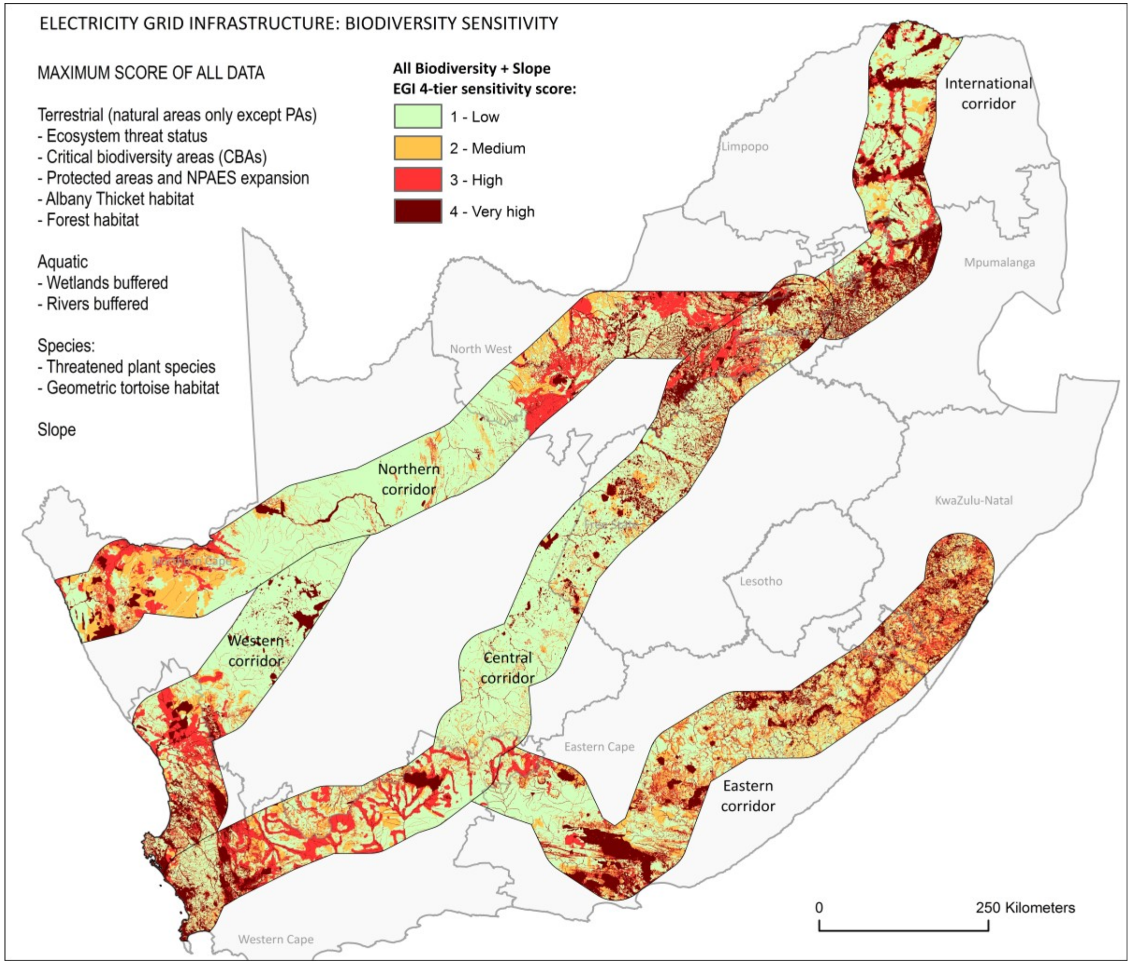
For an overview of input data sets and data sensitivity ratings, see Appendix 8.

Data are provided as GIS coverages, these map images are for overview purposes only. Maps are presented with all corridors together to avoid repetition and because individual corridors are still too large to permit additional detail to be seen.

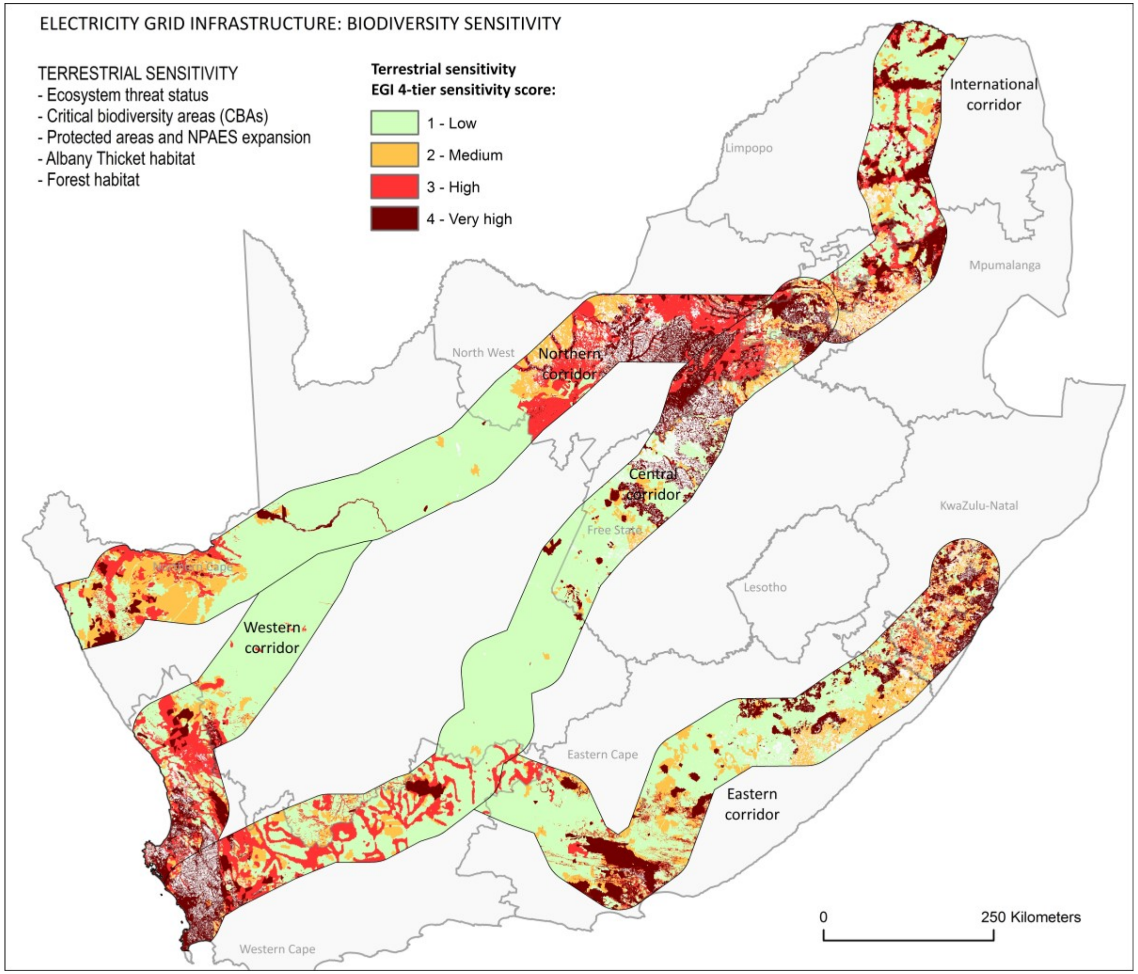
In all maps the highest sensitivity features tend to be highly transformed or fragmented, and are not as extensive or solid as they appear when viewed at the scale presented here. Many of these areas provide a matrix of very low sensitivity transformed habitats in which EGI could be located with minimal impact on adjacent natural habitats.

17.1 Overall sensitivity – maximum score of all biodiversity data types: Terrestrial, Aquatic, Species and Slope

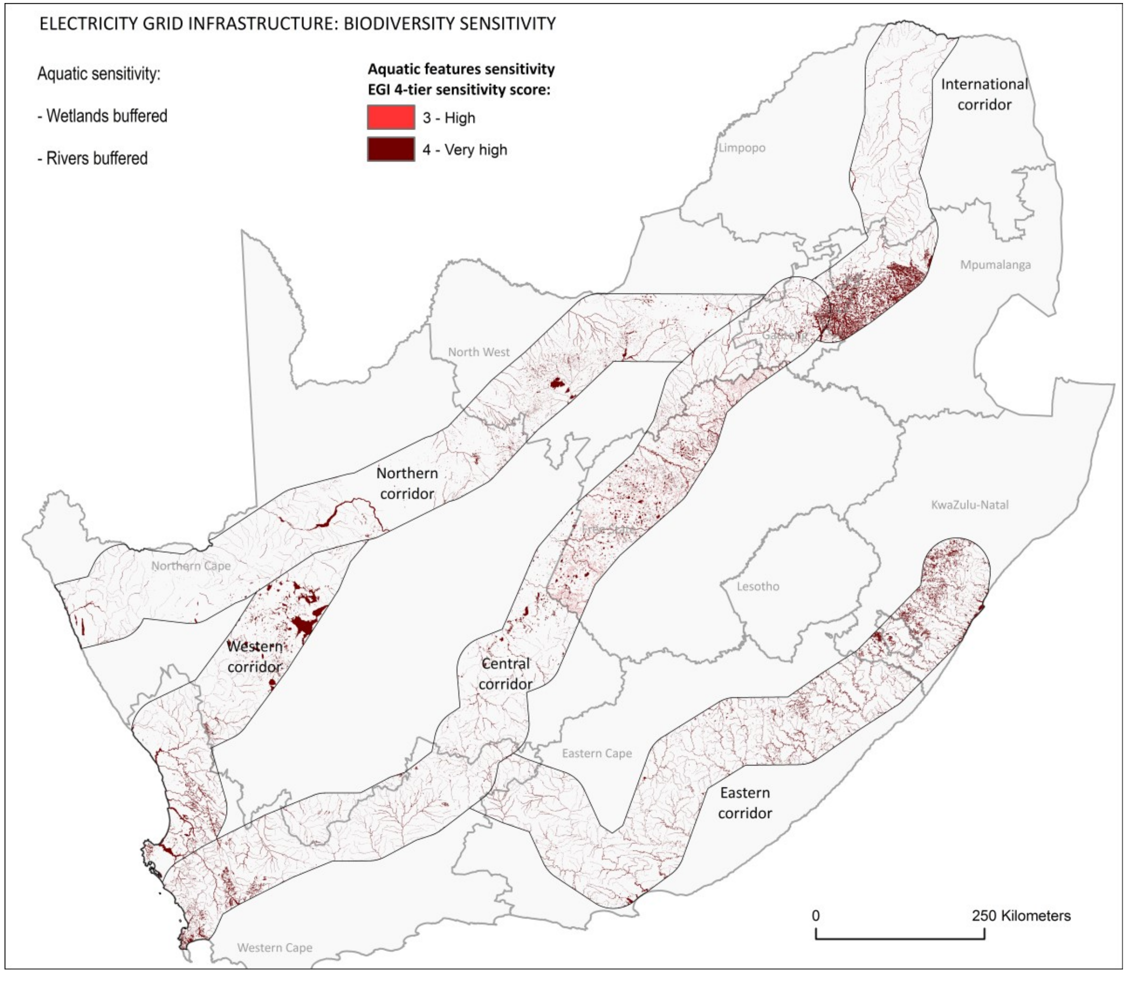
17.2



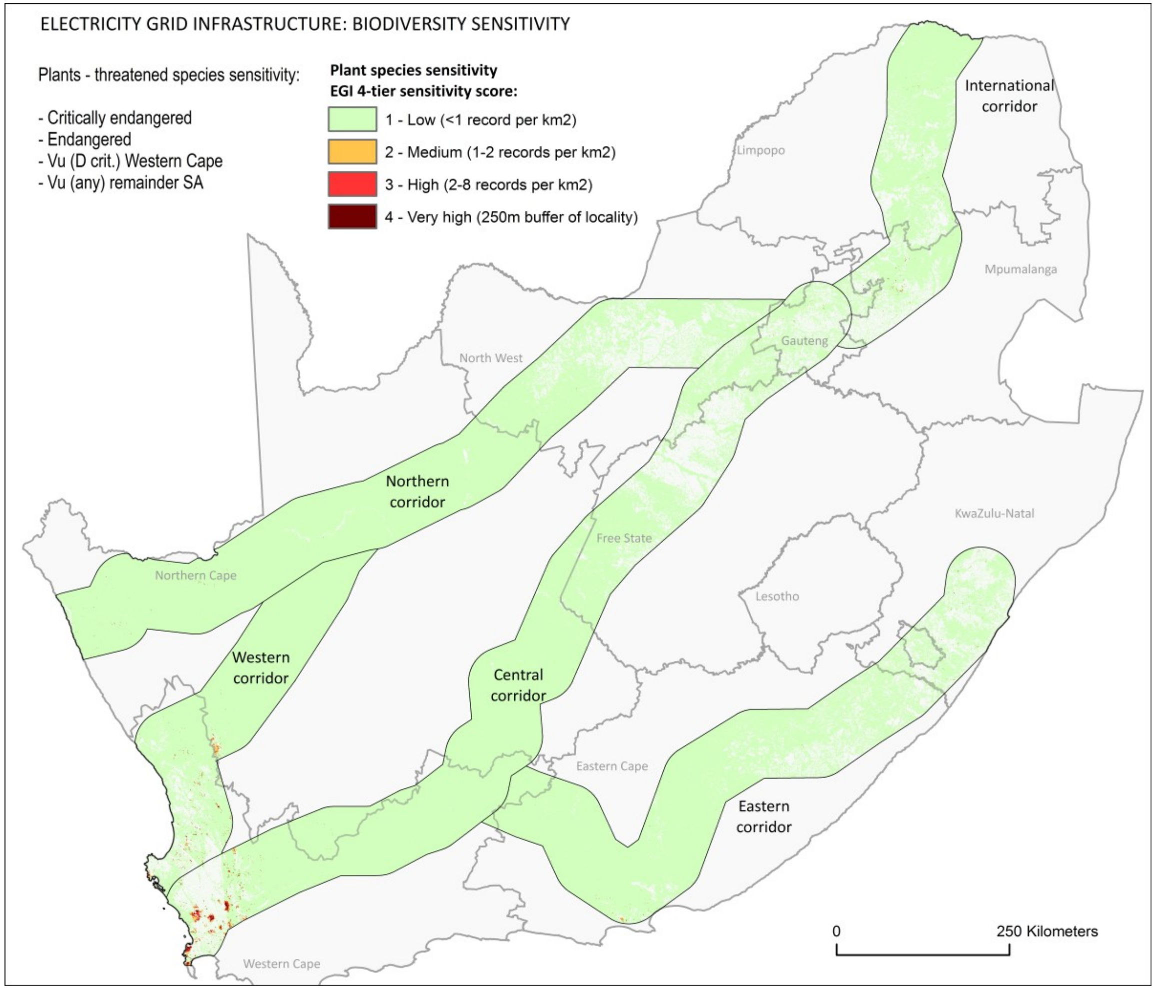
Terrestrial sensitivity: Protected Areas; Critical Biodiversity Areas x Ecosystem Status; Albany Thicket; Forests

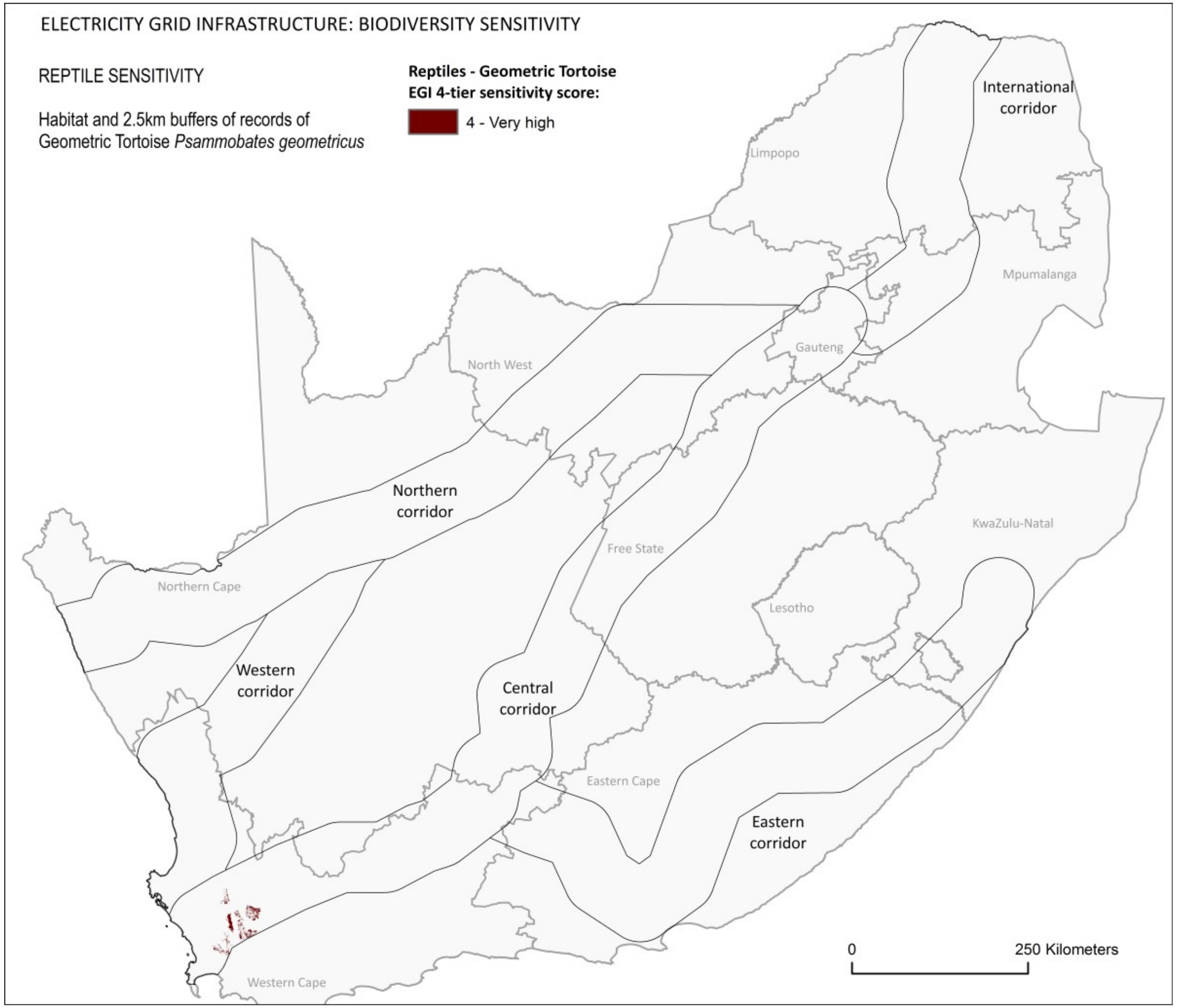


17.3 Aquatic sensitivity: Wetlands and Rivers



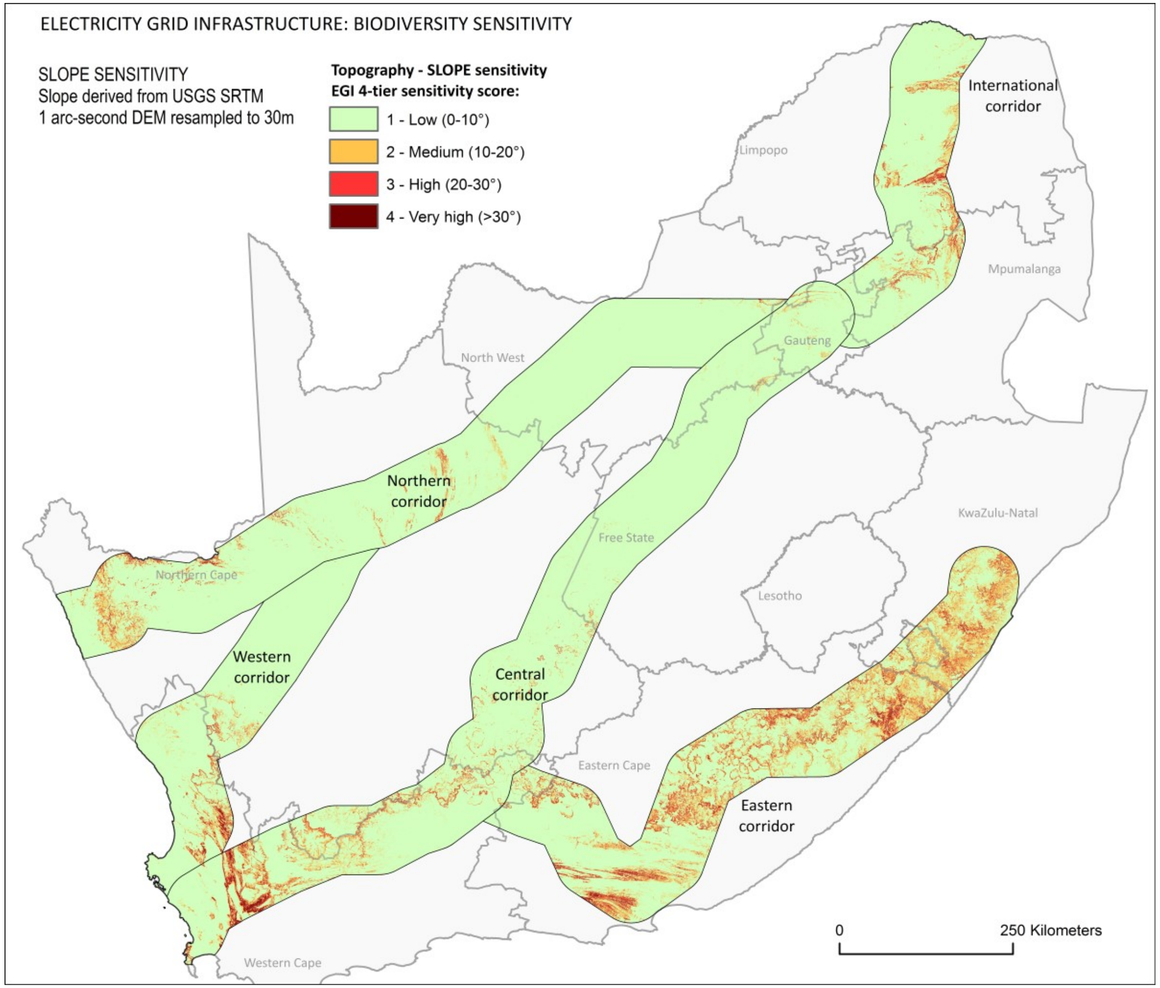
17.4 Species sensitivity: Plants; Reptiles (Geometric Tortoise):





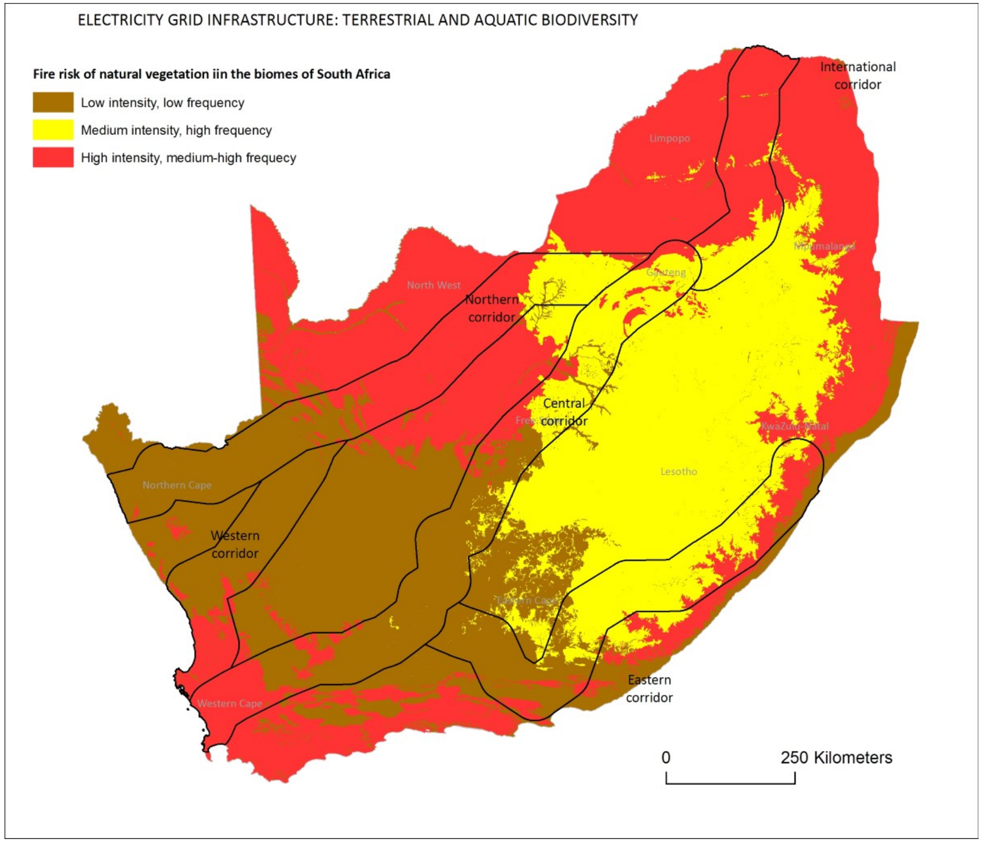
ELECTRICITY GRID INFRASTRUCTURE: BIODIVERSITY SENSITIVITY
REPTILE SENSITIVITY
Habitat and 2.5km buffers of records of
Geometric Tortoise *Psammobates geometricus*
Reptiles - Geometric Tortoise
EGI 4-tier sensitivity score:
4 - Very high
International corridor
Limpopo
Mpumalanga
Gauteng
North West
Northern corridor
Free State
KwaZulu-Natal
Northern Cape
Lesotho
Western corridor
Central corridor
Eastern Cape
Eastern corridor
Western Cape
0
250 Kilometers

17.5 Topographic / Slope sensitivity



17.6 Sensitivity assessment: Scenario with no clearing of natural vegetation.

The Eskom vegetation management guidelines contained in the document 32-247 revision date May 2007 *Environmental Procedure: Procedure for vegetation clearance and maintenance within overhead power line servitudes and on Eskom owned land* provides for evaluation of habitat conservation importance and sensitivity, but nonetheless, implies that clearing of vegetation to ground level should always be implemented. This is even implemented in locations where there is absolutely no risk to infrastructure or transmission from vegetation or wildfires, as can be seen in Section 2 Impact characterisation, Figure 2.8.



Although a crude generalisation, the above figure summarised to biome level illustrates that much of South Africa's natural habitat is either not at all fire-prone, or is subject to relatively low intensity fires that probably pose little risk of interruption of transmission or damage to infrastructure.

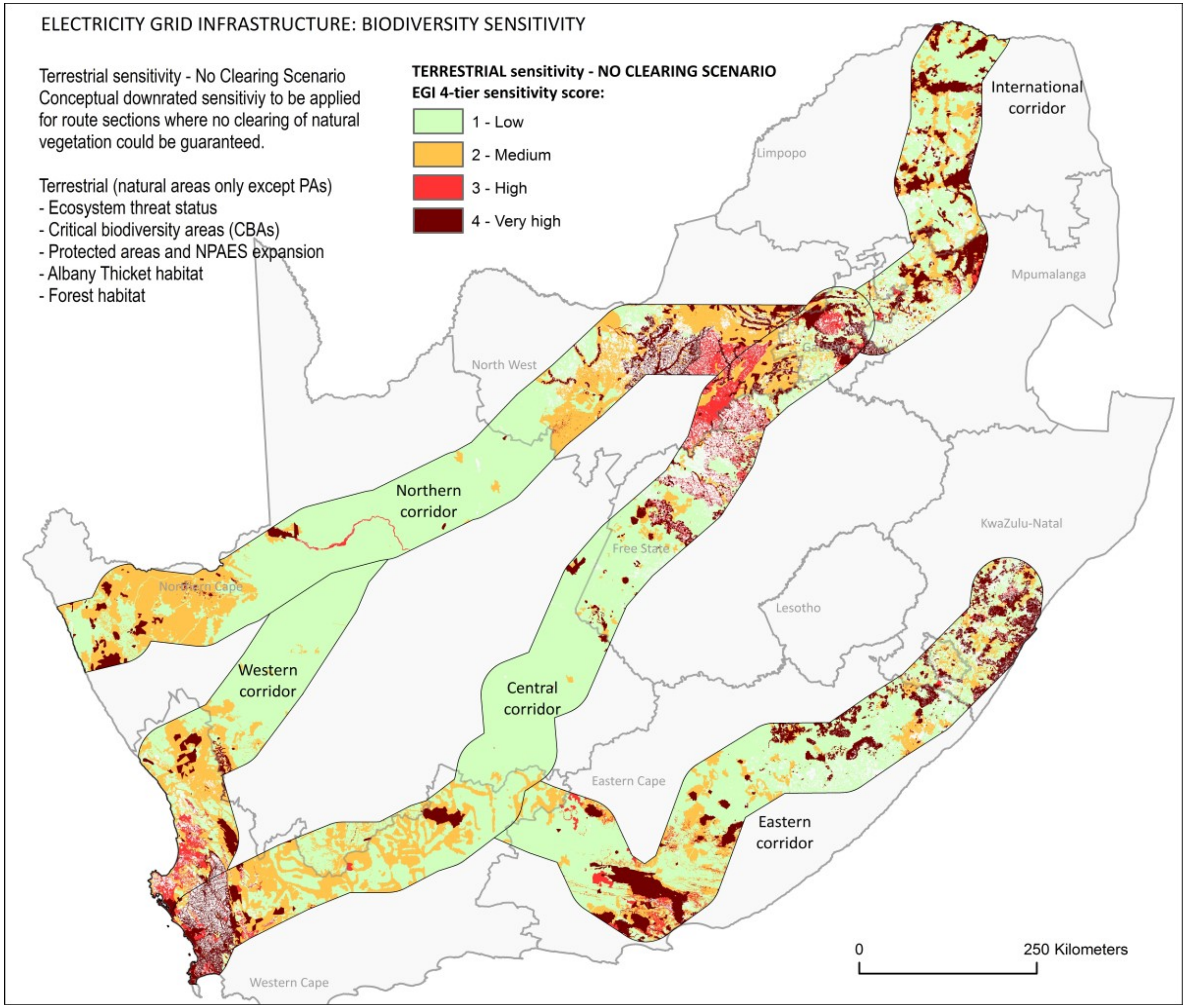
The current Eskom Environmental Procedure does not provide a mechanism to distinguish where clearing is actually required. In addition, if mitigation measures to permit natural fire regimes were implemented at planning and construction, such as use of taller pylons and lines, there does not seem to be a coordinated management framework in place to ensure that these areas would not be cleared anyway.

We propose that Eskom develop a knowledge base, map database and decision framework to provide an objective and consistent approach to vegetation clearing. This would probably include:

- Mapping and data regarding actual fire and other vegetation risk to EGI indicating when clearing should and should not be routinely implemented.
- A decision framework regarding when and to what extent sensitive biodiversity features warrant construction or management approaches that would reduce or eliminate the need for vegetation clearing.

In addition to the large environmental benefits, we believe that identifying all locations where vegetation clearing would not be required would result in a large and ongoing financial cost saving to Eskom.

For corridor route sections where no clearing of vegetation could be assured, the following conceptual down-rating of Terrestrial features compared to the Terrestrial summary layer represented in section 5.1.1 could be applied, providing less biodiversity route constraint, and reduced overall impact findings during assessment.


ELECTRICITY GRID INFRASTRUCTURE: BIODIVERSITY SENSITIVITY
Terrestrial sensitivity - No Clearing Scenario
Conceptual downrated sensitiviy to be applied for route sections where no clearing of natural vegetation could be guaranteed.
Terrestrial (natural areas only except PAs)
- Ecosystem threat status
- Critical biodiversity areas (CBAs)
- Protected areas and NPAES expansion
- Albany Thicket habitat
- Forest habitat
TERRESTRIAL sensitivity - NO CLEARING SCENARIO
EGI 4-tier sensitivity score:
1 - Low
2 - Medium
3 - High
4 - Very high
International corridor
Limpopo
Mpumalanga
North West
Northern corridor
Free State
KwaZulu-Natal
Northern Cape
Lesotho
Western corridor
Central corridor
Eastern Cape
Eastern corridor
Western Cape
0
250 Kilometers

18 INTERPRETATION AND IMPLEMENTATION OF SENSITIVITY MAPS

Specific sensitive feature in the maximum score aggregated four tier maps represented in Section 5 must be interrogated with regard to context, assessment and mitigation requirements by examining the underlying GIS source data.

18.1 Specific Issues and limitations to be taken into account for interpretation of the four tier map

Corridor	Key Impacts	Site Specific Descriptions	Possible Effect	Opportunities to avoid/reduce/offset
Western Corridor	Habitat loss and degradation within listed ecosystems in the west	There are many listed ecosystems in the Cape Lowlands which have a high conservation value and where any further habitat loss is highly undesirable	Habitat loss within listed ecosystems leading to direct impact on biodiversity and reduced ability to meet conservation targets.	Many of these ecosystems are highly fragmented and the remnants are usually well mapped, so these can easily be avoided at the planning stage. Habitat loss within Critically Endangered ecosystems is unacceptable as these ecosystems are by their nature highly fragmented and can easily be avoided.
	Degradation from alien invasion and erosion	The corridor moves from the Cape Lowlands to the Western Karoo through a sensitive area near to Niewoudtville and Calvinia where there are many mountainous areas where erosion and degradation are likely to occur following construction phase disturbance	Erosion leading to degradation and decline in ecosystem services and loss of biodiversity.	Careful route planning to avoid sensitive vegetation units and rugged terrain where possible
Northern Corridor	Impact on Namaqualand Sand Fynbos	There are several areas on the coast of Namaqualand Sand Fynbos which have high endemism and which are not well protected.	Habitat loss and direct impact on biodiversity within sensitive vegetation types.	Fine-scale mapping of vegetation units is available and should be used in preference to the national vegetation map for this area.
	Impact on sensitive fauna associated with the coastal plain	There are several listed and endemic species associated with the Namaqualand coast that would be vulnerable to impact	Habitat loss for fauna and impacts to local populations and disruption of landscape connectivity	Specialist input at the planning and screening stage to avoid sensitive habitats.
	Impact on unique habitats within the Bushmanland inselbergs areas	There are several vegetation types and unique habitats associated with the Bushmanland Inselbergs and Aggeneys area that contain a high abundance is listed and endemic species	Loss of listed flora. Habitat loss within rare and restricted habitats such as quartz patches	Fine scale mapping of this area is available and should be used in preference to the National Vegetation Map. Specialist input required from specialists with specific knowledge and experience of this area.

Corridor	Key Impacts	Site Specific Descriptions	Possible Effect	Opportunities to avoid/reduce/offset
	Impact on listed grassland and savannah vegetation types	Loss of Vaal-Vet Sandy Grassland and Mafikeng Bushveld may occur in the east of this corridor.	Especially within the Mafikeng Bushveld where there is the possibility that the clearing beneath the power line would be required, there is a significant potential impact of habitat loss.	Avoid large intact areas of Mafikeng Bushveld,
International Corridor	Impact on listed vegetation types	This corridor contains several listed vegetation types including Rand Highveld Grassland, Eastern Highveld Grassland and Springbokvlakte Thornveld	Habitat loss within listed ecosystems may impact biodiversity and ecosystem processes.	Planning phase optimisation to reduce impact to listed ecosystems and sensitive features
	Impact on high biodiversity habitats such as Mistbelt Forest	There are some fragments of Mistbelt Forest within the corridor which are identified as specifically sensitive and should be avoided.	Habitat loss with rare ecosystems such as Mistbelt Forest leading to loss of biodiversity, fragmentation and decline of ecosystem function. Impact on associated localised fauna such as golden moles.	The forest fragments are not extensive and should not be impacted, these features should be avoided at the planning stage.
Central Corridor	Impact on listed ecosystems within the Cape Lowlands	There are several highly fragments vegetation types of high conservation concern within the western part of the corridor that are vulnerable to impact	Loss of habitat within listed ecosystems. Direct impact on biodiversity within the footprint.	With careful planning at the route selection and planning stage, impact to these ecosystems can be minimised
	Impact on Riverine Rabbit	The corridor traverses the known habitat of the Riverine Rabbit which is listed as Critically Endangered	Habitat loss and direct impact on the Riverine Rabbit potentially leading to extirpation of local populations	The development footprint in river floodplains within catchments known to contain the Riverine Rabbit should be minimised, this includes pylons as well as roads and other infrastructure.
	Impact on sensitive features associated with the Great Escarpment	The corridor traverses the Great Escarpment which includes several known areas of endemism and plant diversity.	Habitat loss and fragmentation within extensive tracts of currently undisturbed wilderness areas with known high biodiversity. Soil erosion and	New lines should run adjacent to existing lines as much as possible. All roads created during construction should be monitoring for erosion after construction and appropriate action taken to avoid and reduce erosion including the

Corridor	Key Impacts	Site Specific Descriptions	Possible Effect	Opportunities to avoid/reduce/offset
			degradation on steep slopes associated with the Escarpment	use of runoff management and control features
	Impact on listed Grassland vegetation types	There are a lot of Grassland vegetation types in the north of this corridor that are vulnerable to impact and further habitat loss.	Loss of habitat within listed ecosystems. Direct impact on biodiversity within the footprint.	Intact fragments should be avoided as much as possible, New power lines should run adjacent to existing lines where possible.
Eastern Corridor	Soil Erosion and degradation of ecosystems	The majority of this corridor is rugged, hilly or mountainous and any development in this area is likely to pose a risk of generating soil erosion	Soil erosion leading to habitat loss and degradation within the affected area. Siltation and impacts on water quality in aquatic and riparian ecosystems receiving the runoff	Considerate route planning to account for the rugged topography. Specific consideration of the terrain with regards to access road planning and construction
	Impact on sensitive thicket ecosystem	Thicket is naturally dense and forms a closed canopy in many areas. As such it is vulnerable to fragmentation and edge effects from vegetation clearing.	Habitat loss within thicket ecosystems leading to negative effects on biodiversity.	Areas of intact have been mapped at a fine scale should be used at the planning phase to ensure that such areas can be avoided. It is important to note that this applies to access roads as well as pylons. Noorsveld is also part of the Thicket Biome and should be avoided as much as possible.
	Impact on forest fragments and associated biodiversity	There are a lot of forest fragments within the corridor that are vulnerable to impact, In addition these contain several associated fauna of conservation concern	Habitat loss within localised forest patches leading to loss of biodiversity, fragmentation and decline of ecosystem function. Impact on associated localised fauna such as golden moles and Blue (Somango) Monkey	Forest patches to be avoided at the planning stage including an appropriate buffer.
	Impacts on amphibians	The corridor has a high frog diversity including numerous listed species.	Habitat loss and degradation for amphibians Direct negative impacts on amphibians due to pollution and other impacts	Specific attention should be paid to amphibian habitats and the known and likely locations of listed frog species along the planned routes. Steps should be taken to ensure that such habitats are avoided as much as possible at the planning stage and verified in the field where there is uncertainty.

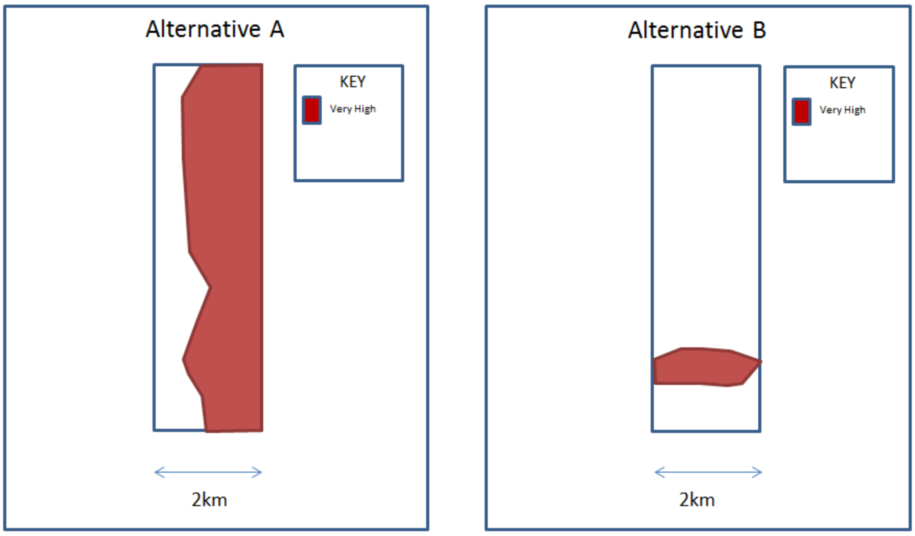
18.2 Environmental authorisation

The main purposes of this SEA are to streamline the authorisation process within the EGI corridors, in part through reducing the legal and process obstacles to development, and to reduce the impacts of EGI. The maps indicate those areas where development is likely to be able to proceed with minimal risk and where authorisation is likely to be obtained at lowest cost and in the shortest timeframe. The sensitivity maps will allow grid infrastructure developers to anticipate the likely impacts, and thus the costs and risks associated with locating infrastructure within certain areas. This would provide infrastructure developers with greater certainty and allow for strategic servitude negotiations to take place within the EGI corridors well in advance of authorisation processes.

The challenge for this SEA is to adapt approaches that are best suited to the assessment of *areal* footprints to the assessment of predominantly *linear* development applications, covering a large total area and traversing a broad suite of environments. Traditional impact statements are not suitable for linear infrastructure as the impacts are generally low at any one point but potentially high when considered at the cumulative level. For example, a power line may traverse a diverse area of many different vegetation types and the habitat loss to each type would be relatively small and on its own would not be considered a high impact, but when the impact of the power line on the whole area is considered, it is not equivalent to the average low impact but significantly higher and best expressed as the sum of all the individual impacts. Traditional assessments of linear infrastructure are often not helpful in planning, impact reduction or decision making.

These challenges call for a phased approach to planning and, ultimately, designing EGI (see Figure 18.1). The outputs of this SEA are suitable for a broad, landscape level Phase 1 planning step, in which the gazetted sensitivity maps (optimal at a scale of 1:50 000) are used for a desktop identification of suitable sub-corridor options within the broader EGI corridors. These options should optimise the logistical and viability requirements of Eskom, while minimising the environmental impact, taking into account all of the sensitivity layers produced for this SEA. It is recommended that there should be quantified comparison of the cumulative cost for each sub-corridor option, to demonstrate that overall impacts have been minimised as far as possible.

We suggest that the best way to assist planning and development of alternatives that meaningfully minimise overall impact, is to implement a phased approach starting with desktop GIS-based least-cost route selection using the provided spatial summary layers as cost surface/s. This approach can explicitly trade off financial costs and reduce the overall cumulative impact on sensitive features when planning routing options, as well as provide a quantifiable comparison of impacts for assessing route alternatives.



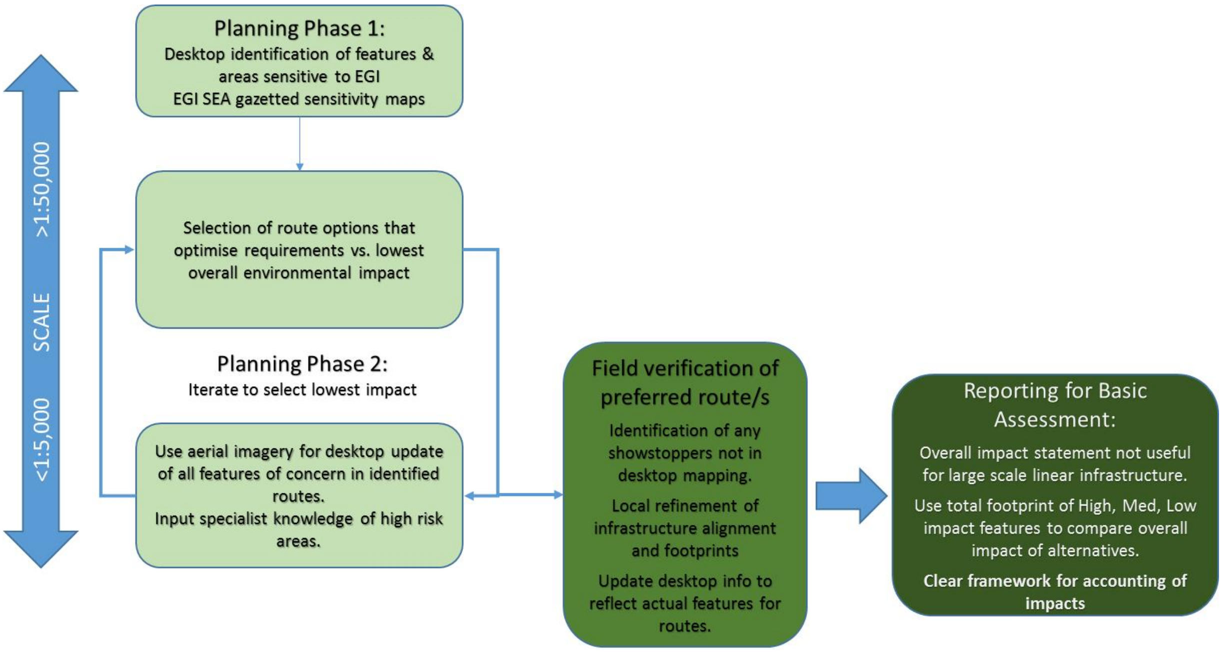


Figure 18.1 Flow chart illustrating the main steps proposed for planning and assessing grid infrastructure.

Given the limitations of the datasets used in this SEA, and the low confidence assigned to some feature mapping, it is likely that important features have been overlooked. However, it is probable that the sensitivity maps capture the majority of highly significant features relevant to broad-scale sub-corridor planning. The current corridors are 100km wide, which in most areas allows for a wide variety of routing options and the resolution of the data here is likely to be adequate for planning sub-corridors down to around 1-2 km wide.

The second planning phase would then aim to refine the routing options through a process of verification of features and their sensitivities to a scale of at most 1:5000 – thus requiring specialist input, related to the identify and nature of the sensitive features present. Use of aerial imagery and specialist knowledge of local features is essential, resulting in medium to high confidence maps of sensitive features and high risk areas. The presence of aquatic features must be verified, and these features buffered according to the rules set for the NFEPA dataset (Table 14.3 for rivers, and Table 14.4 for wetlands).

A preferred sub-corridor that is then considered to be a route alternative can then be identified through iterative selection of alternatives that minimise impacts. Field verification of the preferred route should follow, allowing the identification of environmental showstoppers that were missed in the planning phases. Finally, the preferred route can be carried forward into the Basic Assessment process, in the knowledge that all alternatives have already been taken into account and the preferred route chosen in an objective, quantifiable manner. The four tier mapping can be translated directly to biodiversity impact statements, and appropriate to the large scale and linear nature of planning, allows explicit accounting of hectares of each sensitivity class directly and indirectly impacted, and tracking of reduced impact associated with route and data refinement.

In terms of the sensitivity mapping and the implications for specialist input in the latter stages of the above assessment process, the four tiers of sensitivity should guide specialists in terms of the level and detail of input required for each tier. It is important to recognise that this is not a tiered approach per se, where different levels of sensitivity provide for a different authorisation process, but rather indicates the appropriate level of detail and input that should be used by specialists to address potential impacts along different sections of a power line. This should form part of the Terms of Reference along with standard best practice for specialist studies of EGI applications.

The four tiers of the sensitivity maps is used here to define only three levels of input and should guide the level of input required from specialists as follows:

Low Sensitivity:
These are areas identified as having few features of concern, where the development of EGI is not likely to generate significant ecological impact. As such, detailed ecological input from specialists is not likely to be warranted, however it is possible that there may some locally significant features present that were not mapped here. In order to avoid such potential impacts the following is recommended: The proposed routes are inspected using aerial or satellite imagery by a specialist with local knowledge to confirm that they do not affect any features of significance. The specialist should provide a **<u>Specialist Statement</u>** or section in a larger report confirming the following: • That there are no listed ecosystems (mapped or not) or CBAs along the route. • That there are no significant features along the route that have not been identified in this study. • That the development of the route would not impact adjacent sensitive areas through erosion or other impacts. • If there are any specific mitigation or avoidance measures that should be implemented along the route in order to ensure that it does not generate impacts beyond the footprint area.
Additional Mitigation Recommendations: • If there is any intact vegetation along the route, a preconstruction walk-though of these sections of the route should be a condition of authorisation.
Resource Allocation: • This should be done as a desktop assessment except where features of potential concern have been identified and require field validation. • This can be done at a rate of approximately 100km/day of specialist input for a 200m wide final routing corridor.

Medium & High Sensitivity:
These are areas identified as having known or likely features of potential concern which may be impacted by transmission infrastructure. As some level of impact is highly likely, specialist input in order to assess and provide recommendations to reduce these impacts is required. The following basic outputs should form the basis of specialist contribution in these areas: The specialist should provide a **Specialist Assessment Report** equivalent to that of a Basic Assessment identifying or provide the following: • The extent and condition of any listed ecosystems along the route. • The presence and underlying cause of any Critical Biodiversity Areas along the route. • The presence of any formal conservation areas along the route. • The known or potential presence of any listed or protected plant species along the route and the likely impact of the development on the affected populations. • The potential presence of listed fauna or associated habitats along the route, including their extent and potential impact of the development on these areas. • A fine-scale sensitivity map derived as follows: ▪ Can be used for route planning and which depicts features at a significantly finer scale than the maps contained here. ▪ Uses the same 4 tier system used here and which provides a reasoned motivation for allocating units to the different sensitivity classes. • Provides a summary of the extent of the different sensitivity classes along the options being considered. • Provides an explanation of why any High sensitivity areas along the preferred route cannot be avoided. • An assessment of the likely impacts associated with each of the development alternatives using the standard assessment protocol. • If there are any specific mitigation or avoidance measures that should be implemented along the route in order to reduce and ameliorate the potential impacts of the development, including any specific post-construction management of the power line corridor. .
Additional Mitigation Recommendations: • A preconstruction walk-though of the intact sections of the route should be a condition of authorisation. • The Walk-through report documenting: ▪ The number of individuals of listed or protected species that are likely to be affected along the route. For trees this should include all individuals within the area to be cleared beneath the power line. ▪ The identification and mapping of any specialised faunal habitats or active burrows which may be affected by the pylons, roads or other infrastructure. ▪ Any species suitable for search and rescue which should be moved prior to construction.
Resource Allocation: • This should be done as a desktop assessment in the initial stages, followed up with a field verification of sensitive features along the selected routes, once these have been finalised following initial input from specialists. • This can be done at a rate of approximately 200km/day of specialist input for a 2 km wide corridor, for the reporting and desktop component of the study. • Fieldwork and sensitive feature verification should be allocated at a rate of approximately 100km/day for a 2km wide corridor, but with potential reductions in allocation where there are high levels of transformation present.

Very High Sensitivity:
These are areas identified as having known or likely features of very high potential concern which may be impacted by transmission infrastructure. This includes Critically Endangered vegetation types or species as well as key habitats or environments where transmission infrastructure could generate large negative impact. In general the presence of

such features within the footprint should be considered a potential fatal flaw and all possible measures should be taken to avoid impact to these areas. It is important to note that the presence of these features within a corridor does not trigger these activities, only when such features are in fact within the proposed footprint and cannot be avoided. For these areas, the level of specialist input should include those items covered above for Medium and High Sensitivity area but with the following **additions** to the **Specialist Assessment Report**: • The size and local significance of any populations of Critically Endangered species or habitats along the power line corridor. • The potential impact of the development on these populations including the likely level of population or habitat reduction where an impact is likely to occur and the extent to which this may impact the viability or long-term security of the local population. • Provides a detailed explanation of why the Very High Sensitivity feature cannot be avoided and what measures were taken at the planning stage to try and avoid impact to such features. • A statement regarding why the development should be allowed to proceed in the face of an apparent potential fatal flaw. • An outline of additional studies that should be conducted to try and avoid or ameliorate impacts to such features. • Any potential offset or local conservation actions that could be used to offset the likely impact of the development.
Additional Mitigation Recommendations: • A preconstruction walk-though of the intact sections of the route should be a condition of authorisation. • In addition to the items listed for Medium and High sensitivity areas, the walk-through report should provide a count or delineation of the sensitive feature that may be affected.
Resource Allocation: • Resource allocation should be similar to that for medium and high sensitive areas, but with additional time allocated for the assessment of the species or habitats of conservation concern. • Fieldwork would need to be adapted to the specific situation and extent of the area within the Very High sensitivity class and the exact requirements of the study in terms of the delineation and evaluation of the affected Very High sensitivity features.

The result of the above recommendations is that if a power line route can be restricted to low sensitivity areas, then specialist input would be minimal and no fieldwork may be required. However, this is unlikely in most situations and within the medium and high sensitivity areas, some level of impact is likely and specialist input should be obtained in order to identify the preferred alternative and evaluate the likely impacts of the development. Features of very high sensitivity are a special case, and assigning this level of sensitivity to features has been done with due consideration. Such areas should drive the route planning process, and should be avoided wherever possible. Where such areas are impacted, specific and directed input relevant to the nature and extent of the affected feature will be required. Impact to such areas should be accompanied by strong motivation from the applicant as to why these features cannot be avoided. The proper strategic use of the maps provided here should minimise such occurrences, and their frequency within final development footprints will provide a measure of the level of compliance with the recommendations of this report.

In terms of the assessment approach, we have identified the traditional impact statement approach as unsuitable for linear infrastructure as the impacts are generally low at any one point but potentially high when considered at the cumulative level. As such, unless there is specific impact on a localised feature of significance, then all impacts associated with EGI development should be assessed at the cumulative level for the whole development. Although there may be localised impacts associated with substations or other concentrated development components that are specific to these components and can be adequately assessed in the traditional manner, if there are no specific impacts associated with these features, then there is no reason for them not be considered in conjunction along with the rest of the development. Therefore the implementation of this approach would result in the identification of the preferred alternative based on the iterative approach as outlined abovein Figure 6.1, which would be based on the total summed footprint within high, medium and low impact areas for each alternative. This accounting is in essence equivalent to an impact statement as it provides an objective and verifiable statement regarding the potential impact of the development as well as the degree to which is it superior to the other alternatives. However, as the sensitivity of different areas varies, this is not an absolute scale and needs to be related to the relevant section of the EGI corridor as a benchmark. When identifying the relevant impacts on features of concern as well as the most appropriate mitigation measures, the specialist would then need to go through the steps listed above for each sensitivity class along the route. The selection of the preferred alternative is based on the aggregated approach as described, but then the specialist would be required to disaggregate this to some degree during their assessment in order to identify the dominant receivers, major impact avenues and most effective mitigation measures.

The sensitivity maps provided here should not be seen as set in stone, but rather representing a baseline point from where the detail and accuracy of the maps can be improved over time, as different sections of the corridors are subject to detailed study during development applications, or when major revisions of the underlying data takes place as may occur from time to time with the national vegetation map, list of threatened ecosystems or updates to Critical Biodiversity Area maps or other fine-scale conservation planning products. It is however important that changes are accurately documented and the underlying data layers remain apparent to users so that the reasons for any changes or specific sensitivities can still be extracted from the map. This will ensure that the sensitivity maps are an accurate spatial representation of the decision-making process and the reasons for ranking high sensitivity features will remain explicit within the product.

18.3 Water Use Authorisation

18.3.1 Overview

The National Water Act No. 36 of 1998 (NWA) regulates 11 water uses that require authorisation, some of which are likely to be applicable to the construction and operation of electricity grid infrastructure. Section 21 of the NWA defines water use as:

a. Taking water from a water resource;
b. Storing water;
c. Impeding or diverting the flow of water in a watercourse;
d. Engaging in a stream flow reduction activity;
e. Engaging in a controlled activity identified and declared as such in terms of the Act;
f. Discharging waste or water containing waste into a water resource through a pipe, canal, sewer, sea outfall or other conduit;
g. Disposing of waste in a manner which may detrimentally impact on a water resource;
h. Disposing in any manner of water which contains waste from, or which has been heated in, any industrial or power generation process;
i. Altering the bed, banks, course or characteristics of a watercourse;
j. Removing, discharging or disposing of water found underground if it is necessary for the efficient continuation of an activity or for the safety of people; and
k. Using water for recreational purposes.

Section 21 (a) and (b) thus apply to consumptive use of ground- or surface water (which includes both rivers and wetlands), while the remaining sub-sections refer to non-consumptive water uses. The construction and operation of EGI is likely to result only in non-consumptive water uses, specifically Section 21 (c) and (i). Even these non-consumptive water uses may impact on the integrity and function of water resources and the overall quality of the resource and therefore must be authorised as a water use by the Department of Water and Sanitation (DWS) or competent authority (such as a Catchment Management Agency).

Entitlement or authorisation of water use is governed by:

- Schedule 1 of the Water Act (this covers reasonable domestic use and storage, gardening, watering of animals, and recreational use);
- Existing lawful use;
- Section 22 (3) of the Water Act, where DWS can dispense with authorisation requirements if satisfied that the purpose of the National Water Act will be met by other legislation, or another competent authority;
- General Authorisation (GA); or
- Licensing.

The process to be followed to obtain authorisation for these categories of water use are different, and relate to the risk associated with the water use. Lower risk water uses fall under a number of GAs, and authorisation is a simpler, faster process than for licensing. For instance, the full WULA process requires the determination of the "Reserve" for the relevant catchment, sub-catchment or resource unit. WULAs for groundwater abstraction can only be processed in catchments or resource units where the groundwater reserve determination has already been undertaken.

A GA permits the use of water in a specific area, or according to a set of conditions or limits. DWS or a Catchment Management Agency can also generally authorise specific groups of users in a catchment, so that they can make productive use of certain water resources, without having to apply for a licence. Individuals, groups or organisations who are using water under a GA must still register their water use if it exceeds the limits for registration. Currently, there are two GAs, one for consumptive and one for non-consumptive use, with each specifying areas of applicability and exclusion. The non-consumptive water use GA is relevant here.

<u>Non-consumptive GA (GN 1199)</u>

GN 1199 (18th December 2009) provides guidance regarding impeding and diverting the flow in a watercourse (Section 21 (c)), or altering the bed and banks of a watercourse (Section 21 (i)), and is thus applicable to encroachment of a built footprint into an aquatic feature or its buffer, and the construction or widening of river or wetland crossings, which are likely to be required for some grid infrastructure applications. This GA replaces the need for the full WULA process if the specified requirements are met. This GA does, however, not apply to any activities occurring within 500 m of a wetland or in the quaternary catchments specified as being exclusions from this GA (Figure 18.2). Any water uses not meeting the specified requirements are still subject to a Section 21 (c) and (i) water use licence.

This GA is currently under review, and an amended GA is likely to be released in the coming months.

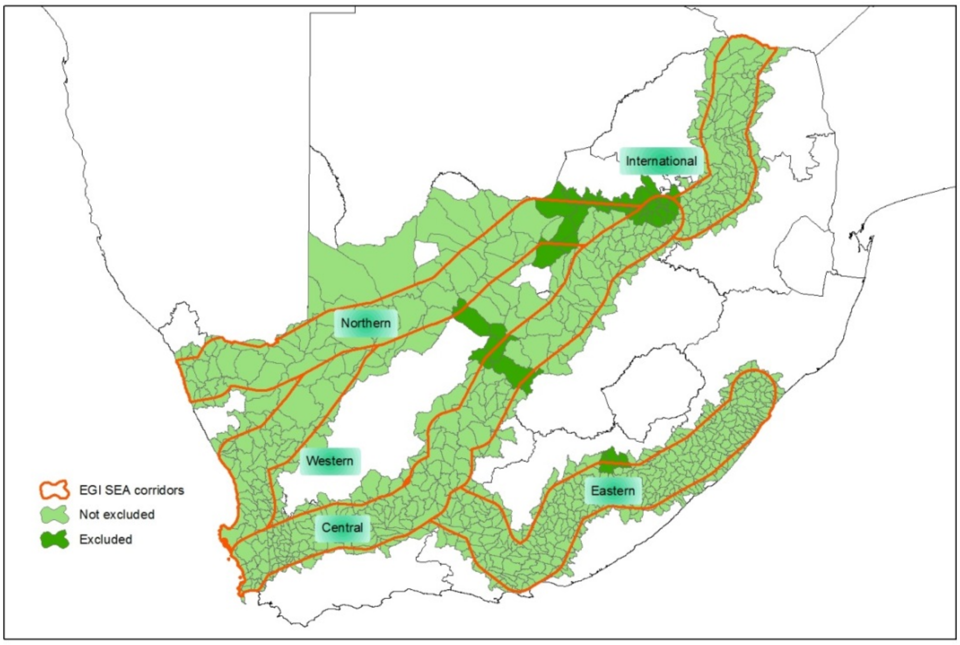


Figure 18.2 Quaternary catchments excluded from GN 1199 (2009).

The amended GA proposes the use of a risk-based approach for the authorisation of Section 21 (c) and (i) water uses, applicable to State-Owned Companies as well as private individuals and entities. This is designed to facilitate the water use authorisation process, by allowing the General Authorisation of certain water uses, deemed to be of an acceptably low environmental and socio-economic risk.

The pre-approval process involves the completion of a risk assessment matrix, and submission of certain documentation. The risk assessment matrix allows for the scoring of severity, spatial scale (extent) and duration of an impact, as well as the likelihood of the impact occurring, in order to assess the significance of the impact, and consequently, the risk rating of each impact. The matrix specifically addresses impacts:

- Within the extent of the watercourse, defined as "within the outer edge of the 1 in 100 year floodline or delineated riparian area as measured from the middle of the watercourse measured on both banks, and
- Within a 500 m radius from the boundary of any wetland (the boundary of a wetland is the outer edge of the seasonal or temporary zone as delineated for the wetland)".

An activity with impacts that are all rated "low" risk will be generally authorised. It must be noted that the amended GA is in draft form, and must still be gazetted. Until this time, the risk assessment matrix can be used at the pre-planning and design phases of a proposed infrastructure project, in order to ensure that the water use risk is low, and thus streamlining the authorisation process.

18.3.2 Water Use Risk Assessment Matrix

The risk assessment matrix proposed in the amended GN 1199 breaks each activity associated with the construction and operation of electricity grid infrastructure into the impacts expected to affect the resource quality characteristics (flow regime, water quality, geomorphology, and habitat/biota) of watercourses and wetlands. Each impact is scored in terms of its:

- **Consequence**, which is the product of the *severity* of the impact, the *spatial scale or extent*, and the *duration* of the impact; and
- **Likelihood**, which is the sum of the *frequency of the activity*, *frequency of the impact*, *existence of legislation* governing the activity and ecosystem; and the *ease of detection* of the impact.

The significance of the impact is calculated as the product of its consequence and likelihood. The final score is used to assign a risk rating to the impact. The implementation of effective mitigation measures can then reduce the risk rating. Avoidance of sensitive aquatic features and buffers, as identified in this SEA, **will reduce the risk to low, thus requiring only a GA**. Mitigation of impacts that are unavoidable – such as when power lines and roads must cross over rivers or wetlands – can reduce the significance of the impacts down to an acceptable, low risk. Acceptable mitigation measures are provided in Appendix 1.

The amended GA specifies **Eskom's transmission and distribution infrastructure** (specifically towers, pylons and power lines) as a category of activity that qualifies for general authorisation, based on the implementation of certain controls as described in technical documents, to be supplied by Eskom. These documents are compulsory, and must be supplied to the relevant authority (DWS or Catchment Management Agency), as follows:

- EMPr, method statements, engineering designs, and best practices;
- Delineation of watercourses (must indicate 1:100 year floodline where affected, and designs must cater for 1 in 100 year floods);
- Proof of mitigation hierarchy, basic impacts/risks and mitigation measures;
- Risk assessment of generic activities determined using Risk Assessment Matrix (see above).

Sub-stations are not listed as a generally authorised activity, subject to controls, and it is thus assumed that this component of EGI may still trigger a Section 21 (c) and (i) water use, should the risk of resource quality impacts be medium to high.

The Risk Assessment Matrix can be used at the planning stage, to change the route options for power lines, location of footprints for sub-stations, and location of roads, and so on. The methods used for construction and maintenance of infrastructure can be modified to reduce the impact on watercourses and wetlands down to low risk.
The risk assessment matrix must be completed by a **suitably qualified aquatic ecologist**.

18.3.3 Water Use Regulatory zone

It is recommended that the amended GA should consider specifying a reduced regulatory zone around wetlands identified in this SEA, and by specialists verifying aquatic features or assessing EGI. The buffers identified in this SEA, using the rules specified in Section 14.2, should be considered the regulatory zone, and that EGI-related activities taking place outside of these buffers do not constitute a water use. This would replace the 500 m regulatory zone specified around all wetlands. Activities within the feature or buffer will be subject to the Risk Assessment Matrix approach for determining the level of risk.

The regulatory zone for rivers is the 1:100 year floodline, or the riparian area, whichever is the greatest. In some cases this zone is less than the buffers identified in this SEA, and in some cases more. Where there is no floodline calculated, or riparian area identified, the SEA buffers can be used instead, reducing the cost of determining either the floodline or riparian area.

19 CONCLUSIONS AND FURTHER RECOMMENDATIONS

The sensitivity maps and associated assessment as contained in this report are specific to grid infrastructure and are not generally applicable. The assessed sensitivity takes specific cognizance of the nature of impacts related to grid infrastructure development and should not be transferred to other types of development.

The maps provided here should be used by Eskom for planning purposes and should allow proactive planning for lowest environmental impact route selection, land acquisition and servitude negotiation within the low sensitivity sections of the corridors. The maps indicate those areas where development is likely to be able to proceed with minimal risk and where authorisation is likely to be obtained at lowest cost and in the shortest amount of time. However, when it comes to choosing a preferred route or option among several competing options, the input of specialists should be obtained as this is complex decision based on a variety of competing considerations. At a broad level routes may appear to be similar in terms of their sensitivity, but in practice, there will always be significant differences in the condition or local significance of the affected features. As a result specialist input will still be required in order aid in the identification of the preferred option and refine the final power line route through the identified corridor.

The implementation of the recommended approach would result in the identification of the preferred alternative based on the iterative refining of the corridor alternatives and the final selection of the preferred option would be based on the total summed footprint area within high, medium and low impact areas for each alternative. This spatial accounting is in essence equivalent to an impact statement as it provides an objective and verifiable statement regarding the potential impact of the development as well as the degree to which is it superior to the other alternatives. When identifying the relevant impacts on features of concern as well as the most appropriate mitigation measures, the specialist would then need to go through the steps detailed for each sensitivity class along the route. The selection of the preferred alternative is therefore based on the aggregated accounting approach, but then the specialist would be required to disaggregate this to some degree during their assessment in order to identify the dominant receivers, major impact avenues and most effective mitigation measures. Finally, it is also important to note that the need for a preconstruction walk-though of final power line routes remains a necessary and important aspect of reducing the overall impact of the EGI development. In addition, such as walk-though would be required in order to comply with provincial and national permitting conditions for nationally protected tree species and other listed and protected species.

Ideally, this study could obviate the need for specialist input, but the available information is of poor quality and resolution for the majority of the transmission corridors' extent and a relatively large degree of uncertainty is inherent to the assessment. Nevertheless there is considerable scope for reducing the level of specialist input required. Ultimately this is necessarily dictated by the degree to which the infrastructure can be restricted to areas of lower sensitivity. Ideally, specialist input would be restricted to a desktop study to verify, at a fine scale, the results of this study. However, as the amount and sensitivity of the affected features increases, so the extent of specialist input would also need to increase, ultimately leading to relatively high levels of input where a large extent of sensitive habitat is affected. This in itself should provide motivation to ensure that routes are well planned and avoid areas of high sensitivity. The proper strategic use of the maps provided here should function to minimise specialist input but this will ultimately depend on the extent to which Eskom is able to maintain development footprints within low sensitivity areas and the adhere to the recommendations of this report.

20 ADDITIONAL REFERENCES

(In addition to 2.2.2 List of data sources)

Eskom Document number 32-247, revision date May 2007 *Environmental Procedure: Procedure for vegetation clearance and maintenance within overhead power line servitudes and on Eskom owned land*
Government Gazette No. 32006 16 March 2009 Guideline regarding the Determination of Bioregions and the Preparation and Publication of Bioregional Plans

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21 APPENDIX 1 – KEY IMPACTS AND MITIGATION MEASURES

Table 21.1 Summary of key activities associated with electrical grid infrastructure development, the associated impacts and effects on aquatic ecosystems and possible mitigation.

Project phase	Activity	Impact	Effect	Mitigation
Design phase	Placement of substations, foundations for pylons and access roads within or close to wetlands or watercourses	Loss of habitat through infilling of wetlands and riparian areas	Loss of both faunal and floral biodiversity and the ecosystem services provided by these habitats.	Freshwater ecosystems and their buffer zones should be identified as no-go areas and infrastructure such as substations, pylons and access roads should avoid these areas, wherever possible.
		Fragmentation of aquatic habitat (mostly as a result of road construction) within wetlands and watercourses	Loss of resilience of ecosystems and ecological integrity through the disruption of ecological processes	Minimise crossings over wetlands and watercourses. If wetlands or watercourses cannot be avoided, ensure that road crossings are constructed using riprap, gabion mattresses, and/or other permeable material to minimise the alteration of surface and sub-surface flow, together with pipe crossings or culverts to ensure connectivity and avoid fragmentation of ecosystems, especially if these are linked to watercourses.
		Hydrological alteration which includes largely the interruption of natural surface and/or subsurface passage of flow and the concentration of flows due to roads across wetlands or watercourses. Flow changes result in degradation of the ecological functioning of these ecosystems that rely on a specific hydrological regime to maintain their integrity.	Geomorphological and hydrological changes lead to loss of habitat quality and a consequent degradation of ecological integrity	Minimise the number of watercourse crossings for access roads where this is unavoidable. Ensure adequate watercourse crossings (i.e. culverts) are designed and constructed where roads traverse these areas so that the concentration of flow (particularly during high flow conditions) is minimised as far as possible.
		Erosion caused by loss of vegetation cover through site clearing and consequent sedimentation of aquatic ecosystems. Erosion is particularly a high risk in steep systems, and in drainage lines that lack channel features and are naturally adapted to lower energy runoff with dispersed surface flows (such as unchannelled valley-bottom wetlands).	Alterations in moisture availability and soil structure can promote the invasion of weedy and/or alien species at the expense of more natural vegetation and thus a loss of habitat integrity and/or biodiversity.	Avoid clearing of indigenous vegetation. Bank stabilisation measures (gabions, eco logs, geofabric, sediment fences) are required when wetland or watercourse banks steeper than 1:5 are denuded during construction.

Project phase	Activity	Impact	Effect	Mitigation
Construction phase	Establishment of construction camps or temporary laydown areas within or in close proximity to wetlands or rivers	Physical destruction or damage of freshwater ecosystems by workers and machinery operating within or in close proximity to wetlands or drainage lines, and through the establishment of construction camps or temporary laydown areas within or in close proximity to wetlands or watercourses	Loss of both faunal and floral biodiversity and the ecosystem services provided by these habitats.	All wetlands and watercourses should generally be treated as "no-go" areas and appropriately demarcated as such. No vehicles, machinery, personnel, construction materials, cement, fuel, oil or waste should be allowed into these areas without the express permission of and supervision by the ECO.
	Stockpiling of materials and washing of equipment within or in close proximity to wetlands or watercourses	Pollution (water quality deterioration) of freshwater ecosystems through the runoff of contaminants such as fuel, oil, concrete, wash-water, sediment and sewage into these ecosystems.	Habitat degradation which results in the loss of resilience of ecosystems through the disruption of ecological processes and thus a loss of ecosystem integrity	Construction activities associated with the establishment of access roads through wetlands or watercourses (if unavoidable) should be restricted to a working area of 10 m in width either side of the road, and these working areas should be clearly demarcated. No vehicles, machinery, personnel, construction material, cement, fuel, oil or waste should be allowed outside of the demarcated working areas.
	Construction of haul roads for movement of machinery and materials	Reduction in habitat quality through erosion and sedimentation of wetlands and rivers		There should be as little disturbance to surrounding vegetation as possible when construction activities are undertaken, as intact vegetation adjacent to construction areas will assist in the control of sediment dispersal from exposed areas.
	Excavation of borrow pits for road construction			Construction camps, toilets and temporary laydown areas should be located outside of the recommended buffer areas around wetlands and watercourses.
	Operation of heavy machinery within or in close proximity to wetlands or watercourses	Disturbance of aquatic and semi-aquatic fauna, as a result of the noise from construction teams and their machinery working within or in close proximity to wetlands and rivers.		No fuel storage, refuelling, vehicle maintenance or vehicle depots should be allowed within 30 m of the edge of any wetlands or drainage lines. Refuelling and fuel storage areas, and areas used for the servicing or parking of vehicles and machinery, should be located on impervious bases and should have bunds around them. Bunds should be sufficiently high to ensure that all the fuel kept in the area will be captured in the

Project phase	Activity	Impact	Effect	Mitigation
				event of a major spillage.
				Vehicles and machinery should not be washed within 30 m of the edge of any wetland or watercourse.
				No effluents or polluted water should be discharged directly into any watercourse or wetland areas.
				If construction areas are to be pumped of water (e.g. after rains), this water should be pumped into an appropriate settlement area, and not allowed to flow straight into any watercourses or wetland areas.
				No spoil material, including stripped topsoil, should be temporarily stockpiled within 30 m of the edge of any wetland or drainage line. Freshwater ecosystems located in close proximity to construction areas (i.e. within ~30 m) should be inspected on a regular basis by the ECO for signs of disturbance from construction activities, and for signs of sedimentation or pollution. If signs of disturbance, sedimentation or pollution are noted, immediate action should be taken to remedy the situation and, if necessary, a freshwater ecologist should be consulted for advice on the most suitable remediation measures.

Project phase	Activity	Impact	Effect	Mitigation
				Workers should be made aware of the importance of not destroying or damaging the vegetation along watercourses and in wetland areas, of not undertaking activities that could result in the pollution of drainage lines or wetlands, and of not killing or harming any animals that they encounter. This awareness should be promoted throughout the construction phase.
Operational phase	Clearing or trimming of natural wetland or riparian vegetation	Loss and/or reduction in habitat quality	Degradation of ecological integrity	One of the options that could be explored to mitigate against the potential vegetation clearing/trimming impacts would be to consider constructing taller pylons in certain areas that are high enough to allow for the growth of relatively tall vegetation.
	Application of herbicides	Pollution (water quality deterioration) of freshwater ecosystems		Avoid the use of herbicides in close proximity (close than 50 m) to wetlands or rivers
	Operation of high-voltage transmission lines above freshwater ecosystems.	Disturbance to aquatic fauna due to the noise and electromagnetic field (EMF) from the transmission line.		There is no way to mitigate against the noise- and EMF-related disturbance to aquatic and semi-aquatic fauna potentially associated with the operation of the proposed power line and associated substations and switching stations, and it is difficult to predict how significant this potential impact could be. The light-related disturbance from the substations and switching station could be mitigated to some degree by minimising the amount of lighting at these facilities and by using low intensity lights that are directed exclusively to the areas where night-time lighting is required.

Project phase	Activity	Impact	Effect	Mitigation
	Stormwater runoff on and off access roads	Erosion on the downhill slopes below roads, and channelling of flow on and in the vicinity of roads	Changes in flow patterns, head-cut and gully erosion, and sedimentation in wetlands and watercourses	If wetlands or watercourses cannot be avoided, ensure that road crossings are constructed using riprap, gabion mattresses, and/or other permeable material to minimise the alteration of surface and sub-surface flow, together with pipe crossings or culverts to ensure connectivity and avoid fragmentation of ecosystems, especially if these are linked to watercourses. There should be as little disturbance as possible to the vegetation on either side of roads, as intact vegetation will assist in the control of water and sediment dispersal from roads.

22 APPENDIX 2 – VEGETATION TYPES PER CORRIDOR

The remaining extent (ha) of listed ecosystems within the different corridors.

Vegetation Type	Status	Central corridor Total	Eastern corridor Total	International corridor Total	Northern corridor Total	Western corridor Total	Grand Total
Atlantis Sand Fynbos	CR	31452					31452
Blesbokspruit Highveld Grassland	CR	8876		5970			14847
Blinkwater Valley	CR		209				209
Boesmanspruit Highveld Grassland	CR			3293			3293
Bronberg Mountain Bushveld	CR	4884					4884
Cape Flats Sand Fynbos	CR	6850					6850
Durban Metropole North Coast Grassland	CR		13259				13259
Glen Austin Pan	CR	221					221
Highover Nature Reserve and Roselands Farm Surrounds	CR		6509				6509
Interior North Coast Grasslands	CR		16508				16508
Interior South Coast Grasslands	CR		42388				42388
Klipriver Highveld Grassland	CR	27669					27669
Kogelberg Sandstone Fynbos	CR	1330					1330
Magaliesberg Pretoria Mountain Bushveld	CR	2928					2928
Mlazi Gorge	CR		2891				2891
New Hanover Plateau	CR		22800				22800
Northern Coastal Grasslands	CR		4719				4719
Oakland and Townhill Ridge	CR		443				443
Peninsula Granite Fynbos	CR	2508					2508
Peninsula Shale Renosterveld	CR	526					526
Rietvleiriver Highveld Grassland	CR	11586					11586
Roodepoort Reef Mountain Bushveld	CR	6186					6186
Southern Coastal Grasslands	CR		3235				3235
Swartland Alluvium Fynbos	CR	11018					11018
Swartland Granite Renosterveld	CR	11552					11552
Swartland Shale Renosterveld	CR	19386				17751	37137
Swartland Silcrete Renosterveld	CR	570				70	640
Umvoti Valley Complex	CR		1487				1487
Western Highveld Sandy Grassland	CR				99222		99222
Wilge Mountain Bushveld	CR			3457			3457
Witwatersberg Pretoria Mountain Bushveld	CR	10799					10799
Woodbush Granite Grassland	CR			3579			3579

Vegetation Type	Status	Central corridor Total	Eastern corridor Total	International corridor Total	Northern corridor Total	Western corridor Total	Grand Total
Albany Alluvial Vegetation	EN		21350				21350
Bazini Forest Complex	EN		994				994
Brakfontein Reef Bushveld	EN	82					82
Breede Alluvium Fynbos	EN	15367					15367
Bronkhorstspruit Highveld Grassland	EN			5012			5012
Cape Flats Dune Strandveld	EN	15336					15336
Cape Vernal Pools	EN	5				1	6
Cumberland Crest	EN		2162				2162
Dullstroom Plateau Grasslands	EN			26979			26979
Egoli Granite Grassland	EN	40207					40207
Gqunu Forest	EN		508				508
Greytown North Grasslands	EN		1090				1090
Hangklip Sand Fynbos	EN	897					897
Hlabeni State Forest	EN		427				427
Humansdorp Shale Renosterveld	EN		1732				1732
Impendle Highlands	EN		1256				1256
Karkloof Forest Collective	EN		8583				8583
Kouebokkeveld Alluvium Fynbos	EN	5832					5832
Kraanspoort Mountain Bushveld	EN			6718			6718
KwaZulu-Natal Coastal Forest	EN		3				3
KwaZulu-Natal Sandstone Sourveld	EN		29615				29615
Loskop Grasslands	EN		2515				2515
Lower Gariep Alluvial Vegetation	EN				20895		20895
Ntimbankulu Forest	EN		738				738
Oribi-Port Edward Pondoland-Ugu Sourveld	EN		10210				10210
Peninsula Sandstone Fynbos	EN	11096					11096
Pietermaritzburg South	EN		12813				12813
Saldanha Granite Strandveld	EN					8550	8550
Sekhukhune Mountainlands	EN			108786			108786
Sihleza	EN		8489				8489
Southern Weza State Forest	EN		5401				5401
Stoffberg Mountainlands	EN			15564			15564
Tsakane Clay Grassland	EN	12905					12905
Umgeni Valley Bushveld	EN		2208				2208
Vaal-Vet Sandy Grassland	EN	503923			149153		653076
Western Cape Milkwood Forest	EN	2					2
Witwatersberg Skeerpoort	EN	29212			33		29245

Vegetation Type	Status	Central corridor Total	Eastern corridor Total	International corridor Total	Northern corridor Total	Western corridor Total	Grand Total
Mountain Bushveld							
Algoa Sandstone Fynbos	VU		7778				7778
Beinn Mheadmon Mountain Grasslands	VU		62				62
Bloemfontein Dry Grassland	VU	27572					27572
Bokkeveld Sandstone Fynbos	VU					77476	77476
Boland Granite Fynbos	VU	13661					13661
Boschhoek Forests	VU		756				756
Boschhoek Plateau	VU		1869				1869
Breede Alluvium Renosterveld	VU	154					154
Cape Winelands Shale Fynbos	VU	1672					1672
Cederberg Sandstone Fynbos	VU	40040				120591	160631
Ceres Shale Renosterveld	VU	23794					23794
Drakensberg Foothill Wattled Crane Habitat	VU		169				169
Eastern Creighton and Donnybrook	VU		9331				9331
Eastern Highveld Grassland	VU	5786		104110			109895
Eastern Scarp Forest	VU		3435				3435
Eastern Temperate Freshwater Wetlands	VU	1427	1044	1621	1268		5360
Eastlands	VU		1044				1044
Glen Cairn Valley	VU		2310				2310
Gold Cliff Farm Surrounds	VU		1110				1110
Harding East	VU		2034				2034
Harding West	VU		860				860
Hawequas Sandstone Fynbos	VU	37663					37663
Hopefield Sand Fynbos	VU	27351				59303	86654
Impendle Lowland Grasslands	VU		7				7
Ixopo Surrounds	VU		9567				9567
Kouebokkeveld Shale Fynbos	VU	22436					22436
Kromberg Plateau	VU		137				137
KwaMncane North Plateau	VU		1118				1118
KwaZulu-Natal Coastal Belt	VU		98075				98075
Leipoldtville Sand Fynbos	VU	1348				128721	130070
Loskop Mountainlands	VU			44856			44856
Mafikeng Bushveld	VU				555128		555128
Magaliesberg Hekpoort Mountain Bushveld	VU				1765		1765
Marikana Thornveld	VU	35180		3069			38249
Michaelhouse Grasslands	VU		1314				1314
Midlands Mistbelt Grassland	VU		194624				19462

Vegetation Type	Status	Central corridor Total	Eastern corridor Total	International corridor Total	Northern corridor Total	Western corridor Total	Grand Total
							4
Midmar Valley	VU		7192				7192
Mount Gilboa Plateau	VU		6047				6047
Mthatha Moist Grassland	VU		204226				204226
Ngongoni Veld	VU		379265				379265
Nieuwoudtville Shale Renosterveld	VU					7205	7205
Ntsikeni Vlei	VU		723				723
Oakspring Valley	VU		1064				1064
Piketberg Quartz Succulent Shrubland	VU					141	141
Piketberg Sandstone Fynbos	VU	1471				38223	39694
Pondoland Scarp Forest	VU		1006				1006
Rand Highveld Grassland	VU	158146		298243	55998		512387
Saldanha Flats Strandveld	VU	6425				29400	35825
Schweizer-Reneke Bushveld	VU				2690		2690
Sherwood Forest Collective	VU		503				503
Soweto Highveld Grassland	VU	95248		12963			108211
Springbokvlakte Thornveld	VU			108592			108592
Swartberg/Franklin Vlei/Kokstad Ridge and Wetlands	VU		22744				22744
Swartland Alluvium Renosterveld	VU	2968					2968
Tzaneen Sour Bushveld	VU			51915			51915
Umvoti Vlei and Surrounds	VU		3804				3804
Vaalkop Headlands	VU		4390				4390
Vredefort Dome Granite Grassland	VU	54239					54239

22.1 International Corridor

Vegetation Types within the International Corridor, their status and extent.

Biome	Veg	Status	Total Extent	Extent within Corridor	Remaining Extent	Proportion of Corridor
Grassland Biome	Rand Highveld Grassland	VU	10261	57.55	29.82	11.34
Grassland Biome	Eastern Highveld Grassland	VU	12669	26.30	10.41	5.18
Grassland Biome	Sekhukhune Montane Grassland		1381	12.24		2.41
Grassland Biome	Soweto Highveld Grassland	VU	14513	5.44	1.30	1.07
Savanna Biome	Makhado Sweet Bushveld		10107	75.62		14.90
Savanna Biome	Central Sandy Bushveld		17242	68.44		13.48
Savanna Biome	Musina Mopane Bushveld		8797	65.35		12.87
Savanna Biome	Polokwane Plateau Bushveld		4444	45.83		9.03
Savanna Biome	Springbokvlakte Thornveld	VU	8797	21.67	10.86	4.27
Savanna Biome	Sekhukhune Mountain Bushveld		2316	20.45		4.03
Savanna Biome	Loskop Mountain Bushveld		2066	17.22		3.39
Savanna Biome	Sekhukhune Plains Bushveld		2522	15.30		3.01
Savanna Biome	Limpopo Ridge Bushveld		2785	15.06		2.97
Savanna Biome	Soutpansberg Mountain Bushveld		4119	14.51		2.86
Savanna Biome	Loskop Thornveld		760	7.85		1.55
Savanna Biome	Mamabolo Mountain Bushveld		683	7.04		1.39
Savanna Biome	Tzaneen Sour Bushveld	VU	3426	6.45	5.19	1.27

22.2 Central Corridor

Vegetation Types within the Central Corridor, their status and extent.

Biome	Veg	Status	Total Extent	Extent within Corridor	Remaining Extent	Proportion of Corridor
Nama-Karoo Biome	Northern Upper Karoo		41829	218.15		15.34
Grassland Biome	Vaal-Vet Sandy Grassland	EN	22743	145.12	50.39	10.20
Nama-Karoo Biome	Gamka Karoo		20325	142.35		10.01
Nama-Karoo Biome	Eastern Upper Karoo		49821	140.09		9.85
Savanna Biome	Kimberley Thornveld		19512	65.82		4.63
Grassland Biome	Western Free State Clay Grassland		6671	61.84		4.35
Nama-Karoo Biome	Upper Karoo Hardeveld		11734	47.61		3.35
Fynbos Biome	Swartland Shale Renosterveld	CR	4946	42.49	1.94	2.99
Grassland Biome	Carletonville Dolomite Grassland		9118	40.77		2.87
Succulent Karoo Biome	Koedoesberge-Moordenaars Karoo		4715	37.03		2.60
Grassland Biome	Soweto Highveld Grassland	VU	14513	33.50	9.52	2.36
Grassland Biome	Rand Highveld Grassland	VU	10261	31.31	15.81	2.20
Succulent Karoo Biome	Tanqua Karoo		6988	28.44		2.00
Fynbos Biome	Roggeveld Shale Renosterveld		2917	22.94		1.61
Azonal Vegetation	Highveld Alluvial Vegetation		4657	19.35		1.36
Grassland Biome	Besemkaree Koppies Shrubland		9678	18.90		1.33
Azonal Vegetation	Southern Karoo Riviere		5299	15.60		1.10

22.3 Eastern Corridor

Vegetation types which occur in the Eastern Corridor

Biome	Veg	Status	Total Extent	Extent within Corridor	Remaining Extent	Proportion of Corridor
Grassland Biome	Drakensberg Foothill Moist Grassland		12891.99	74.59		7.08
Savanna Biome	Ngongoni Veld	VU	10051.15	70.70	37.93	6.71
Nama-Karoo Biome	Eastern Lower Karoo		8321.06	69.52		6.60
Grassland Biome	Midlands Mistbelt Grassland	VU	6576.58	58.35	19.46	5.54
Grassland Biome	Tsomo Grassland		6136.87	53.67		5.09
Albany Thicket Biome	Sundays Thicket		5235.65	50.97		4.84
Savanna Biome	Eastern Valley Bushveld		9955.73	50.50		4.79
Grassland Biome	East Griqualand Grassland		8667.46	47.37		4.50
Grassland Biome	Mthatha Moist Grassland	VU	5282.50	39.07	20.42	3.71
Albany Thicket Biome	Great Fish Thicket		6763.37	38.20		3.63
Grassland Biome	Queenstown Thornveld		3606.30	36.63		3.48
Grassland Biome	Indian Ocean Coastal Belt		1303.52	36.09		3.42
Grassland Biome	KwaZulu-Natal Coastal Belt	VU	6326.68	34.20	9.81	3.25
Grassland Biome	Tarkastad Montane Shrubland		4239.67	28.49		2.70
Grassland Biome	Karoo Escarpment Grassland		8378.30	24.68		2.34
Azonal Vegetation	Southern Karoo Riviere		5299.13	23.75		2.25
Nama-Karoo Biome	Eastern Upper Karoo		49821.32	20.12		1.91
Grassland Biome	Southern Drakensberg Highland Grassland		6477.66	17.89		1.70
Grassland Biome	Amathole Montane Grassland		4419.55	17.87		1.70
Grassland Biome	Bedford Dry Grassland		2050.87	17.18		1.63
Nama-Karoo Biome	Upper Karoo Hardeveld		11734.28	16.66		1.58
Grassland Biome	Southern KwaZulu-Natal Moist Grassland		2276.62	16.60		1.58
Nama-Karoo Biome	Albany Broken Veld		1647.92	16.42		1.56
Nama-Karoo Biome	Lower Karoo Gwarrieveld		1569.59	15.22		1.44
Albany Thicket Biome	Sundays Noorsveld		1271.14	12.84		1.22
Savanna Biome	KwaZulu-Natal Sandstone Sourveld	EN	1346.48	12.82	2.96	1.22
Fynbos Biome	Kouga Grassy Sandstone Fynbos		4136.66	12.08		1.15
Albany Thicket Biome	Groot Thicket		2484.38	11.83		1.12
Savanna Biome	KwaZulu-Natal Hinterland Thornveld		1145.80	11.06		1.05
Albany Thicket Biome	Camdebo Escarpment Thicket		1976.22	10.89		1.03

22.4 Northern Corridor

Vegetation types which occur in the Northern Corridor

Biome	Veg	Status	Total Extent	Extent within Corridor	Remaining Extent	Proportion of Corridor
Nama-Karoo Biome	Bushmanland Arid Grassland		45479	242.62		21.73
Savanna Biome	Mafikeng Bushveld	VU	14389	98.26	55.51	8.80
Savanna Biome	Gordonia Duneveld		36772	52.06		4.66
Grassland Biome	Western Highveld Sandy Grassland	CR	8581	50.89	9.92	4.56
Savanna Biome	Kuruman Thornveld		5794	45.53		4.08
Grassland Biome	Carletonville Dolomite Grassland		9118	45.45		4.07
Nama-Karoo Biome	Kalahari Karroid Shrubland		8284	44.66		4.00
Savanna Biome	Ghaap Plateau Vaalbosveld		15424	44.08		3.95
Savanna Biome	Kuruman Vaalbosveld		3933	39.62		3.55
Savanna Biome	Olifantshoek Plains Thornveld		8497	35.33		3.16
Savanna Biome	Gordonia Plains Shrubland		7884	34.19		3.06
Succulent Karoo Biome	Namaqualand Klipkoppe Shrubland		10936	33.32		2.98
Savanna Biome	Stella Bushveld		3218	32.50		2.91
Grassland Biome	Vaal-Vet Sandy Grassland	EN	22743	28.21	14.92	2.53
Savanna Biome	Kuruman Mountain Bushveld		4361	22.16		1.98
Desert Biome	Eastern Gariep Rocky Desert		2569	18.61		1.67
Nama-Karoo Biome	Bushmanland Sandy Grassland		2283	18.00		1.61
Nama-Karoo Biome	Lower Gariep Broken Veld		4538	17.20		1.54
Savanna Biome	Kathu Bushveld		7443	16.25		1.46
Grassland Biome	Rand Highveld Grassland	VU	10261	15.26	5.60	1.37
Succulent Karoo Biome	Namaqualand Strandveld		3916	14.64		1.31
Desert Biome	Eastern Gariep Plains Desert		1578	14.22		1.27
Grassland Biome	Klerksdorp Thornveld		3928	13.91		1.25
Succulent Karoo Biome	Namaqualand Blomveld		3809	12.93		1.16

22.5 Western Corridor

Vegetation types which occur in the Western Corridor

Biome	Veg	Status	Total Extent	Extent within Corridor	Remaining Extent	Proportion of Corridor
Nama-Karoo Biome	Bushmanland Basin Shrubland		34691	136.48		26.80
Nama-Karoo Biome	Bushmanland Arid Grassland		45479	51.54		10.12
Succulent Karoo Biome	Hantam Karoo		7464	49.48		9.72
Fynbos Biome	Leipoldtville Sand Fynbos	VU	2755	26.80	12.87	5.26
Succulent Karoo Biome	Namaqualand Klipkoppe Shrubland		10936	23.67		4.65
Azonal Vegetation	Bushmanland Vloere		4707	16.99		3.34
Fynbos Biome	Cederberg Sandstone Fynbos	VU	2449	15.64	12.06	3.07
Succulent Karoo Biome	Northern Knersvlakte Vygieveld		1514	15.09		2.96
Fynbos Biome	Hopefield Sand Fynbos	VU	1798	13.90	5.93	2.73
Succulent Karoo Biome	Namaqualand Strandveld		3916	13.33		2.62
Fynbos Biome	Graafwater Sandstone Fynbos		1254	12.53		2.46
Succulent Karoo Biome	Knersvlakte Quartz Vygieveld		1212	12.05		2.37
Fynbos Biome	Bokkeveld Sandstone Fynbos	VU	1361	10.00	7.75	1.96
Succulent Karoo Biome	Vanrhynsdorp Gannabosveld		971	9.71		1.91
Succulent Karoo Biome	Knersvlakte Shale Vygieveld		885	8.85		1.74
Fynbos Biome	Olifants Sandstone Fynbos		1059	8.23		1.62
Azonal Vegetation	Namaqualand Riviere		855	7.83		1.54
Fynbos Biome	Saldanha Flats Strandveld	VU	760	6.84	2.94	1.34
Fynbos Biome	Swartland Shale Renosterveld	CR	4946	6.76	1.78	1.33
Succulent Karoo Biome	Namaqualand Blomveld		3809	5.28		1.04
Succulent Karoo Biome	Namaqualand Spinescent Grassland		522	5.22		1.02

23 APPENDIX 3 – MAMMAL SPECIES LISTS PER CORRIDOR

23.1 International Corridor

Listed mammals species recorded from the different zones of the International Corridor

Family	Genus	Species	Subspecies	Common name	Red list category	No. records	Zone
Bovidae	*Hippotragus*	*equinus*		Roan Antelope	Vulnerable	8	5
Bovidae	*Hippotragus*	*niger*		Sable Antelope	Vulnerable	43	5
Bovidae	*Ourebia*	*ourebi*		Oribi	Endangered	11	5
Bovidae	*Raphicerus*	*sharpei*		Sharpe's Grysbok	Near Threatened	50	5
Canidae	*Lycaon*	*pictus*		African wild dog	Endangered	1651	5
Cercopithecidae	*Cercopithecus*	*mitis*		Blue Monkey	Vulnerable	4	5
Cercopithecidae	*Cercopithecus*	*mitis*		Blue Monkey	Vulnerable	57	5
Chrysochloridae	*Neamblysomus*	*julianae*		Juliana's Golden Mole	Vulnerable	1	5
Erinaceidae	*Atelerix*	*frontalis*		Southern African Hedgehog	Near Threatened	4	5
Felidae	*Acinonyx*	*jubatus*		Cheetah	Vulnerable	80	5
Felidae	*Leptailurus*	*serval*		Serval	Near Threatened	22	5
Felidae	*Panthera*	*leo*		Lion	Vulnerable	94	5
Hipposideridae	*Cloeotis*	*percivali*		Percival's Short-eared Trident Bat	Critically Endangered	1	5
Hyaenidae	*Crocuta*	*crocuta*		Spotted Hyena	Near Threatened	13	5
Hyaenidae	*Hyaena*	*brunnea*		Brown Hyena	Near Threatened	149	5
Macroscelididae	*Petrodromus*	*tetradactylus*		Four-toed Elephant Shrew	Endangered	1	5
Manidae	*Smutsia*	*temminckii*		Ground Pangolin	Vulnerable	8	5
Muridae	*Dasymys*	*incomtus*		Common Dasymys	Near Threatened	1	5
Mustelidae	*Mellivora*	*capensis*		Honey Badger	Near Threatened	99	5
Rhinolophidae	*Rhinolophus*	*clivosus*		Geoffroy's Horseshoe Bat	Near Threatened	19	5
Rhinolophidae	*Rhinolophus*	*darlingi*		Darling's Horseshoe Bat	Near Threatened	9	5
Soricidae	*Crocidura*	*maquassiensis*		Makwassie Musk Shrew	Vulnerable	4	5
Vespertilionidae	*Myotis*	*tricolor*		Temminck's Myotis	Near Threatened	2	5
Vespertilionidae	*Pipistrellus*	*rusticus*		Rusty Pipistrelle	Near Threatened	18	5
Bovidae	*Ourebia*	*ourebi*		Oribi	Endangered	6	17
Canidae	*Lycaon*	*pictus*		African wild dog	Endangered	1	17
Chrysochloridae	*Amblysomus*	*robustus*		Robust Golden Mole	Endangered	5	17
Chrysochloridae	*Chrysospalax*	*villosus*		Rough-haired Golden Mole	Critically Endangered	18	17
Erinaceidae	*Atelerix*	*frontalis*		Southern African Hedgehog	Near Threatened	3	17

Family	Genus	Species	Subspecies	Common name	Red list category	No. records	Zone
Felidae	*Leptailurus*	*serval*		Serval	Near Threatened	9	17
Hyaenidae	*Hyaena*	*brunnea*		Brown Hyena	Near Threatened	17	17
Mustelidae	*Mellivora*	*capensis*		Honey Badger	Near Threatened	3	17
Rhinolophidae	*Rhinolophus*	*clivosus*		Geoffroy's Horseshoe Bat	Near Threatened	2	17
Soricidae	*Crocidura*	*maquassiensis*		Makwassie Musk Shrew	Vulnerable	2	17
Vespertilionidae	*Myotis*	*welwitschii*		Welwitsch's Myotis	Near Threatened	1	17

23.2 Central Corridor

Listed mammal species recorded from the different sections of the Central Corridor

Family	Genus	Species	Subspecies	Common name	Red list category	No. records	Zone
Bovidae	*Damaliscus*	*pygargus*	*pygargus*	Bontebok	Vulnerable	1	6
Bovidae	*Hippotragus*	*equinus*		Roan Antelope	Vulnerable	4	6
Bovidae	*Hippotragus*	*niger*		Sable Antelope	Vulnerable	43	6
Bovidae	*Neotragus*	*moschatus*	*zuluensis*		Vulnerable	1	6
Bovidae	*Ourebia*	*ourebi*		Oribi	Endangered	2	6
Chrysochloridae	*Neamblysomus*	*julianae*		Juliana's Golden Mole	Vulnerable	2252	6
Equidae	*Equus*	*zebra*	*hartmannae*	Hartmann's Zebra	Endangered	3	6
Erinaceidae	*Atelerix*	*frontalis*		Southern African Hedgehog	Near Threatened	10	6
Felidae	*Acinonyx*	*jubatus*		Cheetah	Vulnerable	3	6
Felidae	*Leptailurus*	*serval*		Serval	Near Threatened	33	6
Felidae	*Panthera*	*leo*		Lion	Vulnerable	7	6
Hipposideridae	*Cloeotis*	*percivali*		Percival's Short-eared Trident Bat	Critically Endangered	3	6
Hyaenidae	*Crocuta*	*crocuta*		Spotted Hyena	Near Threatened	1	6
Hyaenidae	*Hyaena*	*brunnea*		Brown Hyena	Near Threatened	67	6
Manidae	*Smutsia*	*temminckii*		Ground Pangolin	Vulnerable	1	6
Mustelidae	*Mellivora*	*capensis*		Honey Badger	Near Threatened	11	6
Nesomyidae	*Mystromys*	*albicaudatus*		African White-tailed Rat	Endangered	50	6
Pteropodidae	*Eidolon*	*helvum*		African Straw-colored Fruit Bat	Near Threatened	1	6
Rhinolophidae	*Rhinolophus*	*clivosus*		Geoffroy's Horseshoe Bat	Near Threatened	48	6
Rhinolophidae	*Rhinolophus*	*darlingi*		Darling's Horseshoe Bat	Near Threatened	1	6
Vespertilionidae	*Miniopterus*	*schreibersii*		Schreibers's Long-fingered Bat	Near Threatened	16	6
Vespertilionidae	*Myotis*	*tricolor*		Temminck's Myotis	Near Threatened	19	6
Vespertilionidae	*Myotis*	*welwitschii*		Welwitsch's Myotis	Near Threatened	2	6
Vespertilionidae	*Pipistrellus*	*rusticus*		Rusty Pipistrelle	Near Threatened	8	6
Bovidae	*Damaliscus*	*pygargus*	*pygargus*	Bontebok	Vulnerable	4	7

Family	Genus	Species	Subspecies	Common name	Red list category	No. records	Zone
Bovidae	*Hippotragus*	*equinus*		Roan Antelope	Vulnerable	79	7
Bovidae	*Hippotragus*	*niger*		Sable Antelope	Vulnerable	43	7
Equidae	*Equus*	*zebra*	*hartmannae*	Hartmann's Zebra	Endangered	6	7
Equidae	*Equus*	*zebra*	*zebra*	Cape Mountain Zebra	Vulnerable	1185	7
Erinaceidae	*Atelerix*	*frontalis*		Southern African Hedgehog	Near Threatened	9	7
Felidae	*Leptailurus*	*serval*		Serval	Near Threatened	5	7
Felidae	*Panthera*	*leo*		Lion	Vulnerable	4	7
Hyaenidae	*Hyaena*	*brunnea*		Brown Hyena	Near Threatened	14	7
Leporidae	*Bunolagus*	*monticularis*		Riverine Rabbit	Critically Endangered	30	7
Mustelidae	*Mellivora*	*capensis*		Honey Badger	Near Threatened	13	7
Pteropodidae	*Eidolon*	*helvum*		African Straw-colored Fruit Bat	Near Threatened	1	7
Rhinolophidae	*Rhinolophus*	*capensis*		Cape Horseshoe Bat	Near Threatened	2	7
Rhinolophidae	*Rhinolophus*	*clivosus*		Geoffroy's Horseshoe Bat	Near Threatened	3	7
Rhinolophidae	*Rhinolophus*	*denti*		Dent's Horseshoe Bat	Near Threatened	1	7
Vespertilionidae	*Cistugo*	*lesueuri*		Lesueur's Wing-gland Bat	Near Threatened	1	7
Vespertilionidae	*Myotis*	*tricolor*		Temminck's Myotis	Near Threatened	2	7
Bovidae	*Damaliscus*	*pygargus*	*pygargus*	Bontebok	Vulnerable	1	12
Chrysochloridae	*Amblysomus*	*corriae*		Fynbos Golden Mole	Near Threatened	1	12
Leporidae	*Bunolagus*	*monticularis*		Riverine Rabbit	Critically Endangered	46	12
Bovidae	*Damaliscus*	*pygargus*	*pygargus*	Bontebok	Vulnerable	164	13
Bovidae	*Hippotragus*	*equinus*		Roan Antelope	Vulnerable	1	13
Bovidae	*Hippotragus*	*niger*		Sable Antelope	Vulnerable	2	13
Bovidae	*Neotragus*	*moschatus*	*zuluensis*		Vulnerable	1	13
Bovidae	*Ourebia*	*ourebi*		Oribi	Endangered	1	13
Bovidae	*Philantomba*	*monticola*		Blue Duiker	Vulnerable	6	13
Chrysochloridae	*Amblysomus*	*corriae*		Fynbos Golden Mole	Near Threatened	64	13
Equidae	*Equus*	*zebra*	*zebra*	Cape Mountain Zebra	Vulnerable	7	13
Felidae	*Panthera*	*leo*	_	Lion	Vulnerable	7	13
Hyaenidae	*Hyaena*	*brunnea*	_	Brown Hyena	Near Threatened	2	13
Mustelidae	*Mellivora*	*capensis*	_	Honey Badger	Near Threatened	128	13
Nesomyidae	*Mystromys*	*albicaudatus*	_	African White-tailed Rat	Endangered	9	13
Phocidae	*Mirounga*	*leonina*	_	Southern Elephant Seal	Endangered	3	13
Rhinolophidae	*Rhinolophus*	*capensis*	_	Cape Horseshoe Bat	Near Threatened	76	13
Rhinolophidae	*Rhinolophus*	*clivosus*	_	Geoffroy's Horseshoe Bat	Near Threatened	27	13
Vespertilionidae	*Miniopterus*	*schreibersii*	_	Schreibers's Long-fingered Bat	Near Threatened	582	13
Vespertilionidae	*Myotis*	*tricolor*	_	Temminck's Myotis	Near Threatened	93	13

23.3 Eastern Corridor

Listed mammals recorded from the different sections of the Eastern Corridor.

Family	Genus	Species	Subspecies	Common name	Red list category	No. records	Zone
Bovidae	*Hippotragus*	*niger*		Sable Antelope	Vulnerable	1	8
Equidae	*Equus*	*zebra*	*zebra*	Cape Mountain Zebra	Vulnerable	130	8
Felidae	*Leptailurus*	*serval*		Serval	Near Threatened	4	8
Bovidae	*Raphicerus*	*sharpei*		Sharpe's Grysbok	Near Threatened	2	9
Bovidae	*Damaliscus*	*pygargus*	*pygargus*	Bontebok	Vulnerable	2	9
Bovidae	*Hippotragus*	*equinus*		Roan Antelope	Vulnerable	2	9
Bovidae	*Hippotragus*	*niger*		Sable Antelope	Vulnerable	8	9
Bovidae	*Philantomba*	*monticola*		Blue Duiker	Vulnerable	11	9
Equidae	*Equus*	*zebra*	*zebra*	Cape Mountain Zebra	Vulnerable	102	9
Erinaceidae	*Atelerix*	*frontalis*		Southern African Hedgehog	Near Threatened	1	9
Felidae	*Leptailurus*	*serval*		Serval	Near Threatened	3	9
Felidae	*Acinonyx*	*jubatus*		Cheetah	Vulnerable	6	9
Felidae	*Panthera*	*leo*		Lion	Vulnerable	43	9
Hyaenidae	*Crocuta*	*crocuta*		Spotted Hyena	Near Threatened	156	9
Hyaenidae	*Hyaena*	*brunnea*		Brown Hyena	Near Threatened	2	9
Mustelidae	*Mellivora*	*capensis*		Honey Badger	Near Threatened	14	9
Rhinolophidae	*Rhinolophus*	*clivosus*		Geoffroy's Horseshoe Bat	Near Threatened	6	9
Vespertilionidae	*Miniopterus*	*schreibersii*		Schreibers's Long-fingered Bat	Near Threatened	26	9
Bovidae	*Ourebia*	*ourebi*		Oribi	Endangered	184	10
Bovidae	*Damaliscus*	*pygargus*	*pygargus*	Bontebok	Vulnerable	1	10
Bovidae	*Damaliscus*	*pygargus*	*pygargus*	Bontebok	Vulnerable	586	10
Bovidae	*Hippotragus*	*niger*		Sable Antelope	Vulnerable	1	10
Bovidae	*Philantomba*	*monticola*		Blue Duiker	Vulnerable	18	10
Cercopithecidae	*Cercopithecus*	*mitis*		Blue Monkey	Vulnerable	2	10
Chrysochloridae	*Chrysospalax*	*trevelyani*		Giant Golden Mole	Vulnerable	2	10
Equidae	*Equus*	*zebra*	*hartmannae*	Hartmann's Zebra	Endangered	4	10
Equidae	*Equus*	*zebra*	*zebra*	Cape Mountain Zebra	Vulnerable	595	10
Felidae	*Leptailurus*	*serval*		Serval	Near Threatened	61	10
Hyaenidae	*Hyaena*	*brunnea*		Brown Hyena	Near Threatened	10	10
Muridae	*Dasymys*	*incomtus*		Common Dasymys	Near Threatened	2	10
Mustelidae	*Mellivora*	*capensis*		Honey Badger	Near Threatened	4	10
Nesomyidae	*Mystromys*	*albicaudatus*		African White-tailed Rat	Endangered	5	10
Rhinolophidae	*Rhinolophus*	*capensis*		Cape Horseshoe Bat	Near Threatened	1	10

Family	Genus	Species	Subspecies	Common name	Red list category	No. records	Zone
Rhinolophidae	*Rhinolophus*	*clivosus*		Geoffroy's Horseshoe Bat	Near Threatened	20	10
Vespertilionidae	*Hypsugo*	*anchietae*		Anchieta's Pipistrelle	Near Threatened	1	10
Vespertilionidae	*Miniopterus*	*fraterculus*		Lesser Long-fingered Bat	Near Threatened	2	10
Vespertilionidae	*Miniopterus*	*schreibersii*		Schreibers's Long-fingered Bat	Near Threatened	16	10
Vespertilionidae	*Laephotis*	*botswanae*		Botswanan Long-eared Bat	Vulnerable	3	10
Bovidae	*Ourebia*	*ourebi*		Oribi	Endangered	89	11
Bovidae	*Philantomba*	*monticola*		Blue Duiker	Vulnerable	49	11
Canidae	*Canis*	*adustus*		Side-striped Jackal	Near Threatened	1	11
Chrysochloridae	*Chrysospalax*	*trevelyani*		Giant Golden Mole	Vulnerable	2	11
Felidae	*Leptailurus*	*serval*		Serval	Near Threatened	9	11
Manidae	*Smutsia*	*temminckii*		Ground Pangolin	Vulnerable	2	11
Molossidae	*Otomops*	*martiensseni*		Large-eared Giant Mastiff Bat	Vulnerable	36	11
Muridae	*Dasymys*	*incomtus*		Common Dasymys	Near Threatened	1	11
Mustelidae	*Mellivora*	*capensis*		Honey Badger	Near Threatened	1	11
Rhinolophidae	*Rhinolophus*	*swinnyi*		Swinny's Horseshoe Bat	Endangered	1	11
Rhinolophidae	*Rhinolophus*	*clivosus*		Geoffroy's Horseshoe Bat	Near Threatened	43	11
Vespertilionidae	*Hypsugo*	*anchietae*		Anchieta's Pipistrelle	Near Threatened	1	11
Vespertilionidae	*Miniopterus*	*fraterculus*		Lesser Long-fingered Bat	Near Threatened	35	11
Vespertilionidae	*Miniopterus*	*schreibersii*		Schreibers's Long-fingered Bat	Near Threatened	78	11
Vespertilionidae	*Myotis*	*tricolor*		Temminck's Myotis	Near Threatened	25	11

23.4 Northern Corridor

Listed Fauna recorded within the different zones of the Northern Corridor

Family	Genus	Species	Subspecies	Common name	Red list category	No. records	Corridor Zone
Equidae	*Equus*	*zebra*	*hartmannae*	Hartmann's Zebra	Endangered	1	1
Bathyergidae	*Bathyergus*	*janetta*		Namaqua Dune Mole-rat	Near Threatened	16	1
Muridae	*Parotomys*	*littledalei*		Littledale's Whistling Rat	Near Threatened	1	1
Mustelidae	*Mellivora*	*capensis*		Honey Badger	Near Threatened	2	1
Rhinolophidae	*Rhinolophus*	*capensis*		Cape Horseshoe Bat	Near Threatened	3	1
Rhinolophidae	*Rhinolophus*	*clivosus*		Geoffroy's Horseshoe Bat	Near Threatened	2	1
Equidae	*Equus*	*zebra*	*zebra*	Cape Mountain Zebra	Vulnerable	35	1

Family	Genus	Species	Subspecies	Common name	Red list category	No. records	Corridor Zone
Equidae	*Equus*	*zebra*	*hartmannae*	Hartmann's Zebra	Endangered	30	2
Erinaceidae	*Atelerix*	*frontalis*		Southern African Hedgehog	Near Threatened	1	2
Muridae	*Parotomys*	*littledalei*		Littledale's Whistling Rat	Near Threatened	3	2
Mustelidae	*Mellivora*	*capensis*		Honey Badger	Near Threatened	10	2
Petromuridae	*Petromus*	*typicus*		Dassie Rat	Near Threatened	7	2
Manidae	*Smutsia*	*temminckii*		Ground Pangolin	Vulnerable	3	2
Vespertilionidae	*Cistugo*	*seabrae*		Angolan Wing-gland Bat	Vulnerable	3	2
Canidae	*Lycaon*	*pictus*		African wild dog	Endangered	1	3
Equidae	*Equus*	*zebra*	*hartmannae*	Hartmann's Zebra	Endangered	1	3
Bathyergidae	*Bathyergus*	*janetta*		Namaqua Dune Mole-rat	Near Threatened	1	3
Erinaceidae	*Atelerix*	*frontalis*		Southern African Hedgehog	Near Threatened	9	3
Hyaenidae	*Hyaena*	*brunnea*		Brown Hyena	Near Threatened	20	3
Mustelidae	*Mellivora*	*capensis*		Honey Badger	Near Threatened	5	3
Pteropodidae	*Eidolon*	*helvum*		African Straw-colored Fruit Bat	Near Threatened	1	3
Rhinolophidae	*Rhinolophus*	*clivosus*		Geoffroy's Horseshoe Bat	Near Threatened	54	3
Rhinolophidae	*Rhinolophus*	*denti*		Dent's Horseshoe Bat	Near Threatened	43	3
Vespertilionidae	*Miniopterus*	*schreibersii*		Schreibers's Long-fingered Bat	Near Threatened	120	3
Vespertilionidae	*Miniopterus*	*schreibersii*		Schreibers's Long-fingered Bat	Near Threatened	102	3
Bovidae	*Damaliscus*	*pygargus*	*pygargus*	Bontebok	Vulnerable	4	3
Bovidae	*Hippotragus*	*equinus*		Roan Antelope	Vulnerable	5	3
Bovidae	*Hippotragus*	*niger*		Sable Antelope	Vulnerable	8	3
Felidae	*Acinonyx*	*jubatus*		Cheetah	Vulnerable	5	3
Manidae	*Smutsia*	*temminckii*		Ground Pangolin	Vulnerable	12	3
Canidae	*Lycaon*	*pictus*		African wild dog	Endangered	2	4
Erinaceidae	*Atelerix*	*frontalis*		Southern African Hedgehog	Near Threatened	6	4
Felidae	*Leptailurus*	*serval*		Serval	Near Threatened	15	4
Hyaenidae	*Hyaena*	*brunnea*		Brown Hyena	Near Threatened	47	4
Mustelidae	*Mellivora*	*capensis*		Honey Badger	Near Threatened	10	4
Rhinolophidae	*Rhinolophus*	*clivosus*		Geoffroy's Horseshoe Bat	Near Threatened	2	4
Bovidae	*Hippotragus*	*equinus*		Roan Antelope	Vulnerable	1	4
Bovidae	*Hippotragus*	*niger*		Sable Antelope	Vulnerable	9	4
Felidae	*Acinonyx*	*jubatus*		Cheetah	Vulnerable	2	4
Manidae	*Smutsia*	*temminckii*		Ground Pangolin	Vulnerable	1	4

23.5 Western Corridor

Listed mammals recorded from the different sections of the Western Corridor

Family	Genus	Species	Subspecies	Common name	Red list category	No. records	Zone
Bovidae	*Damaliscus*	*pygargus*	*pygargus*	Bontebok	Vulnerable	28	14
Chrysochloridae	*Eremitalpa*	*granti*		Grant's Golden Mole	Vulnerable	3	14
Equidae	*Equus*	*zebra*	*zebra*	Cape Mountain Zebra	Vulnerable	6	14
Hyaenidae	*Hyaena*	*brunnea*		Brown Hyena	Near Threatened	2	14
Mustelidae	*Mellivora*	*capensis*		Honey Badger	Near Threatened	92	14
Rhinolophidae	*Rhinolophus*	*capensis*		Cape Horseshoe Bat	Near Threatened	26	14
Rhinolophidae	*Rhinolophus*	*clivosus*		Geoffroy's Horseshoe Bat	Near Threatened	62	14
Vespertilionidae	*Cistugo*	*lesueuri*		Lesueur's Wing-gland Bat	Near Threatened	52	14
Vespertilionidae	*Miniopterus*	*schreibersii*		Schreibers's Long-fingered Bat	Near Threatened	12	14
Vespertilionidae	*Myotis*	*tricolor*		Temminck's Myotis	Near Threatened	15	14
Equidae	*Equus*	*zebra*	*zebra*	Cape Mountain Zebra	Vulnerable	13	15
Muridae	*Parotomys*	*littledalei*		Littledale's Whistling Rat	Near Threatened	2	15
Mustelidae	*Mellivora*	*capensis*		Honey Badger	Near Threatened	4	15
Nesomyidae	*Mystromys*	*albicaudatus*		African White-tailed Rat	Endangered	4	15
Rhinolophidae	*Rhinolophus*	*capensis*		Cape Horseshoe Bat	Near Threatened	36	15
Muridae	*Parotomys*	*littledalei*		Littledale's Whistling Rat	Near Threatened	2	16
Vespertilionidae	*Miniopterus*	*schreibersii*		Schreibers's Long-fingered Bat	Near Threatened	2	16

24 APPENDIX 4 – REPTILE SPECIES LISTS PER CORRIDOR

24.1 International Corridor

Listed reptiles recorded from the different zones of the International Corridor.

Family	Genus	Species	Subspecies	Common name	Red list category	No. records	Atlas region endemic	Zone
Gekkonidae	Lygodactylus	incognitus		Cryptic Dwarf Gecko	Data Deficient	7	Yes	5
Scincidae	Acontias	rieppeli		Woodbush Legless Skink	Endangered	5	Yes	5
Lacertidae	Australolacerta	rupicola		Soutpansberg Rock Lizard	Near Threatened	59	Yes	5
Cordylidae	Chamaesaura	macrolepis		Large-scaled Grass Lizard	Near Threatened	2		5
Gekkonidae	Lygodactylus	soutpansbergensis		Soutpansberg Dwarf Gecko	Near Threatened	10	Yes	5
Cordylidae	Platysaurus	orientalis	fitzsimonsi	FitzSimons' Flat Lizard	Near Threatened	50	Yes	5
Cordylidae	Pseudocordylus	transvaalensis		Northern Crag Lizard	Near Threatened	21	Yes	5
Amphisbaenidae	Chirindia	langi	occidentalis	Soutpansberg Worm Lizard	Vulnerable	1	Yes	5
Crocodylidae	Crocodylus	niloticus		Nile Crocodile	Vulnerable	6		5
Gekkonidae	Homopholis	mulleri		Muller's Velvet Gecko	Vulnerable	2	Yes	5
Gekkonidae	Lygodactylus	methueni		Methuen's Dwarf Gecko	Vulnerable	1	Yes	5

24.2 Central Corridor

Listed reptiles recorded from the different zones of the Central Corridor.

Family	Genus	Species	Common name	Red list category	No. records	Atlas region endemic	Zone
Testudinidae	Psammobates	geometricus	Geometric Tortoise	Critically Endangered	4	Yes	13
Cordylidae	Chamaesaura	aenea	Coppery Grass Lizard	Near Threatened	1	Yes	6
Atractaspididae	Homoroselaps	dorsalis	Striped Harlequin Snake	Near Threatened	4	Yes	6
Gekkonidae	Goggia	braacki	Braack's Pygmy Gecko	Near Threatened	12	Yes	7
Testudinidae	Homopus	boulengeri	Karoo Padloper	Near Threatened	2	Yes	7
Testudinidae	Homopus	boulengeri	Karoo Padloper	Near Threatened	2	Yes	12
Gekkonidae	Afroedura	hawequensis	Hawequa Flat Gecko	Near Threatened	9	Yes	13
Cordylidae	Cordylus	niger	Black Girdled Lizard	Near Threatened	78	Yes	13
Cordylidae	Cordylus	oelofseni	Oelofsen's Girdled Lizard	Near Threatened	26	Yes	13

Family	Genus	Species	Common name	Red list category	No. records	Atlas region endemic	Zone
Cheloniidae	Eretmochelys	imbricata	Hawksbill Turtle	Near Threatened	2		13
Scincidae	Scelotes	gronovii	Gronovi's Dwarf Burrowing Skink	Near Threatened	9	Yes	13
Scincidae	Scelotes	kasneri	Kasner's Dwarf Burrowing Skink	Near Threatened	1	Yes	13
Scincidae	Scelotes	montispectus	Bloubergstrand Dwarf Burrowing Skink	Near Threatened	6	Yes	13
Crocodylidae	Crocodylus	niloticus	Nile Crocodile	Vulnerable	1		6
Cordylidae	Smaug	giganteus	Giant Girdled Lizard	Vulnerable	7	Yes	6
Chamaeleonidae	Bradypodion	pumilum	Cape Dwarf Chameleon	Vulnerable	92	Yes	13
Cheloniidae	Caretta	caretta	Loggerhead Turtle	Vulnerable	1		13
Colubridae	Psammophis	leightoni	Cape Sand Snake	Vulnerable	3	Yes	13

24.3 Eastern Corridor

Listed reptiles recorded from the different zones of the Eastern Corridor.

Family	Genus	Species	Common name	Red list category	No. records	Atlas region endemic	Zone
Scincidae	Scelotes	inornatus	Durban Dwarf Burrowing Skink	Critically Endangered	38	Yes	11
Chamaeleonidae	Bradypodion	taeniabronchum	Elandsberg Dwarf Chameleon	Endangered	37	Yes	9
Gekkonidae	Goggia	braacki	Braack's Pygmy Gecko	Near Threatened	1	Yes	8
Cordylidae	Chamaesaura	aenea	Coppery Grass Lizard	Near Threatened	2	Yes	9
Testudinidae	Homopus	boulengeri	Karoo Padloper	Near Threatened	1	Yes	9
Lacertidae	Nucras	taeniolata	Albany Sandveld Lizard	Near Threatened	5	Yes	9
Cordylidae	Chamaesaura	aenea	Coppery Grass Lizard	Near Threatened	3	Yes	10
Cordylidae	Chamaesaura	macrolepis	Large-scaled Grass Lizard	Near Threatened	1		10
Atractaspididae	Macrelaps	microlepidotus	Natal Black Snake	Near Threatened	3	Yes	10
Cordylidae	Chamaesaura	macrolepis	Large-scaled Grass Lizard	Near Threatened	26		11

Family	Genus	Species	Common name	Red list category	No. records	Atlas region endemic	Zone
Atractaspididae	Homoroselaps	dorsalis	Striped Harlequin Snake	Near Threatened	1	Yes	11
Atractaspididae	Macrelaps	microlepidotus	Natal Black Snake	Near Threatened	16	Yes	11
Cordylidae	Pseudocordylus	spinosus	Spiny Crag Lizard	Near Threatened	2	Yes	11
Chamaeleonidae	Bradypodion	melanocephalum	KwaZulu Dwarf Chameleon	Vulnerable	24	Yes	10
Crocodylidae	Crocodylus	niloticus	Nile Crocodile	Vulnerable	3		10
Scincidae	Scelotes	bourquini	Bourquin's Dwarf Burrowing Skink	Vulnerable	3	Yes	10
Chamaeleonidae	Bradypodion	melanocephalum	KwaZulu Dwarf Chameleon	Vulnerable	382	Yes	11
Crocodylidae	Crocodylus	niloticus	Nile Crocodile	Vulnerable	3		11
Elapidae	Dendroaspis	angusticeps	Green Mamba	Vulnerable	4		11
Scincidae	Scelotes	bourquini	Bourquin's Dwarf Burrowing Skink	Vulnerable	1	Yes	11

24.4 Northern Corridor

Listed reptiles recorded from the different zones of the Northern Corridor.

Family	Genus	Species	Common name	Red list category	No. records	Atlas region endemic	Zone
Gekkonidae	Pachydactylus	rangei	Namib Web-footed Gecko	Critically Endangered	2		1
Testudinidae	Homopus	signatus	Speckled Padloper	Vulnerable	6	Yes	1
Testudinidae	Homopus	signatus	Speckled Padloper	Vulnerable	1	Yes	2
Gekkonidae	Pachydactylus	goodi	Good's Gecko	Vulnerable	1	Yes	2

24.5 Western Corridor

Listed reptiles recorded from the different zones of the Western Corridor.

Family	Genus	Species	Common name	Red list category	No. records	Atlas region endemic	Zone
Cordylidae	Cordylus	macropholis	Large-scaled Girdled Lizard	Near Threatened	63	Yes	14
Cordylidae	Cordylus	niger	Black Girdled Lizard	Near Threatened	58	Yes	14
Cordylidae	Cordylus	oelofseni	Oelofsen's Girdled Lizard	Near Threatened	20	Yes	14
Cheloniidae	Eretmochelys	imbricata	Hawksbill Turtle	Near Threatened	1		14

Family	Genus	Species	Common name	Red list category	No. records	Atlas region endemic	Zone
Cordylidae	Pseudocordylus	spinosus	Spiny Crag Lizard	Near Threatened	1	Yes	14
Scincidae	Scelotes	gronovii	Gronovi's Dwarf Burrowing Skink	Near Threatened	28	Yes	14
Scincidae	Scelotes	kasneri	Kasner's Dwarf Burrowing Skink	Near Threatened	21	Yes	14
Scincidae	Scelotes	montispectus	Bloubergstrand Dwarf Burrowing Skink	Near Threatened	4	Yes	14
Chamaeleonidae	Bradypodion	pumilum	Cape Dwarf Chameleon	Vulnerable	1	Yes	14
Testudinidae	Homopus	signatus	Speckled Padloper	Vulnerable	17	Yes	14
Colubridae	Psammophis	leightoni	Cape Sand Snake	Vulnerable	18	Yes	14
Testudinidae	Homopus	signatus	Speckled Padloper	Vulnerable	6	Yes	15

25 APPENDIX 5 – AMPHIBIAN SPECIES LISTS PER CORRIDOR

25.1 International Corridor

Listed amphibians recorded from the different zones of the International Corridor.

Family	Genus	Species	Common name	Red list category	No. records	Atlas region endemic	Zone
Pyxicephalidae	Pyxicephalus	adspersus	Giant Bull Frog	Near Threatened	20		5
Brevicepitidae	Breviceps	sylvestris	Transvaal Rain Frog	Vulnerable	10	Yes	5
Pyxicephalidae	Pyxicephalus	adspersus	Giant Bull Frog	Near Threatened	4		17

25.2 Central Corridor

Listed amphibians recorded from the different zones of the Central Corridor.

Family	Genus	Species	Common name	Red list category	No. records	Atlas region endemic	Zone
Pyxicephalidae	Pyxicephalus	adspersus	Giant Bull Frog	Near Threatened	58		6
Pyxicephalidae	Pyxicephalus	adspersus	Giant Bull Frog	Near Threatened	8		7
Heleophrynidae	Heleophryne	rosei	Table Mountain Ghost Frog	Critically Endangered	15	Yes	13
Pyxicephalidae	Microbatrachella	capensis	Micro Frog	Critically Endangered	16	Yes	13
Bufonidae	Amietophrynus	pantherinus	Panther Toad	Endangered	27	Yes	13
Pipidae	Xenopus	gilli	Cape Platanna	Endangered	7	Yes	13
Pyxicephalidae	Arthroleptella	landdrosia	Landroskop Moss Frog	Near Threatened	1	Yes	13
Pyxicephalidae	Arthroleptella	lightfooti	Lightfoot's Moss Frog	Near Threatened	16	Yes	13
Pyxicephalidae	Poyntonia	paludicola	Marsh Frog	Near Threatened	3	Yes	13
Brevicepitidae	Breviceps	gibbosus	Cape Rain Frog	Vulnerable	57	Yes	13
Pyxicephalidae	Cacosternum	capense	Cape Caco	Vulnerable	64	Yes	13
Bufonidae	Capensibufo	rosei	Rose's Toadlet	Vulnerable	12	Yes	13

25.3 Eastern Corridor

Listed Amphibians recorded from the different zones of the Eastern Corridor.

Family	Genus	Species	Common name	Red list category	No. records	Atlas region endemic	Zone
Pyxicephalidae	Pyxicephalus	adspersus	Giant Bull Frog	Near Threatened	3		8
Heleophrynidae	Heleophryne	hewitti	Hewitt's Ghost Frog	Critically Endangered	20	Yes	9
Pyxicephalidae	Pyxicephalus	adspersus	Giant Bull Frog	Near Threatened	3		9
Pyxicephalidae	Amietia	poyntoni	Poynton's River Frog	Not evaluated	1		9
Pyxicephalidae	Anhydrophryne	ngongoniensis	Mistbelt or Ngongoni Moss Frog	Critically Endangered	9	Yes	10
Brevicepitidae	Breviceps	bagginsi	Bilbo's Rain Frog	Data Deficient	3	Yes	10
Pyxicephalidae	Cacosternum	striatum	Stiped Caco	Data Deficient	4	Yes	10
Pyxicephalidae	Anhydrophryne	rattrayi	Hogsback Frog	Endangered	2	Yes	10
Arthroleptidae	Leptopelis	xenodactylus	Longtoed Tree Frog	Endangered	12	Yes	10
Bufonidae	Vandijkophrynus	amatolicus	Amatola Toad	Endangered	3	Yes	10
Pyxicephalidae	Pyxicephalus	adspersus	Giant Bull Frog	Near Threatened	9		10
Pyxicephalidae	Strongylopus	wageri	Plain Stream Frog	Near Threatened	1		10
Hyperoliidae	Afrixalus	spinifrons	Natal Leaf-folding Frog	Vulnerable	15		10
Pyxicephalidae	Anhydrophryne	ngongoniensis	Mistbelt or Ngongoni Moss Frog	Critically Endangered	7	Yes	11
Pyxicephalidae	Cacosternum	striatum	Stiped Caco	Data Deficient	1	Yes	11
Hyperoliidae	Hyperolius	pickersgilli	Pickersgill's Reed Frog	Endangered	6	Yes	11
Arthroleptidae	Leptopelis	xenodactylus	Longtoed Tree Frog	Endangered	1	Yes	11
Pyxicephalidae	Natalobatrachus	bonebergi	Kloof Frog	Endangered	29	Yes	11
Hyperoliidae	Afrixalus	spinifrons	Natal Leaf-folding Frog	Vulnerable	29		11
Hemisotidae	Hemisus	guttatus	Spotted Shovelnosed Frog	Vulnerable	8	Yes	11

25.4 Northern Corridor

Listed Amphibians recorded from the different zones of the Northern Corridor.

Family	Genus	Species	Common name	Red list category	No. records	Atlas region endemic	Zone
Brevicepitidae	Breviceps	macrops	Desert Rain Frog	Vulnerable	8	Yes	1
Pyxicephalidae	Strongylopus	springbokensis	Namaqua Stream Frog	Vulnerable	6	Yes	1
Pyxicephalidae	Pyxicephalus	adspersus	Giant Bull Frog	Near Threatened	1		2
Pyxicephalidae	Strongylopus	springbokensis	Namaqua Stream Frog	Vulnerable	2	Yes	2
Pyxicephalidae	Pyxicephalus	adspersus	Giant Bull Frog	Near Threatened	7		3
Pyxicephalidae	Pyxicephalus	adspersus	Giant Bull Frog	Near Threatened	2		4

25.5 Western Corridor

Listed Amphibians recorded from the different zones of the Western Corridor.

Family	Genus	Species	Common name	Red list category	No. records	Atlas region endemic	Zone
Brevicepitidae	Breviceps	gibbosus	Cape Rain Frog	Vulnerable	11	Yes	14
Pyxicephalidae	Cacosternum	capense	Cape Caco	Vulnerable	18	Yes	14
Pyxicephalidae	Pyxicephalus	adspersus	Giant Bull Frog	Near Threatened	2		16

26 APPENDIX 6 – BUTTERFLY SPECIES LISTS PER CORRIDOR

26.1 Corridor Summary

Summary of butterfly species richness and status recorded from the different zones of the International Corridor.

Corridor	Section	IUCN Status								
		Extinct (EX)	Critically Endangered (CR)	Endangered (EN)	Vulnerable (VU)	Near Threatened (NT)	Data Deficient (DD)	Not listed	Not Evaluated (NE)	Least Concern (LC)
Central	6	1		2	5			4	51	206
	7							2	4	104
	12									75
	13		4	4	2	1	1	1	16	139
Eastern	8								1	79
	9			1	1			3		160
	10			1	3		2	7	10	306
	11			1	3		2	14	43	301
International	5	2	1			308		98	8	24
	17			2		138		4		3
Northern	1					58		3	1	1
	2					54		1	3	
	3					101		8	2	1
	4					150		5	3	2
Western	14				2	1	1	3	2	99
	15						1	1	1	83
	16								1	24

26.2 International Corridor

Listed butterflies recorded from the different zones of the International Corridor.

Family	Genus	Species	Subspecies	Common name	Red list category	No. records	Atlas region endemic	Zone
LYCAENIDAE	*Alaena*	*margaritacea*		Wolkberg zulu	Critically Endangered (CR)	118	Yes	5
NYMPHALIDAE	*Pseudonympha*	*swanepoeli*		Swanepoel's brown	Critically Endangered (CR)	2	Yes	5
NYMPHALIDAE	*Dingana*	*clara*		Clara's widow	Vulnerable (VU)	32	Yes	5
HESPERIIDAE	*Platylesches*	*dolomitica*		Hilltop hopper	Vulnerable (VU)	2	Yes	5
NYMPHALIDAE	*Telchinia*	*induna*	*salmontana*	Induna acraea	Vulnerable (VU)	41	Yes	5
HESPERIIDAE	*Metisella*	*meninx*		Marsh sylph	Vulnerable (VU)	8		5
LYCAENIDAE	*Lepidochrysops*	*rossouwi*		Rossouw's blue	Vulnerable (VU)	3		5
LYCAENIDAE	*Aloeides*	*stevensoni*		Stevenson's copper	Vulnerable (VU)	64	Yes	5
NYMPHALIDAE	*Dingana*	*fraterna*		Scarce widow	Endangered (EN)	8	Yes	17

LYCAENIDAE	*Aloeides*	*rossouwi*		Rossouw's copper	Endangered (EN)	54	Yes	17
LYCAENIDAE	*Aloeides*	*dentatis*	*dentatis*	Roodepoort copper	Vulnerable (VU)	1	Yes	17
HESPERIIDAE	*Platylesches*	*dolomitica*		Hilltop hopper	Vulnerable (VU)	1	Yes	17
HESPERIIDAE	*Metisella*	*meninx*		Marsh sylph	Vulnerable (VU)	36		17
LYCAENIDAE	*Lepidochrysops*	*rossouwi*		Rossouw's blue	Vulnerable (VU)	85		17

26.3 Central Corridor

Listed Butterflies recorded from the different zones of the Central Corridor.

Family	Genus	Species	Subspecies	Common name	Red list category	No. records	Atlas region endemic	Zone
LYCAENIDAE	*Orachrysops*	*ariadne*		Karkloof blue	Endangered (EN)	1	Yes	6
LYCAENIDAE	*Lepidochrysops*	*praeterita*		Highveld blue	Endangered (EN)	76	Yes	6
LYCAENIDAE	*Lepidochrysops*	*hypopolia*		Morant's blue	Extinct (EX)	1	Yes	6
LYCAENIDAE	*Chrysoritis*	*aureus*		Heidelberg opal	Vulnerable (VU)	70	Yes	6
LYCAENIDAE	*Aloeides*	*dentatis*	*dentatis*	Roodepoort copper	Vulnerable (VU)	134	Yes	6
HESPERIIDAE	*Platylesches*	*dolomitica*		Hilltop hopper	Vulnerable (VU)	4	Yes	6
HESPERIIDAE	*Metisella*	*meninx*		Marsh sylph	Vulnerable (VU)	45		6
LYCAENIDAE	*Orachrysops*	*mijburghi*		Mijburgh's blue	Vulnerable (VU)	4	Yes	6
NYMPHALIDAE	*Stygionympha*	*dicksoni*		Dickson's hillside brown	Critically Endangered (CR)	1	Yes	13
LYCAENIDAE	*Trimenia*	*malagrida*	*malagrida*	Scarce mountain copper	Critically Endangered (CR)	52	Yes	13
LYCAENIDAE	*Chrysoritis*	*thysbe*	*schloszae*	Moorreesburg Common opal	Critically Endangered (CR)	52	Yes	13
LYCAENIDAE	*Trimenia*	*wallengrenii*	*wallengrenii*	Wallengren's silver-spotted copper	Critically Endangered (CR)	20	Yes	13
LYCAENIDAE	*Aloeides*	*carolynnae*	*carolynnae*	Carolynn's copper	Endangered (EN)	71	Yes	13
HESPERIIDAE	*Kedestes*	*lenis*	*lenis*	Unique ranger	Endangered (EN)	5	Yes	13
LYCAENIDAE	*Trimenia*	*malagrida*	*paarlensis*	Scarce mountain copper	Endangered (EN)	57	Yes	13
LYCAENIDAE	*Chrysoritis*	*rileyi*		Riley's opal	Endangered (EN)	66	Yes	13
LYCAENIDAE	*Aloeides*	*egerides*		Red Hill copper	Near Threatened (NT)	40	Yes	13
LYCAENIDAE	*Aloeides*	*lutescens*		Worcester copper	Vulnerable (VU)	25	Yes	13
LYCAENIDAE	*Trimenia*	*wallengrenii*	*gonnemoi*	Wallengren's silver-spotted copper	Vulnerable (VU)	11	Yes	13

26.4 Eastern Corridor

Listed Butterflies recorded from the different zones of the Eastern Corridor.

Family	Genus	Species	Subspecies	Common name	Red list category	No. records	Atlas region endemic	Zone
LYCAENIDAE	*Aloeides*	*clarki*		Coega copper	Endangered (EN)	23	Yes	9
LYCAENIDAE	*Durbaniella*	*clarki*	*belladonna*	Clark's rocksitter	Vulnerable (VU)	70	Yes	9
LYCAENIDAE	*Orachrysops*	*ariadne*		Karkloof blue	Endangered (EN)	107	Yes	10
LYCAENIDAE	*Chrysoritis*	*lyncurium*		Tsomo river opal	Vulnerable (VU)	4	Yes	10
LYCAENIDAE	*Capys*	*penningtoni*		Pennington's protea	Vulnerable (VU)	131	Yes	10
LYCAENIDAE	*Lepidochrysops*	*pephredo*		Estcourt blue	Vulnerable (VU)	32	Yes	10
LYCAENIDAE	*Durbania*	*amakosa*	*flavida*	Amakoza rocksitter	Endangered (EN)	99	Yes	11
LYCAENIDAE	*Durbania*	*amakosa*	*albescens*	Amakoza rocksitter	Vulnerable (VU)	16	Yes	11
LYCAENIDAE	*Lepidochrysops*	*ketsi*	*leucomacula*	Ketsi blue	Vulnerable (VU)	2	Yes	11
LYCAENIDAE	*Chrysoritis*	*lyncurium*		Tsomo river opal	Vulnerable (VU)	1	Yes	11

26.5 Northern Corridor

Listed Butterflies recorded from the different zones of the Northern Corridor.

Family	Genus	Species	Subspecies	Common name	Red list category	No. records	Atlas region endemic	Zone
LYCAENIDAE	Chrysoritis	trimeni		Trimen's opal	Vulnerable (VU)	28	Yes	1
LYCAENIDAE	Anthene	lindae		Linda's hairtail	Vulnerable (VU)	20	Yes	3
HESPERIIDAE	Platylesches	dolomitica		Hilltop hopper	Vulnerable (VU)	3	Yes	4

26.6 Western Corridor

Listed Butterflies recorded from the different zones of the Western Corridor.

Family	Genus	Species	Subspecies	Common name	Red list category	No. records	Atlas region endemic	Zone
LYCAENIDAE	*Aloeides*	*egerides*		Red Hill copper	Near Threatened (NT)	1	Yes	14
LYCAENIDAE	*Thestor*	*dicksoni*	*malagas*	Atlantic skolly	Vulnerable (VU)	55	Yes	14
LYCAENIDAE	*Trimenia*	*wallengrenii*	*gonnemoi*	Wallengren's silver-spotted copper	Vulnerable (VU)	20	Yes	14

27 APPENDIX 7 – WETLANDS & RIVER TYPES PER CORRIDOR

% of total wetland area per HGM type, and split between ecoregions, for each corridor, and % of river length per flow type, split by ecoregions for each corridor.

Wetlands per ecoregion in the Central Corridor

Central														
HGM unit	Condition	Not assigned to an ecoregion	BUSHVELD BASIN	DROUGHT CORRIDOR	EASTERN BANKENVELD	GREAT KAROO	HIGH VELD	NAMA KAROO	SOUTH WESTERN COASTAL BELT	SOUTHERN FOLDED MOUNTAINS	SOUTHERN KALAHARI	WESTERN BANKENVELD	WESTERN FOLDED MOUNTAINS	Total area per type
Unknown (or estuary)		33							1	56				2
	AB													
	C													
	Z1													
	Z2	33							1	55				2
Channelled valley-bottom wetland		10	74	52	44	21	13	5	26	14	15	34	60	13
	AB			3		14	5	4	1		14	6	22	6
	C	6	19	14		2	5	1	15	3	1	22	27	5
	DEF	1					1						7	1
	Z1	3	55	35	44	5	2		9	10		6	4	2
	Z2													
Depression		31		7		53	49	72	18		55	3		52
	AB	30		5		33	34	67	4		47			41
	C			2		17	10	5			2	1		7
	Z1	1				3	5		13		5	3		4
	Z2													

Central														
HGM unit	Condition	Not assigned to an ecoregion	BUSHVELD BASIN	DROUGHT CORRIDOR	EASTERN BANKENVELD	GREAT KAROO	HIGH VELD	NAMA KAROO	SOUTH WESTERN COASTAL BELT	SOUTHERN FOLDED MOUNTAINS	SOUTHERN KALAHARI	WESTERN BANKENVELD	WESTERN FOLDED MOUNTAINS	Total area per type
Flat		2		5	28	4	4	2	6	1	6	5	10	4
	AB					3	1	2	1	1	4	1	6	2
	C	1		3	8		1				1	1	2	1
	DEF													
	Z1			2	20		2		5		1	3	2	1
	Z2													
Floodplain wetland		21					22	9	40	11	9		15	17
	AB						4	1						2
	C						1		7	7	2		9	1
	DEF	12					4	4			6		7	4
	Z1						1		33	4				1
	Z2	9					13	4			1			8
Seep		2	11	20	18	9	7	3	6	3	9	25	13	6
	AB	1		6		3	2	2	2	1	6	1	5	2
	C		3	7	17	4	3			1	1	4	6	2
	DEF										1			
	Z1	1	7	7	1	1	2		3		1	20	2	1
	Z2													
Unchannelled valley-bottom wetland		1	15	16	10	14	5	8	4	16	6	33	2	6

Central														
HGM unit	Condition	Not assigned to an ecoregion	BUSHVELD BASIN	DROUGHT CORRIDOR	EASTERN BANKENVELD	GREAT KAROO	HIGH VELD	NAMA KAROO	SOUTH WESTERN COASTAL BELT	SOUTHERN FOLDED MOUNTAINS	SOUTHERN KALAHARI	WESTERN BANKENVELD	WESTERN FOLDED MOUNTAINS	Total area per type
	AB			3		10	3	7		6	4	3		4
	C		11	7		1	1		2	9	2	5	1	1
	DEF													
	Z1		4	6	10	3	1		2	1		24	1	1
	Z2													
Total area (hectares)		11504	461	233	21	3577	129 141	71820	7035	730	17044	492	11873	253930

Rivers per ecoregion in the Central Corridor

Central													
River type	CONDITION	FOREIGN	BUSHVELD BASIN	DROUGHT CORRIDOR	EASTERN BANKENVELD	GREAT KAROO	HIGH VELD	NAMA KAROO	SOUTH WESTERN COASTAL BELT	SOUTHERN FOLDED MOUNTAINS	SOUTHERN KALAHARI	WESTERN BANKENVELD	WESTERN FOLDED MOUNTAINS	TOTAL % FOR CORRIDOR
Unknown										**3**				
	AB									1				
	EF									2				
	Z													
Ephemeral			**8**	**100**		**98**	**36**	**82**	**53**	**72**	**25**	**25**	**28**	**69**
	AB			48		55	2	31	1	46	25	9	11	28
	B			4			1	22					1	6
	C			19		36	12	6	32	14		11	3	19
	D		8				3	2	14	4			5	3
	E								1					

Central														
River type	CONDITION	FOREIGN	BUSHVELD BASIN	DROUGHT CORRIDOR	EASTERN BANKENVELD	GREAT KAROO	HIGH VELD	NAMA KAROO	SOUTH WESTERN COASTAL BELT	SOUTHERN FOLDED MOUNTAINS	SOUTHERN KALAHARI	WESTERN BANKENVELD	WESTERN FOLDED MOUNTAINS	TOTAL % FOR CORRIDOR
	EF					1	1						3	1
	Z			29		6	17	21	4	9		5	5	13
Foreign		100												
	AB	100												
	Z													
Permanent or seasonal			92		100	2	64	18	47	24	75	75	72	31
	A												4	
	AB						1	1		5			19	2
	B							2				2	11	1
	C		53		81	1	24	4	19	9	39	51	16	12
	D		39				23	6	24	3		20	13	10
	EF				19		8	6	3	7	36	2	6	4
	Z						8		2				1	2
Total river length (1000s of kms)		0	73	767	43	5029	4020	4309	1456	267	156	478	1122	17720

Wetlands per ecoregion of the Eastern Corridor

Eastern													
HGM unit	Condition	Not assigned to an ecoregion	DROUGHT CORRIDOR	EASTERN COASTAL BELT	EASTERN ESCARPMENT MOUNTAINS	GREAT KAROO	NAMA KAROO	NORTH EASTERN COASTAL BELT	NORTH EASTERN UPLANDS	SOUTH EASTERN COASTAL BELT	SOUTH EASTERN UPLANDS	SOUTHERN FOLDED MOUNTAINS	Total % per type
Unknown (or estuary)		**70**						**31**		**41**			**11**
	AB												
	C	1											
	Z1												
	Z2	69						31		41			11
Channelled valley-bottom wetland		**27**	**65**	**99**	**79**	**22**		**51**	**79**	**4**	**55**	**74**	**51**
	AB	3	18	1	22	4		26	79		16	28	14
	C	3	25	82	45	12		18		1	30	43	26
	DEF		12	2									1
	Z1	21	11	14	12	6		5		3	9	3	9
	Z2							1					
Depression			**17**		**6**	**12**				**14**		**3**	**3**
	AB		9		3	12				3		2	1
	C		5		3					3		1	1
	Z1		2		1					7			1
	Z2												
Flat			**4**		**7**	**20**		**6**	**4**	**5**	**5**	**2**	**5**

Eastern													
HGM unit	Condition	Not assigned to an ecoregion	DROUGHT CORRIDOR	EASTERN COASTAL BELT	EASTERN ESCARPMENT MOUNTAINS	GREAT KAROO	NAMA KAROO	NORTH EASTERN COASTAL BELT	NORTH EASTERN UPLANDS	SOUTH EASTERN COASTAL BELT	SOUTH EASTERN UPLANDS	SOUTHERN FOLDED MOUNTAINS	Total % per type
	AB		3		1	19		2	3	1	2		2
	C		1		1			3			1	2	1
	DEF												
	Z1				5			1	2	3	2		1
	Z2												
Floodplain wetland						18		4		25	12	5	10
	AB					9		1		15		5	1
	C					9		2		8	8		6
	DEF												
	Z1									3	3		2
	Z2										1		1
Seep		3	8		1	21	100	4	15	7	23	1	16
	AB	2	6		1	17		1	1	3	5		4
	C		1			2	65	2	5	1	12	1	8
	DEF												
	Z1	1	1			2	35	1	9	3	5		4
	Z2												
Unchannelled valley-bottom wetland			6	1	7	7		5	2	4	4	15	4
	AB		2		6	1		1	2		1	8	1

Eastern													
HGM unit	Condition	Not assigned to an ecoregion	DROUGHT CORRIDOR	EASTERN COASTAL BELT	EASTERN ESCARPMENT MOUNTAINS	GREAT KAROO	NAMA KAROO	NORTH EASTERN COASTAL BELT	NORTH EASTERN UPLANDS	SOUTH EASTERN COASTAL BELT	SOUTH EASTERN UPLANDS	SOUTHERN FOLDED MOUNTAINS	Total % per type
	C		1		1	4		3			1	4	1
	DEF												
	Z1		3	1		2		1		4	2	3	2
	Z2												
Total area (hectares)		6303	6191	2293	356	1011	5	4953	427	5588	45429	336	72892

Rivers per ecoregion of the Eastern Corridor

Eastern											
River type	CONDITION	DROUGHT CORRIDOR	EASTERN COASTAL BELT	EASTERN ESCARPMENT MOUNTAINS	GREAT KAROO	NAMA KAROO	NORTH EASTERN UPLANDS	SOUTH EASTERN COASTAL BELT	SOUTH EASTERN UPLANDS	SOUTHERN FOLDED MOUNTAINS	TOTAL % FOR CORRIDOR
Unknown			**2**								
	AB										
	EF										
	Z		2								
Ephemeral		**64**		**13**	**91**	**100**	**44**	**58**	**3**	**54**	**35**
	AB	36		7	38	100		29	2	45	19
	B	2									
	C	4			19			11		6	4
	D	11			18						5
	E										
	EF							13			
	Z	11		6	16		44	5	1	3	6

Eastern											
River type	CONDITION	DROUGHT CORRIDOR	EASTERN COASTAL BELT	EASTERN ESCARPMENT MOUNTAINS	GREAT KAROO	NAMA KAROO	NORTH EASTERN UPLANDS	SOUTH EASTERN COASTAL BELT	SOUTH EASTERN UPLANDS	SOUTHERN FOLDED MOUNTAINS	TOTAL % FOR CORRIDOR
Foreign											
	AB										
	Z										
Permanent or seasonal		36	97	87	9		56	42	97	46	65
	A								2	4	1
	AB	4	12	52	1		31	2	20	16	12
	B		28				25		10		8
	C	10	29	24	3			6	24	14	17
	D	19	10		3			26	7	9	11
	EF		4		3			7	1		1
	Z	4	15	11				1	33	4	15
Total river length (1000s of kms)		5364	2994	394	2435	34	48	686	7314	1816	21085

Wetlands per ecoregion in the International Corridor

International												
HGM unit	Condition	Not assigned to an ecoregion	BUSHVELD BASIN	EASTERN BANKENVELD	HIGHVELD	LIMPOPO PLAIN	LOWVELD	NORTH EASTERN HIGHLANDS	NORTHERN PLATEAU	SOUTPANSBERG	WESTERN BANKENVELD	Total % per type
Unknown (or estuary)												
	AB											
	C											
	Z1											
	Z2											
Channelled valley-bottom wetland		21	24	39	46	54	11	80	66	31	69	42
	AB	2	1	12	5				11	1		6
	C	14	12	23	25	1			37	1	13	23
	DEF	5			12							9
	Z1	1	11	4	4	52	11	80	18	29	56	5
	Z2											
Depression		2	17	4	14	18			13	52	5	12
	AB		16	2	1	15			7	7		2
	C	1	1	1	6	2			1			5
	Z1			1	7	1			5	44	5	5
	Z2											
Flat		4		6	8	3			3	7		7
	AB			4		1			1			1

International												
HGM unit	Condition	Not assigned to an ecoregion	BUSHVELD BASIN	EASTERN BANKENVELD	HIGHVELD	LIMPOPO PLAIN	LOWVELD	NORTH EASTERN HIGHLANDS	NORTHERN PLATEAU	SOUTPANS BERG	WESTERN BANKENVELD	Total % per type
	C	3		1	4							3
	DEF				1							
	Z1				3	2			2	7		2
	Z2											
Floodplain wetland		70	51	5	16	4						20
	AB	28	48	5								5
	C	42	2		1	4						5
	DEF				5							4
	Z1		1		9							6
	Z2											
Seep		3	2	44	13	8	89	20	16	2	16	16
	AB	2		36	1	1			1		4	6
	C	1	1	8	8	2		20				7
	DEF				1							1
	Z1		1	1	2	5	89		15	2	12	2
	Z2											
Unchannelled valley-bottom wetland			5	2	3	13			2	7	10	3
	AB		2		1	1				3		1
	C		1		2	1				1		1
	DEF											

International												
HGM unit	Condition	Not assigned to an ecoregion	BUSHVELD BASIN	EASTERN BANKENVELD	HIGHVELD	LIMPOPO PLAIN	LOWVELD	NORTH EASTERN HIGHLANDS	NORTHERN PLATEAU	SOUTPANSBERG	WESTERN BANKENVELD	Total % per type
	Z1		2	1	1	11			1	3	10	1
	Z2											
Total area (hectares)		4632	2505	8005	37787	1021	9	8	601	476	26	55072

Rivers per ecoregion in the International Corridor

International												
River type	Condition	Foreign	Bushveld Basin	Eastern Bankenveld	Highveld	Limpopo Plain	Lowveld	North Eastern Highlands	Northern Plateau	Soutpansberg	Western Bankenveld	Total % for corridor
Unknown		0	0	0	0	0	0	0	0	0	0	0
	AB	0	0	0	0	0	0	0	0	0	0	0
	EF	0	0	0	0	0	0	0	0	0	0	0
	Z	0	0	0	0	0	0	0	0	0	0	0
Ephemeral		0	22	29	20	52	33	60	48	30	25	33
	AB	0	0	13	0	36	0	0	7	30	25	13
	B	0	0	0	0	10	0	0	0	0	0	2
	C	0	11	2	13	1	0	29	30	0	0	8
	D	0	3	8	0	3	0	31	7	0	0	5
	E	0	0	0	0	0	0	0	0	0	0	0
	EF	0	0	0	0	0	0	0	0	0	0	0
	Z	0	8	6	6	3	33	0	3	0	0	6
Foreign		100	0	0	0	0	0	0	0	0	0	0
	AB	89	0	0	0	0	0	0	0	0	0	0

International												
River type	Condition	Foreign	Bushveld Basin	Eastern Bankenveld	Highveld	Limpopo Plain	Lowveld	North Eastern Highlands	Northern Plateau	Soutpansberg	Western Bankenveld	Total % for corridor
	Z	11	0	0	0	0	0	0	0	0	0	0
Permanent or seasonal		**0**	**78**	**71**	**80**	**48**	**67**	**40**	**52**	**70**	**75**	**67**
	A	0	0	0	0	0	0	0	0	0	0	0
	AB	0	3	10	1	0	0	0	0	0	0	4
	B	0	0	9	0	10	0	0	0	15	0	5
	C	0	14	29	27	23	0	40	25	36	75	24
	D	0	34	19	32	16	67	0	21	20	0	24
	EF	0	3	0	5	0	0	0	6	0	0	2
	Z	0	23	4	15	0	0	0	0	0	0	8
Total river length (1000s of kms)		**2**	**1048**	**1830**	**933**	**1189**	**125**	**112**	**623**	**212**	**23**	**6097**

Wetlands per ecoregion in the Northern Corridor

Northern											
HGM unit	Condition	Not assigned to an ecoregion	GHAAP PLATEAU	HIGHVELD	NAMA KAROO	NAMAQUA HIGHLANDS	ORANGE RIVER GORGE	SOUTHERN KALAHARI	WESTERN BANKENVELD	WESTERN COASTAL BELT	Total % per type
Unknown (or estuary)										2	
	AB										
	C										
	Z1										
	Z2									2	
Channelled valley-bottom wetland		10	6	12	24	73	6	8	31	46	13
	AB	9	6	8	16	73	4	4	1	46	10
	C	1	1	4	8		2	5	28		4
	DEF										
	Z1				1				2		
	Z2										
Depression		1	43	46	18		1	56	20	26	37
	AB	1	40	20	8		1	48	20	26	26
	C		3	17	1			5			7
	Z1			8	8			4			5
	Z2										
Flat		1	16	7	14	8	2	6	24	3	10
	AB		13	2	5	1	2	4	15	2	5

Northern											
HGM unit	Condition	Not assigned to an ecoregion	GHAAP PLATEAU	HIGHVELD	NAMA KAROO	NAMAQUA HIGHLANDS	ORANGE RIVER GORGE	SOUTHERN KALAHARI	WESTERN BANKENVELD	WESTERN COASTAL BELT	Total % per type
	C		3	3	7	7		2	2		3
	DEF										
	Z1		1	2	3				7		1
	Z2										
Floodplain wetland		**79**		**17**	**28**	**7**	**90**	**13**			**20**
	AB	18		17	6	7	3	10			9
	C	60			20		87	1			10
	DEF							2			
	Z1				2						
	Z2										
Seep		**6**	**30**	**14**	**9**	**5**	**1**	**12**	**21**	**4**	**15**
	AB	5	20	7	6	3	1	8	3	2	9
	C		8	4	2			3	18	1	4
	DEF										
	Z1	1	2	4	1	2		1			2
	Z2										
Unchannelled valley-bottom wetland		**4**	**4**	**4**	**7**	**7**	**1**	**4**	**4**	**20**	**5**
	AB		3	2	6	3		3		7	3
	C	4	1	1		4		1	2	12	1
	DEF										

Northern											
HGM unit	Condition	Not assigned to an ecoregion	GHAAP PLATEAU	HIGHVELD	NAMA KAROO	NAMAQUA HIGHLANDS	ORANGE RIVER GORGE	SOUTHERN KALAHARI	WESTERN BANKENVELD	WESTERN COASTAL BELT	Total % per type
	Z1			1					3	1	
	Z2										
Total area (hectares)		7654	20802	26741	18819	838	832	18782	329	1968	96765

Rivers per ecoregion in the Northern Corridor

Northern												
River type	Condition	Foreign	Bushveld Basin	Ghaap Plateau	Highveld	Nama Karoo	Namaqua Highlands	Orange River Gorge	Southern Kalahari	Western Bankenveld	Western Coastal Belt	Total % for corridor
Unknown		0	0	0	0	0	0	0	0	0	0	0
	AB	0	0	0	0	0	0	0	0	0	0	0
	EF	0	0	0	0	0	0	0	0	0	0	0
	Z	0	0	0	0	0	0	0	0	0	0	0
Ephemeral		0	40	100	52	86	100	67	96	49	100	86
	AB	0	0	8	1	79	73	67	19	22	29	47
	B	0	0	2	0	6	7	0	6	9	34	5
	C	0	0	59	45	0	20	0	39	15	37	22
	D	0	40	0	0	0	0	0	1	3	0	0
	E	0	0	0	0	0	0	0	0	0	0	0
	EF	0	0	0	0	0	0	0	0	0	0	0
	Z	0	0	32	6	1	0	0	32	0	0	12
Foreign		100	0	0	0	0	0	0	0	0	0	0

Northern												
River type	Condition	Foreign	Bushveld Basin	Ghaap Plateau	Highveld	Nama Karoo	Namaqua Highlands	Orange River Gorge	Southern Kalahari	Western Bankenveld	Western Coastal Belt	Total % for corridor
	AB	0	0	0	0	0	0	0	0	0	0	0
	Z	100	0	0	0	0	0	0	0	0	0	0
Permanent or seasonal		**0**	**60**	**0**	**48**	**14**	**0**	**33**	**4**	**51**	**0**	**14**
	A	0	0	0	0	0	0	0	0	0	0	0
	AB	0	0	0	0	0	0	5	0	19	0	1
	B	0	0	0	0	0	0	23	1	1	0	2
	C	0	12	0	44	14	0	5	3	31	0	11
	D	0	48	0	2	0	0	0	0	0	0	0
	EF	0	0	0	0	0	0	0	0	0	0	0
	Z	0	0	0	2	0	0	0	0	0	0	0
Total river length (1000s of kms)		1	13	863	981	3495	1025	724	2417	183	188	9890

Wetlands per ecoregion in the Western Corridor

Western									
HGM unit	Condition	Not assigned to an ecoregion	GREAT KAROO	NAMA KAROO	NAMAQUA HIGHLANDS	SOUTH WESTERN COASTAL BELT	WESTERN COASTAL BELT	WESTERN FOLDED MOUNTAINS	Total % per type
Unknown (or estuary)		70				24	9		8
	AB								
	C								
	Z1						3		
	Z2	70				24	6		8
Channelled valley-bottom wetland		13	46	2	64	16	45	80	9
	AB	3	30	2	64	1	35	17	4
	C	11	15			12	9	10	3
	DEF							53	2
	Z1		1			4	1	1	
	Z2								
Depression			2	85	20	4	4		65
	AB			81	19		1		61
	C		1	4	1	1	2		3
	Z1			1		3	1		1
	Z2								
Flat		3	26	4	1	2	14	3	4
	AB	2	9	4	1		7	2	4

Western									
HGM unit	Condition	Not assigned to an ecoregion	GREAT KAROO	NAMA KAROO	NAMAQUA HIGHLANDS	SOUTH WESTERN COASTAL BELT	WESTERN COASTAL BELT	WESTERN FOLDED MOUNTAINS	Total % per type
	C	1	15			1	5		1
	DEF								
	Z1		3			1	3		
	Z2								
Floodplain wetland		**9**		**3**		**29**	**20**		**6**
	AB	1		3		2	1		3
	C	7				26	15		3
	DEF								
	Z1	2					4		
	Z2								
Seep		**4**	**19**	**5**		**14**	**4**	**15**	**6**
	AB	1	10	5		1	3	6	4
	C	3	9			3	1	5	1
	DEF							1	
	Z1	1	1			9	1	2	1
	Z2								
Unchannelled valley-bottom wetland			**7**	**1**	**15**	**11**	**3**	**2**	**2**
	AB		3	1	15	6	2		1
	C		3			3			
	DEF								

Western									
HGM unit	Condition	Not assigned to an ecoregion	GREAT KAROO	NAMA KAROO	NAMAQUA HIGHLANDS	SOUTH WESTERN COASTAL BELT	WESTERN COASTAL BELT	WESTERN FOLDED MOUNTAINS	Total % per type
	Z1		1			1	1	1	
	Z2								
Total area (hectares)		25104	3309	199243	34	13922	9568	10821	262002

Rivers per ecoregion in the Western Corridor

Western								
River type	Condition	*Great Karoo*	*Nama Karoo*	*Namaqua Highlands*	*South Western Coastal Belt*	*Western Coastal Belt*	*Western Folded Mountains*	Total % for corridor
Unknown		0	0	0	0	0	0	0
	AB	0	0	0	0	0	0	0
	EF	0	0	0	0	0	0	0
	Z	0	0	0	0	0	0	0
Ephemeral		79	99	100	26	80	21	73
	AB	64	79	49	6	32	1	44
	B	0	17	0	0	0	0	5
	C	5	1	51	20	25	9	14
	D	0	0	0	0	4	0	1
	E	0	0	0	0	0	0	0
	EF	0	0	0	0	0	0	0
	Z	10	3	0	0	19	12	9
Foreign		0	0	0	0	0	0	0
	AB	0	0	0	0	0	0	0

Western								
River type	Condition	*Great Karoo*	*Nama Karoo*	*Namaqua Highlands*	*South Western Coastal Belt*	*Western Coastal Belt*	*Western Folded Mountains*	Total % for corridor
	Z	0	0	0	0	0	0	0
Permanent or seasonal		21	1	0	74	20	79	27
	A	0	0	0	0	0	0	0
	AB	5	0	0	18	3	33	8
	B	6	1	0	0	0	12	3
	C	11	0	0	55	9	13	12
	D	0	0	0	1	8	13	4
	EF	0	0	0	0	0	0	0
	Z	0	0	0	0	0	8	1
Total river length (1000s of kms)		723	1614	219	591	1572	721	5440

28 APPENDIX 8 – DATA AND SENSITIVITY SCORING OVERVIEW

CATEGORY	Data class	Datasets	Feature type	Buffer (m)	EGI Biodiversity sensitivity	downrated Sens if NO CLEARING
TERRESTRIAL HABITAT	Protected areas	SANBI National Protected Area database ver 01042015 + CapeNature/CoCT DCCP info in-process or de facto PAs May 2015 + Any equivalent PAs indicated in fine scale conservation plans	Forest Act PAs	0	Very high	Very high
			Local NR	0	Very high	Very high
			Marine PA	0	Very high	Very high
			Mountain Catchment	0	High	Medium
			National Botanical Gardens	0	Very high	Very high
			Protected Environment	0	High	High
			Provincial NR	0	Very high	Very high
			Special NR	0	Very high	Very high
			National Parks	0	Very high	Very high
			Private Nature Reserves (declared after 2008)	0	High	High
			Private Nature Reserves (declared pre-2008)	0	Medium	Medium
			equivalent to Provincial or National (incl. Contract)	0	Very high	Very high
		National Protected Area Expansion Strategy 2010	NPAES 2010 focal areas	0	Medium	Medium
	Ecosystem Status x Conservation Plan CBA x Habitat condition	Best available Cons status (excluding Criterion D1): Western Cape - Pence 2013 A1 criterion assessment from compiled landcover Rest of SA - 2011 Gazetted Threatened Ecosystems Little Karoo	Critically Endangered Any natural	0	Very high	Very high
			Any ecosystem status CBA Irreplaceable(CBA 1)	0	Very high	Very high
			Endangered CBA best design (CBA 2) or unknown	0	Very high	Very high
			Endangered ESA / E.Cape CBA best design CBAs / other natural	0	Very high	High
			Vulnerable and Least Threatened CBA best design (CBA 2) or unknown		High	Medium
			Vulnerable and Least Threatened ESA / E.Cape CBA best design CBAs / other natural	0	Low	Low
			Degraded and No Natural ANY, including CBA 1 & 2	0	Very low	Very low
	Natural Forest	SANBI SA Veg Map 2006 - forests	all	0	Very high	Very high
		DAFF SA Forest types	all	0	Very high	Very high
		National land cover 2013-14 GTI DEA open licence	class - forest	0	Very high	Very high
	Thicket	STEP 2002 Vegetation Mapping: Albany Thicket Biome	Pristine Thicket habitat condition class	0	Very high	High
		National land cover 2013-14 GTI DEA open licence	Thicket / Dense Bush landcover class	0	High	Medium

AQUATIC	Wetlands	NFEPA Wetlands 2011 supplemented by fine scale mapping available: City Of CT, Mpumalanga Highveld, Wind & Solar SEA mapping, Cape Fine-scale Plans, KZN	Natural wetlands: Floodplain; Channelled and un-channelled valley bottom/Alluvial; Depressions and flats; Seeps	variable 50-200m (see report)	Very high
			RAMSAR WETLANDS (incl artificial)	500	Very high
			All Estuaries	500	Very high
			Artificial wetlands (except RAMSAR)	0	Very low
	Rivers	National FEPA Rivers 2011	Mountain streams, upper and lower foothill rivers, lov	variable 50-20	Very high
SPECIES	Threatened Plants	SANBI National TSP data	all records Cr, EN & D2 with better than 250m accuracy	250	Very high
			grid cells with 2-8 records per km2 within a 5km radius	0	High
			grid cells with 1-2 records per km2 within a 5km radiu:	0	Medium
			grid cells with <1 record per km2 within a 5km radius	0	Low
	Birds	To be compiled by separate bird specialist team			
	Bats	Bat roost exlusion areas EWT July 2014	Major Bat Roosts (>500 bats).	2000	Very high
			(No <500 bat roosts in corridors)		
	Mammals, other	none available for highly restricted spp.			
	Reptiles	Reptiles point records SANBI	Geometric Tortoise only: SA Veg 2009 polygons with >3 post 1995 records or known localities with PLUS 2.5km buffer of all these records/localities	2500	Very high
	Butterflies	Butterflies point records	Not used - no data to indicate records with adequate accuracy and highly restricted s		
PHYSICAL / TOPOGRAPHY	SLOPE	Slope from SRTM 1arc second DEM	Slopes of 0° - 10° (0 - 18%)		Low
			Slopes of 10° - 20° (18 - 36%)		Medium
			Slopes of 20° - 30° (36 - 58%)		High
			Slopes of >30° (>58%)		Very high

29 APPENDIX 9 – LISTING OF ACTIVITIES FOR ENVIRONMENTAL AUTHORISATION

Activities relevant to environmental authorisation of electricity grid infrastructure:

	Basic assessment (Listing Notice 1)		Scoping and EIA (Listing Notice 2)
11	The development of facilities or infrastructure for the transmission and distribution of electricity- (i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts; or (ii) inside urban areas or industrial complexes with a capacity of 275 kilovolts or more.	9	The development of facilities or infrastructure for the transmission and distribution of electricity with a capacity of 275 kilovolts or more, outside an urban area or industrial complex.
12	The development of - (i) Bridges exceeding 100 m^2 in size; (ii) Buildings exceeding 100 m^2 in size; (iii) Infrastructure or structures with a physical footprint of 100 m^2 or more; Where such development occurs within a watercourse, or within a development setback or closer than 32 m to the edge of a watercourse where no development setback has been set, EXCEPT where such development occurs within the urban area, or within existing roads or road reserves.	15	The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for- (i) the undertaking of a linear activity; or (ii) maintenance purposes undertaken in accordance with a maintenance management plan.
17	Development of buildings exceeding 50 m^2 or of infrastructure exceeding 50 m^2 - (i) in the sea; (ii) in an estuary; (iii) within the littoral active zone; (iv) in front of a development setback; or (v) if no development setback exists, within a distance of 100 metres inland of the high-water mark of the sea or an estuary, whichever is the greater, EXCEPT where such development occurs in the urban area, or where the structure is temporary and will not require clearing of indigenous vegetation.	24	The extraction or removal of peat or peat soils, including the disturbance of vegetation or soils in anticipation of the extraction or removal of peat or peat soils, but excluding where such extraction or removal is for the rehabilitation of wetlands in accordance with a maintenance management plan.
19	The infilling or depositing of any material of more than 5 m^3 into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 5 m^3 from - (i) a watercourse; (ii) the seashore; or (iii) the littoral active zone, an estuary or a distance of 100 metres inland of the high-water mark of the sea or an estuary, whichever distance is the greater, EXCEPT where such infilling, depositing , dredging, excavation, removal or moving – (a) will occur behind a development setback; (b) is for maintenance purposes undertaken in accordance with a maintenance management plan.		
27	The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for- (i) the undertaking of a linear activity; or (ii) maintenance purposes undertaken in accordance with a maintenance management plan.		

	Basic assessment (Listing Notice 1)		Scoping and EIA (Listing Notice 2)
47	The expansion of facilities or infrastructure for the transmission and distribution of electricity where the expanded capacity will exceed 275 kilovolts and the development footprint will increase.		
48	The expansion of bridges, buildings and infrastructure by more than 100 m², where such development occurs within a watercourse, or within a development setback or closer than 32 m to the edge of a watercourse where no development setback has been set, EXCEPT where such development occurs within the urban area, or within existing roads or road reserves.		

Listings specific to geographical areas (Listing notice 3):

4	The development of a road wider than 4 metres with a reserve less than 13.5 metres.	**(a) In Free State, Limpopo, Mpumalanga and Northern Cape provinces:** i. In an estuary; ii. Outside urban areas, in: (aa) A protected area identified in terms of NEMPAA, excluding disturbed areas; (bb) National Protected Area Expansion Strategy Focus areas; (cc) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority; (dd) Sites or areas identified in terms of an International Convention; (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; (ff) Core areas in biosphere reserves; (gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core areas of a biosphere reserve, excluding disturbed areas; or (hh) Areas seawards of the development setback line or within 1 kilometre from the high-water mark of the sea if no such development setback line is determined; or iii. In urban areas: (aa) Areas zoned for use as public open space; (bb) Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority or zoned for a conservation purpose; or (cc) Seawards of the development setback line or within urban protected areas. **(b) In Eastern Cape:** i. In an estuarine functional zone; ii. Outside urban areas, in: (aa) A protected area identified in terms of NEMPAA, excluding disturbed areas; (bb) National Protected Area Expansion Strategy Focus areas; (cc) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority; (dd) Sites or areas identified in terms of an International Convention; (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; (ff) Core areas in biosphere reserves; (gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core areas of a biosphere reserve, excluding disturbed areas; or (hh) Areas seawards of the development setback line or within 1 kilometre from the high-water mark of the sea if no such development setback line is determined; or iii. In urban areas:

		(aa) Areas zoned for use as public open space; (bb) Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority or zoned for a conservation purpose; or (cc) Seawards of the development setback line or within urban protected areas. **(c) In Gauteng:** i. A protected area identified in terms of NEMPAA, excluding conservancies; ii. National Protected Area Expansion Strategy Focus Areas; iii. Gauteng Protected Area Expansion Priority Areas; iv. Sites identified as Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs) in the Gauteng Conservation Plan or in bioregional plans; v. Sites identified within threatened ecosystems listed in terms of the National Environmental Management Act: Biodiversity Act (Act No. 10 of 2004); vi. Sensitive areas identified in an environmental management framework adopted by relevant environmental authority; vii. Sites identified as high potential agricultural land in terms of Gauteng Agricultural Potential Atlas; viii. Important Bird and Biodiversity Area (IBA); ix. Sites or areas identified in terms of an International Convention; x. Sites managed as protected areas by provincial authorities, or declared as nature reserves in terms of the Nature Conservation Ordinance (Ordinance 12 of 1983) or the National Environmental Management: Protected Areas Act (Act No. 57 of 2003); xi. Sites designated as nature reserves within municipal SDFs; or xii. Sites zoned for a conservation or public open space or equivalent zoning. **(d) In KwaZulu-Natal:** i. In an estuarine functional zone; ii. Trans- frontier protected areas managed under international conventions; iii. Community Conservation Areas; iv. Biodiversity Stewardship Programme Biodiversity Agreement areas; v. World Heritage Sites; vi. A protected area identified in terms of NEMPAA; vii. Sites or areas identified in terms of an International Convention; viii. Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; ix. Core areas in biosphere reserves; x. Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority or zoned for a conservation purpose; xi. Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority; xii. Outside urban areas: (aa) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core areas of a biosphere reserve; or (bb) Areas seawards of the development setback line or within 1 kilometre from the high-water mark of the sea if no such development setback line is determined; or xiii. In urban areas: (aa) Areas zoned for use as public open space; (bb) Seawards of the development setback line or within 100 metres from the high-water mark of the sea if no such development setback line is determined; or (cc) Within urban protected areas. **(e) In North West :** i. Outside urban areas, in: (aa) A protected area identified in terms of NEMPAA;

		(bb) National Protected Area Expansion Strategy Focus areas; (cc) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority; (dd) Sites or areas identified in terms of an International Convention; (ee) Critical biodiversity areas (Terrestrial Type 1 and 2) as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; (ff) Core areas in biosphere reserves; or (gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from a biosphere reserve; or ii. In urban areas: (aa) Areas zoned for use as public open space; (bb) Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority or zoned for a conservation purpose; or (cc) Natural heritage sites. **(f) In Western Cape:** i. Areas outside urban areas; (aa) Areas containing indigenous vegetation; (bb) Areas on the estuary side of the development setback line or in an estuarine functional zone where no such setback line has been determined; or ii. In urban areas: (aa) Areas zoned for conservation use; or (bb) Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority.
12	The clearance of an area of 300 m^2 or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan.	**(a) In Eastern Cape, Free State, Gauteng, Limpopo, North West and Western Cape provinces:** i. Within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004; ii. Within critical biodiversity areas identified in bioregional plans; iii. Within the littoral active zone or 100 metres inland from high water mark of the sea or an estuarine functional zone, whichever distance is the greater, excluding where such removal will occur behind the development setback line on erven in urban areas; or iv. On land, where, at the time of the coming into effect of this Notice or thereafter such land was zoned open space, conservation or had an equivalent zoning. **(b) In KwaZulu-Natal:** i. Trans-frontier protected areas managed under international conventions; ii. Community Conservation Areas; iii. Biodiversity Stewardship Programme Biodiversity Agreement areas; iv. Within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004; v. Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; vi. Within the littoral active zone or 100 metres inland from high water mark of the sea or an estuarine functional zone, whichever distance is the greater, excluding where such removal will occur behind the development setback line on erven in urban areas; vii. On land, where, at the time of the coming into effect of this Notice or thereafter such land was zoned open space, conservation or had an equivalent

		zoning; viii. A protected area identified in terms of NEMPAA, excluding conservancies; ix. World Heritage Sites; x. Sites or areas identified in terms of an International Convention; xi. Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority or zoned for a conservation purpose; xii. Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority; or xiii. In an estuarine functional zone. **(c) In Mpumalanga:** i. Within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004; ii. Within critical biodiversity areas identified in bioregional plans; iii. Within the littoral active zone or 100 metres inland from high water mark of the sea or an estuarine functional zone, whichever distance is the greater, excluding where such removal will occur behind the development setback line on erven in urban areas; or iv. On land, where, at the time of the coming into effect of this Notice or thereafter such land was zoned open space, conservation or had an equivalent zoning or proclamation in terms of NEMPAA. **(d) In Northern Cape**: i. Within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA 'or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004; ii. Within critical biodiversity areas identified in bioregional plans; iii. Within the littoral active zone or 100 metres inland from high water mark of the sea or an estuary, whichever distance is the greater, excluding where such removal will occur behind the development setback line on erven in urban areas; or iv. On land, where, at the time of the coming into effect of this Notice or thereafter such land was zoned open space, conservation or had an equivalent zoning.
14	The development of- (ii) channels exceeding 10 m² in size; (iii) bridges exceeding 10 10 m² in size; (x) buildings exceeding 10 m² in size; (xii) infrastructure or structures with a physical footprint of 10 m² or more;	**(a) In Free State, Limpopo, Mpumalanga and Northern Cape:** i. In an estuary; ii. Outside urban areas, in: (aa) A protected area identified in terms of NEMPAA, excluding conservancies; (bb) National Protected Area Expansion Strategy Focus areas; (cc) World Heritage Sites; (dd) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority; (ee) Sites or areas identified in terms of an International Convention; (ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; (gg) Core areas in biosphere reserves; (hh) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve (ii) Areas seawards of the development setback line or within 1 kilometre from the high-water mark of the sea if no such development setback line is determined; or

		iii. In urban areas: (aa) Areas zoned for use as public open space (bb) Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority, zoned for a conservation (cc) Areas seawards of the development setback line. **(b) In Gauteng:** i. A protected area identified in terms of NEMPAA, excluding conservancies; ii. National Protected Area Expansion Strategy Focus Areas; iii. Gauteng Protected Area Expansion Priority Areas; iv. Sites identified as Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs) in the Gauteng Conservation Plan or in bioregional plans; - v. Sites identified within threatened ecosystems listed in terms of the National Environmental Management Act: Biodiversity Act (Act No. 10 of 2004); vi. Sensitive areas identified in an environmental management framework adopted by relevant environmental authority; vii. Sites or areas identified in terms of an International Convention viii. Sites managed as protected areas by provincial authorities, or declared as nature reserves in terms of the Nature Conservation Ordinance (Ordinance 12 of 1983) or the National Environmental Management: Protected Areas Act (Act No. 57 of 2003); ix. Sites designated as nature reserves within municipal SDFs; or x. Sites zoned for conservation or public open space or equivalent zoning. **(c) In Eastern Cape:** i. In an estuarine functional zone; ii. Outside urban areas, in: (aa) A protected area identified in terms of NEMPAA, excluding conservancies; (bb) National Protected Area Expansion Strategy Focus areas; (cc) World Heritage Sites; (dd) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority; (ee) Sites or areas identified in terms of an International Convention; (ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; (gg) Core areas in biosphere reserves; (hh) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve; or (ii) Areas seawards of the development setback line or within 1 kilometre from the high-water mark of the sea if no such development setback line is determined; or iii. In urban areas: (aa) Areas zoned for use as public open space; (bb) Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority, zoned for a conservation purpose; or (cc) Areas seawards of the development setback line. **(d) In KwaZulu-Natal:** i. In an estuarine functional zone; ii. Community Conservation Areas; iii. Biodiversity Stewardship Programme Biodiversity Agreement areas; iv. A protected area identified in terms of NEMPAA, excluding conservancies; v. World Heritage Sites; vi. Sites or areas identified in terms of an International Convention; vii. Critical biodiversity areas or ecological support areas as identified in systematic biodiversity plans adopted by the competent authority or in

		bioregional plans; viii. Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority; ix. Core areas in biosphere reserves; x. Outside urban areas: (aa) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve; or (bb) Areas seawards of the development setback line or within 1 kilometre from the high-water mark of the sea if no such development setback line is determined; or xi. In urban areas: (aa) Areas zoned for use as public open space; (bb) Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority, zoned for a conservation purpose; or (cc) Areas seawards of the development setback line or within 100 metres from the high-water mark of the sea if no such development setback line is determined. **(e) In North West:** i. Outside urban areas, in: (aa) A protected area identified in terms of NEMPAA; (bb) National Protected Area Expansion Strategy Focus areas; (cc) World Heritage Sites; (dd) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority; (ee) Sites or areas identified in terms of an International Convention; (ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; (gg) Core areas in biosphere reserves; or . (hh) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core areas of a biosphere reserve; or ii. Inside urban areas: (aa) Areas zoned for use as public open space; or (bb) Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority or zoned for a conservation purpose. **(f) In Western Cape:** i. Outside urban areas, in: (aa) A protected area identified in terms of NEMPAA, excluding conservancies; (bb) National Protected Area Expansion Strategy Focus areas; (cc) World Heritage Sites; (dd) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority; (ee) Sites or areas listed in terms of an International Convention; (ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; (gg) Core areas in biosphere reserves; or (hh) Areas on the estuary side of the development setback line or in an estuarine functional zone where no such setback line has been determined.
18	The widening of a road by more than 4 metres, or the	**(a) In Free State, Limpopo, Mpumalanga and Northern Cape provinces:** i. In an estuary;

	lengthening of a road by more than 1 kilometre.	ii. Outside urban areas, in: (aa) A protected area identified in terms of NEMPAA, excluding conservancies; (bb) National Protected Area Expansion Strategy Focus areas; (cc) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority; (dd) Sites or areas identified in terms of an International Convention; (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; (ff) Core areas in biosphere reserves; (gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve; (hh) Areas seawards of the development .setback line or within 1 kilometre from the high-water mark of the sea if no such development setback line is determined; or (ii) Areas on the watercourse side of the development setback line or within 100 metres from the edge of a watercourse where no such setback line has been determined; or iii. Inside urban areas: (aa) Areas zoned for use as public open space; or (bb) Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority or zoned for a conservation purpose. **(b) In Eastern Cape:** i. In an estuarine functional zone; ii. Outside urban areas, in: (aa) A protected area identified in terms of NEMPAA, excluding conservancies; (bb) National Protected Area Expansion Strategy Focus areas; (cc) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority; (dd) Sites or areas identified in terms of an International Convention; (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional, plans; (ff) Core areas in biosphere reserves; (gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve; (hh) Areas seawards of the development setback line or within 1 kilometre from the high-water mark of the sea if no such development setback line is determined; or (ii) Areas on the watercourse side of the development setback line or within 100 metres from the edge of a watercourse where no such setback line has been determined; or iii. Inside urban areas: (aa) Areas zoned for use as public open space; or (bb) Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority or zoned for a conservation purpose. **(c) In Gauteng:** i. A protected area identified in terms of NEMPAA, excluding conservancies; ii. National Protected Area Expansion Strategy Focus Areas; iii. Gauteng Protected Area Expansion Priority Areas; iv. Sites identified as Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs) in the Gauteng Conservation Plan or in bioregional plans; v. Sites identified within threatened ecosystems listed in terms of the National Environmental Management Act: Biodiversity Act (Act No. 10 of 2004);

		vi. Sensitive areas identified in an environmental management framework adopted by relevant environmental authority; vii. Sites identified as high potential agricultural land in terms of Gauteng Agricultural Potential Atlas; viii. Sites or areas identified in terms of an International Convention; ix. Important Bird and Biodiversity Area (IBA); x. Sites managed as protected areas by provincial authorities, or declared as nature reserves in terms of the Nature Conservation Ordinance (Ordinance 12 of 1983) or the National Environmental Management: Protected Areas Act (Act No. 57 of 2003); xi. Sites designated as nature reserves within municipal SDFs; or xii. Sites zoned for a conservation or public open space or equivalent zoning. **(d) In KwaZulu-Natal:** i. Trans-frontier protected areas managed under international conventions; ii. Community Conservation Areas; iii. Biodiversity Stewardship Programme Biodiversity Agreement areas; iv. World Heritage Sites; v. In an estuarine functional zone; vi. A protected area identified in terms of NEMPAA; vii. Sites or areas identified in terms of an International Convention; viii. Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; ix. Core areas in biosphere reserves; x. Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority or zoned for a conservation purpose; xi. Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority; xii. Outside urban areas: (aa) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core areas of a biosphere reserve; or (bb) Areas seawards of the development setback line or within 1 kilometre from the high-water mark of the sea if no such development setback line is determined; or xiii. In urban areas: (aa) Areas zoned for use as public open space; (bb) Seawards of the development setback line or within 100 metres from the high-water mark of the sea if no such development setback line is determined; or (cc) Within urban protected areas. **(e) In North West :** i. Outside urban areas, in: (aa) A protected area identified in terms of NEMPAA; (bb) National Protected Area Expansion Strategy Focus areas; (cc) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority; (dd) Sites or areas identified in terms of an International Convention; (ee) Critical biodiversity areas (Terrestrial Type 1 and 2) as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; (ff) Core areas in biosphere reserves; or (gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve; or

		ii. In urban areas: (aa) Areas zoned for use as public open space; (bb) Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority or zoned for a conservation purpose; or (cc) Natural heritage sites. **(f) In Western Cape:** i. All areas outside urban areas: (aa) Areas containing indigenous vegetation; (bb) Areas on the estuary side of the development setback line or in an estuarine functional zone where no such setback line has been determined; or ii. In urban areas: (aa) Areas zoned for conservation use; or (bb) Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority.

STRATEGIC ENVIRONMENTAL ASSESSMENT FOR
ELECTRICITY GRID INFRASTRUCTURE IN SOUTH AFRICA

Appendix C.4

Heritage Scoping Assessment Report




Jayson Orton
ASHA Consulting

CONTENTS

FIGURES

1 SPECIALIST CV

Jayson David John Orton

ARCHAEOLOGIST AND HERITAGE CONSULTANT

Contact details ad personal information:

Address: 6A Scarborough Road, Muizenberg, 7945
Telephone: (021) 788 8425
Cell Phone: 083 272 3225
Email: jayson@asha-consulting.co.za

Education:

SA College High School	Matric	1994
University of Cape Town	B.A. (Archaeology, Environmental & Geographical Science)	1997
University of Cape Town	B.A. (Honours) (Archaeology)*	1998
University of Cape Town	M.A. (Archaeology)	2004
University of Oxford	D.Phil. (Archaeology)	2013

*Frank Schweitzer memorial book prize for an outstanding student and the degree in the First Class.

Employment History:

Spatial Archaeology Research Unit, UCT	Research assistant	Jan 1996 – Dec 1998
Department of Archaeology, UCT	Field archaeologist	Jan 1998 – Dec 1998
UCT Archaeology Contracts Office	Field archaeologist	Jan 1999 – May 2004
UCT Archaeology Contracts Office	Heritage & archaeological consultant	Jun 2004 – May 2012
School of Archaeology, University of Oxford	Undergraduate Tutor	Oct 2008 – Dec 2008
ACO Associates cc	Associate, Heritage & archaeological consultant	Jan 2011 – Dec 2013
ASHA Consulting (Pty) Ltd	Director, Heritage & archaeological consultant	Jan 2014 –

Memberships:

South African Archaeological Society Council member	2004 –
Assoc. Southern African Professional Archaeologists (ASAPA) member	2006 –
ASAPA Cultural Resources Management Section member	2007 –
UCT Department of Archaeology Research Associate	2013 –
Heritage Western Cape APM Committee member	2013 –
Fish Hoek Valley Historical Association	2014 –

Professional Accreditation:

ASAPA membership number:	233, CRM Section member
Principal Investigator:	Coastal shell middens (awarded 2007)
	Stone Age archaeology (awarded 2007)
	Grave relocation (awarded 2014)
Field Director:	Rock art (awarded 2007)
	Colonial period archaeology (awarded 2007)

Fieldwork and Project Experience:

Extensive fieldwork as both Field Director and Principle Investigator throughout the Western and Northern Cape, and also in the western parts of the Free State and Eastern Cape as follows:

Phase 1 surveys and impact assessments:

- Project types
  - Heritage Impact Assessments (largely in the Environmental Impact Assessment or Basic Assessment context under NEMA and Section 38(8) of the NHRA, but also self-standing assessments under Section 38(1) of the NHRA)
  - Archaeological specialist studies and impact assessments
  - Phase 1 test excavations in historical and prehistoric sites
  - Archaeological research projects
- Development types
  - Mining and borrow pits
  - Roads (new and upgrades)
  - Residential, commercial and industrial development
  - Dams and pipe lines
  - Power lines and substations
  - Renewable energy facilities (wind energy, solar energy and hydro-electric facilities)

Phase 2 mitigation and research excavations:

- ESA open sites
  - Duinefontein, Gouda
- MSA rock shelters
  - Fish Hoek, Yzerfontein, Cederberg, Namaqualand
- MSA open sites
  - Swartland, Bushmanland, Namaqualand
- LSA rock shelters
  - Cederberg, Namaqualand, Bushmanland
- LSA open sites (inland)
  - Swartland, Franschhoek, Namaqualand, Bushmanland
- LSA coastal shell middens
  - Melkbosstrand, Yzerfontein, Saldanha Bay, Paternoster, Dwarskersbos, Infanta, Knysna, Namaqualand
- LSA burials
  - Melkbosstrand, Saldanha Bay, Namaqualand, Knysna
- Historical sites
  - Franschhoek (farmstead and well), Waterfront (fort, dump and well), Noordhoek (cottage), variety of small excavations in central Cape Town and surrounding suburbs
- Historic burial grounds
  - Green Point (Prestwich Street), V&A Waterfront (Marina Residential), Paarl

2 SPECIALIST DECLARATION

I, Jayson Orton, as the appointed independent specialist hereby declare that I:

- act/ed as the independent specialist in this application;
- regard the information contained in this report as it relates to my specialist input/study to be true and correct;
- do not have and will not have any financial interest in the undertaking of the activity, other than remuneration for work performed;
- have and will not have any vested interest in the proposed activity proceeding;
- have disclosed any material information that have or may have the potential to influence the objectivity of any report or decisions base thereon; and
- am aware that a false declaration is an offence in terms of regulation 71 of GN No. R. 543.

Signature of the specialist:	
Name of company:	ASHA Consulting
Professional Registration (incl number):	ASAPA CRM Section member No. 233
Date:	06.07.2015

3 ABBREVIATIONS AND ACRONYMS

AIA	Archaeological Impact Assessment - Archaeological component of a Heritage Impact Assessment
CSIR	Council for Scientific and Industrial Research
DEA	Department of Environmental Affairs
EC	Eastern Cape
eCRAG	Eastern Cederberg Rock Art Group
HIA	Heritage Impact Assessment
HWC	Heritage Western Cape
KZN	KwaZulu-Natal
NEMA	National Environmental Management Act
NHRA	National Heritage Resources Act, no. 27 of 1999
NHS	National Heritage Site
PHRA	Provincial Heritage Resources Authority
PHS	Provincial Heritage Site
PIA	Palaeontological Impact Assessment - Palaeontological component of a Heritage Impact Assessment
PSM	Palaeosensitivity Map
SAHRA	South African Heritage Resources Agency
SAHRIS	South African Heritage Resources Information System
SARU	UCT Spatial Archaeology Research Unit
VIA	Visual Impact Assessment
WHS	World Heritage Site

4 TERMS OF REFERENCES (TORS)

4.1 Background and Details of the Project

The National Department of Environmental Affairs (DEA) has embarked on a process of identifying ways to act swiftly, streamline and shorten the environmental authorisation process for major infrastructure build programmes in South Africa. In particular, the DEA is looking to facilitate the efficient roll out of Strategic Integrated Projects (SIPs) lead by the Presidential Infrastructure Coordinating Committee and detailed in the National Infrastructure Plan.

As part of this process, the Department of Environmental Affairs (DEA), mandated by Ministers and Members of the Executive Council (MinMec), commissioned the Council for Scientific and Industrial Research (CSIR) in January 2014 to undertake a Strategic Environmental Assessment (SEA) linked to SIP 10: Electricity Transmission and Distribution for all. The SEA is titled national Department of Environmental Affairs Electricity Grid Infrastructure Strategic Environmental Assessment. The aim of the SEA is to identify suitable routing corridors that will enable the efficient and effective expansion of key strategic transmission infrastructure designed to satisfy national transmission requirements up to the 2040 planning horizon. The CSIR is teaming up with Eskom and the South African National Biodiversity Institute (SANBI) to deliver on project outputs.

Upon gazetting of the corridors, it is envisaged that the environmental authorisation process for transmission infrastructure[1] will be streamlined in specific areas identified through the SEA process as being less sensitive to the negative impacts of electricity grid infrastructure development. This should incentivise Eskom and other potential transmission infrastructure developers to plan and develop in less sensitive areas.

The SEA process also provides a platform for coordination between the various authorities responsible for issuing authorisations, permits or consents and thereby will further contribute to a more streamlined environmental authorisation process.

The preliminary corridors (the starting point of the SEA) were identified by Eskom and are based on the results of a detailed Eskom Strategic Grid Plan Study. The Study considered a number of possible future generation and load scenarios and in so doing identified the need for five national transmission infrastructure corridors to facilitate the balancing of South Africa's electricity supply and demand needs up 2040.

The corridors are:

1. The Eastern Corridor
2. The Western Corridor
3. The Northern Corridor
4. The Central Corridor
5. The International Corridor

The SEA then undertook a corridor refinement process to determine optimal placement of the five (5) 100km wide corridors by considering key constraints (Phase I) and opportunities (Phase II) for electricity transmission level infrastructure development.

[1] Including associated infrastructure such as transmission substations and distribution lines.

Phase I involved a wall to wall nation-wide sensitivity delineation assessment to determine areas where electricity grid infrastructure is likely to have an impact on the environment (environmental constraints) and areas where the environment is likely to have an impact on electricity grid infrastructure (engineering constraints). The full extent of South Africa was then graded and mapped for environmental and engineering sensitivity, indicating areas to be avoided (Very High sensitivity), to areas which are sensitive for various reasons (High-Medium sensitivity), to areas which demonstrate no sensitivity (Low sensitivity). The outputs of Phase I are a 'wall to wall' environmental constraints map and 'wall to wall' engineering constraints map.

Phase II involved a review of national, provincial and local government development plans as well as detailed consultation with government and industry to determine areas of future bulk demand for electricity and or transmission level infrastructure. Key strategic demand areas were identified and mapped.

Project Status

Based on the outputs of the Phases I and II, the position of the preliminary corridors are in the process of being adjusted to best support development plans but also minimise overlap with environmental and engineering sensitive areas (See Annexure 1 for a more detailed explanation of the corridor refinement process and overall SEA approach).

Once the corridor refinement process is completed and the final corridor extent has been determined, the wall to wall environmental constraints map will be cut according to the boundaries of final corridors to form the 'draft environmental constraints map'.

The final corridors together with the draft environmental constraints map will be completed and made available to the successful bidder by the 16 March.

The Eskom Preliminary corridors are illustrated in Figure 1 below.

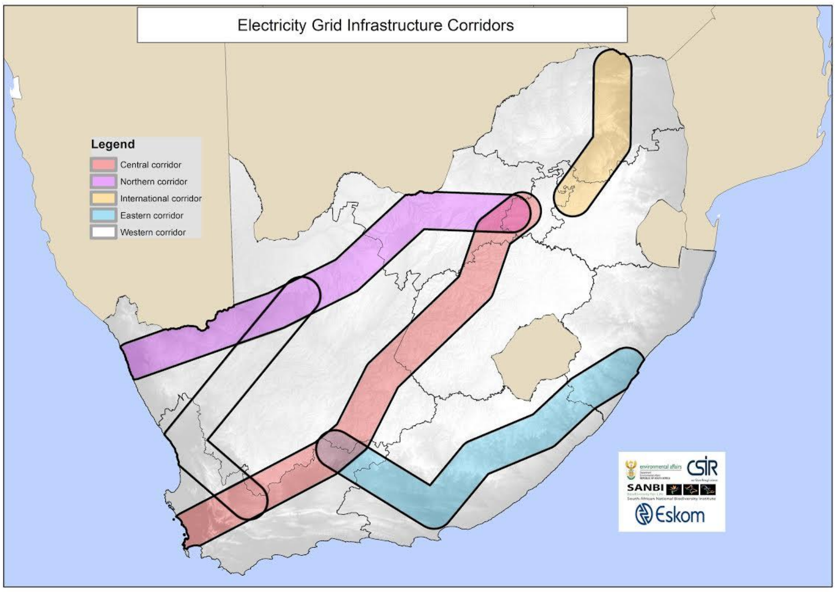


Figure 1: Eskom Preliminary Corridors

4.2 Scope of Work

The appointed supplier will be required to review and interrogate the draft environmental constraints map with respect to features linked to heritage resources. The appointed supplier will be required to identify any gaps in information. Once the appointed supplier has considered the draft environmental constraints map, the appointed supplier will be required to develop a dedicated heritage sensitivity map for each of the corridors with respect to electricity grid infrastructure.

The study methodology developed as part of this project will inform future SEA-level heritage specialist assessment methodologies.

This RfP has been reviewed by the South African Heritage Resource Agency (SAHRA). The supplier must undertake the assessment in close collaboration with SAHRA as well as the relevant provincial heritage authorities to ensure that the outcomes of the study are accepted by these agencies and will be taken into consideration for future heritage authorisation and commenting in the pre-assessed areas. It is recommended that the supplier meet with appropriate representatives from these departments as part of conducting this assessment.

The heritage assessment needs to identify and consider cultural/historical, archaeological and paleontological resources and sensitivities and might, therefore, be undertaken by a team of relevant and experienced specialists. The heritage specialist/team of specialists will also have close interaction with, and provide inputs into the visual impact assessment study based on landscape character and features, including heritage features. Heritage data must be made available to the visual specialist by 8th May 2015.

The following documents give background and should be considered when developing an assessment methodology:
Minimum standards for undertaking the archaeological and paleontological component of heritage impact assessments;
Section 38(3) of the NHRA; and
Heritage polices and guidelines.

The following data sources should as a minimum be consulted as part of the study:

- South African Heritage Resources Information System (SAHRIS) inclusive of previous Heritage Impact Assessments undertaken in the area;
- Research papers related to the areas identified; and
- Archival research.

The aim of the assessment is to:

- Identify all declared heritage resources in the proposed corridors and determine the sensitivity of each heritage resource based on the potential impact of electricity grid infrastructure on each of these resources.
- Through a review of the information presented in the draft environmental constraints map together with the sourcing of additional heritage resource information, develop a consolidated sensitivity map of all sensitive heritage resource features identified for each of the corridors.
- Through a review of the draft environmental constraints map and Heritage Impact Assessments (together with SAHRA's responses to those assessments available on SAHRIS) provide an indication of the types of heritage resources likely to be prevalent within the corridors.
- Determine the extent and the comprehensiveness of information available on each corridor (and parts thereof) with respect to heritage resources.

- Describe what additional information and level of assessment is required in each sensitivity category before an authorisation with respect to heritage should be considered. This should be done separately for each corridor and/or sections of the corridor; and
- Assess the corridor in terms of the potential impacts of electricity grid infrastructure on heritage resources, taking cognizance of the relative sensitivity of these resources, and outline proposed management actions to enhance benefits and avoid/reduce/offset negative impacts.

It is important to note that the outputs from this study will be used to inform a planning document for electricity grid infrastructure development in the corridors. The study is not being undertaken to circumvent requirements of the National Heritage Resources Act relating to power line development and project level assessment. Rather, the aim is to inform and focus further heritage assessment requirements at a project level with respect to electricity grid infrastructure development in the corridors (i.e. serve as a scoping exercise).

The key deliverables and reporting requirements include:

- Study methodology;
- Data sources;
- Assumptions, limitations, confidence estimates;
- A map with, and description of heritage resources and features in each corridor. These heritage features and resources must be submitted for use in the visual impact assessment by 8th May 2015;
- Identify and report key heritage resource sensitivities (features) within each of the corridors, making use of datasets made available through the draft environmental constraints map and additional information sourced by the specialist[2].
- Develop an approach for classing each sensitivity feature according to a four- tiered sensitivity rating system i.e. Very High, High, Medium or Low[3].
- Provide the assessment criteria and assumptions behind the determination of sensitivity ratings for each sensitivity feature;
- Develop GIS based four-tiered consolidated sensitivity map of all sensitivity features identified through the assessment showing the location and spatial extent for each sensitivity feature and associated buffering, if any, for each of the corridors. The sensitivity rating should be illustrated according to the following coloration scheme: Dark Red/Very High, Red/High, Orange/Medium, Green/Low[4].
- A guideline on the interpretation and implementation of the four tier maps as well as permit requirements (where applicable) for each corridor. This section should also make recommendations on requirements for additional specialist studies (if any) within the different tiers of sensitivity specialist before an authorisation can be considered. Recommendations should be focused around the objective of streamlining without compromising environmental protection. This information will be incorporated into a Development Protocol that will ultimately govern development in the corridors; and
- General comments and discussion for each corridor on the nature of key potential impacts and proposed mitigation

[2] The sensitivity delineation should be undertaken in the context of all possible electricity grid infrastructures including transmission lines, distribution lines and substations.
[3] Sensitivities should be graded in relation to the ability to apply mitigation measures
[4] Where available, standardised and recognised sensitivity mapping methodologies should be used to determine sensitivities for each feature for each of the corridors.

5 APPROACH AND METHODOLOGY

5.1 Study Methodology

ASHA Consulting and CTS jointly undertook the drafting of the Specialist Report for the National Electricity Grid Infrastructure SEA for heritage. This report will assess the impact that the proposed electrical infrastructure may have on heritage resources. The nature of this impact is expected to be both physical and visual in nature. In both instances the integrity and significance of the heritage resources may be affected if an impact of these two natures occurs.

The main source of information was the data related to sites and Heritage Impact Assessments recorded on SAHRIS (South African Heritage Resources Information System). SAHRIS was set up by the South African Heritage Resources Agency in 2012 to act as the National Inventory required under S. 39 of the National Heritage Resources Act (NHRA). The aim of the system is to consolidate and coordinate the information on heritage resources (places and objects) which comprise the National Estate. This would include all site records held by Provincial Heritage Resources Authorities, universities, museums and archives around the country. Nic Wiltshire, the Director of CTS, was the developer of SAHRIS and is intimately familiar with the data thus far available in the system. This proved to be an important component of the project in establishing the reliability and accuracy of varying datasets.

Currently, the SAHRIS system includes records of:

- sites identified during research curated by the University of Cape Town and the KwaZulu-Natal Museum;
- all permit applications submitted to SAHRA after 2003. Details and documents for these applications have been captured by the Archaeology, Palaeontology and Meteorites Unit at SAHRA. Older permit applications have been digitised and uploaded to SAHRIS but have not yet been extracted into the relevant content types. The spatial data for these sites is being progressively organised and made available by CTS and SAHRA
- all heritage cases and heritage reports (including Heritage Impact Assessments) submitted to the South African Heritage Resources Agency from 1990 to the present, to Heritage Western Cape from 2004 to 2009, to Amafa KwaZulu-Natal from 2012 to the present and most cases for the Eastern Cape Provincial Heritage Resources Authority from 2011 to the present.

5.1.1 Previous Heritage Impact Assessments and Surveys

Most Heritage Impact Assessments previously undertaken within the area of the five corridors proposed for the SEA were considered and all heritage resources identified within these reports were extracted into SAHRIS and accurately mapped. Each Heritage Impact Assessment or permit report was also assessed in terms of survey coverage. The extent of the coverage was labelled in three categories, namely low, medium or high - this informed the subsequent determination of overall heritage sensitivity. Two different categories of coverage were considered, one for Heritage Impact Assessments (HIAs) excluding the palaeontological component, and one exclusively for Palaeontological Impact Assessments (PIAs). Once the PIAs and HIAs (excluding PIAs) were separately mapped and assessed, *combined coverage map*s were created by merging the coverage level for each polygon according to the lowest level of coverage/highest sensitivity. Each of these layers has been provided separately in the dataset to enable detailed analysis.

Coverage for HIAs excluding palaeontology

The coverage for Heritage Impact Assessments, excluding Palaeontological Impact Assessments, was divided as follows:

Low coverage (red) refers to:

- desktop studies where no field assessment of the area was undertaken.
- reports where the sites are listed and described but no GPS coordinates were provided.
- reports from the 1990s/early 2000s, with GPS coordinates with low accuracy ratings.
- reports where the entire property was mapped, but only a small/limited area was surveyed (less than 20%).
- reports on SAHRIS which are not properly mapped.

Medium coverage (orange) refers to:

- reports for which a field survey was undertaken but the area was not extensively covered. This may apply to instances where some impediments did not allow for full coverage, such as thick vegetation.
- reports for which the entire property was mapped, but only a specific area was surveyed thoroughly. This is differentiated from low ratings listed above when these surveys cover from 20% to 50% of the property.
- reports which are titled "Heritage Impact Assessment" but the team composition did not allow for an assessment of all necessary heritage components. An exception may be made for palaeontology, since the report may have been submitted separately and been assessed independently in terms of coverage.

High coverage (green) refers to:

- reports where the area highlighted in the map was extensively surveyed as shown by the GPS track coordinates and/or site distribution.
- permit reports and specific assessments (e.g. of one building or archaeological site).
- instances where the area is highly disturbed and no Heritage Impact Assessment would be necessary.

Coverage for Palaeontological Impact Assessments

Palaeontological Impact Assessments were also assigned a coverage based on the outcome of the study already undertaken:

Low coverage (red) refers to:

- at the end of the study (typically a desktop or scoping study) the palaeontologist recommended that a full Palaeontological Impact Assessment be done.

Medium coverage (orange) refers to:

- the palaeontologist recommended a chance finds procedure for construction activities.

High coverage (green) refers to:

- the area has been fully assessed and no further palaeontological studies are required, but monitoring and/or mitigation may be requested (this will be listed in the specific recommendations for each polygon).

5.1.2 Heritage sites

Heritage sites included in the Heritage Impact Assessments were extracted, created and uploaded on SAHRIS and this process served to increase the number of sites recorded on the system.
From the information available on the system, it appears that many of the sites previously uploaded to SAHRIS have not been formally graded or even assigned provisional grades (field ratings). This is because they had either been sourced from research surveys (e.g. the University of Cape Town) or simply had not had any provisional grades suggested during the impact assessments.

Grading of sites is necessary for heritage management as it is a legal requirement towards the formal protection of sites and informs the requirements for the management of generally protected sites. Where available, the grading level recommended by the relevant heritage practitioner was captured on SAHRIS. For ungraded sites the site type was used to assign a recommended grading level for this study. While we are aware that this will lead to over-sensitive levels in certain instances, there are few other practical options to process this very large dataset at present. It is expected that significance of sites graded this way was possibly overestimated but generally not underestimated. Structures are perhaps the most problematic in this regard because of the great variation in preservation of buildings, particularly in rural areas.

The grading of heritage sites which form part of the national estate is done according to S.7 of the National Heritage Resources Act (NHRA) as follows:

- (a) Grade I: Heritage resources with qualities so exceptional that they are of special national significance;
- (b) Grade II: Heritage resources which, although forming part of the national estate, can be considered to have special qualities which make them significant within the context of a province or a region; and
- (c) Grade III: Other heritage resources worthy of conservation, and which prescribes heritage resources assessment criteria, consistent with the criteria set out in section 3(3), which must be used by a heritage resources authority or a local authority to assess the intrinsic, comparative and contextual significance of a heritage resource and the relative benefits and costs of its protection, so that the appropriate level of grading of the resource and the consequent responsibility for its management may be allocated (…).

Any heritage site which is part of the national estate as defined in section 3 of the NHRA should be graded according to its significance. Grading has three associated components in South Africa, namely the geographical range of a site's significance outlined above (national, provincial/regional or local), the level of significance (high, medium of low) and the heritage authority with the delegated powers to manage the site. SAHRA is the national authority and manages Grade I sites only; PHRAs manage Grade II sites and Grade III sites. Only one municipality, the City of Cape Town Metropolitan Municipality, has obtained limited powers to manage Grade III resources from Heritage Western Cape.

Examples of Grade I (National Heritage Sites) include the Mapungubwe Cultural Landscape in Limpopo, the Parliament Buildings in Cape Town, the Sarah Baartman Burial Site in the Eastern Cape, Robert Sobukwe's grave in Graaff-Reinet, Lake Fundudzi and the Union Buildings and Voortrekker Monument in Pretoria.

Grade II sites are declared as Provincial Heritage Sites under S. 27 of the NHRA after the competent PHRA has established their significance. Many of the current Provincial Heritage Sites were declared as National Monuments under the previous heritage legislation. These sites were re-proclaimed as Provincial Heritage Sites when the National Heritage Resources Act came into effect in 1999. A total of about 3630 sites around the country have been declared as Provincial Heritage Sites. Most of the sites fall within the built environment such as the Castle of Good Hope in Cape Town. Some other examples include Mapoch's Caves in Limpopo, Umhlatuzana Rock Shelter in KwaZulu-Natal, Van der Stel's Copper Mine in the Northern Cape, the old Cemetery in Grahamstown, Eastern Cape and Baboon Point near Eland's Bay in the Western Cape.

Grade III sites have three subcategories according to their level of local significance. IIIa (high), IIIb (medium) and IIIc (low). These sites are significant at the local level and the type of mitigation allowed at these sites varies from destruction (IIIc) or extensive mitigation (IIIb) to general avoidance and minimal modification (IIIa).

Grade IIIa sites are of such a high local significance that they should be protected and retained. These sites should be included in the heritage register of each province as defined in S. 30 of the NHRA and should not be impacted upon. In the instance of buildings, any alteration must be regulated. All human remains are treated with high significance and therefore graves generally fall within this category. While relocation of graves is common practice, relocation should always be considered as the last resort. There are thousands of examples of IIIa buildings in Cape Town and KwaZulu-Natal while rock art sites, caves with archaeological deposits and fossil sites are commonly ascribed a minimum IIIa rating.

Grade IIIb sites are heritage resources rated with medium local significance. They should preferably be retained where possible, but, where developments cannot be realigned or moved, mitigation is normally allowed. Archaeological and palaeontological sites falling into this category include sites which cannot be sufficiently recorded or understood during a Phase 1 survey alone or which require dating, excavation and/or other techniques to analyse the sites. IIIb buildings have some significance and add certain heritage qualities to their immediate area. Developments are normally allowed at these sites as long as the essential heritage elements of these buildings are preserved in some meaningful way.

Grade IIIc sites are of low local significance. These resources must be recorded satisfactorily before destruction is allowed. In many instances the recording and description of the site undertaken during a Heritage Impact Assessment is sufficient and further recording or mitigation is not normally required. These sites include stone artefact scatters such as small stone knapping sites and palaeontological fossils of low significance which do not require recovery. In the case of the built environment, IIIc structures can normally be demolished unless the site contributes towards a series of sites or a conservation area.

There are two useful guides which explain the grading process in more detail:

- the Heritage Western Cape Short Guide to and Policy Statement on Grading issued in 2012[5]
- the SAHRA Minimum Standards for Archaeological and Palaeontological Impact Assessments issued in 2007[6].

A new Heritage Western Cape Guide to Gradings in terms of the NHRA is currently out for comment.
For the purposes of the dataset analysed for this report, the grading by type was assigned as follows for previously ungraded sites[7]:

- Burial Grounds and Graves: IIIa
- Rock Art: IIIa
- Monuments and Memorials: IIIa
- Shipwrecks: IIIa
- Settlements: IIIa
- Archaeological deposit: IIIb
- Palaeontological: IIIb
- Structures: IIIc
- Artefact scatters: IIIc

[5] https://www.westerncape.gov.za/other/2012/9/grading_guide_&_policy_version_5_app_30_may_2012.pdf
[6] http://www.sahra.org.za/sahris/sites/default/files/website/articledocs/ASG2-2%20SAHRA%20A%26PIAs%20MIN%20STDS%20Ph1-2%2016May07.pdf
[7]Note that CTS is working on a longer term project to grade the 'ungraded' sites in collaboration with the heritage authorities which will allow refinement of this methodology in the future.

The following buffer zones were implemented:

- World Heritage Sites (WHSs): as defined in the declaration
- National and Provincial Heritage Sites: 1km
- Grade I and Grade II sites nominated and graded by the heritage authorities but not yet declared: 1km
- Grade I and Grade II sites only assigned provisional gradings by the specialists: 1km (note these buffers are more flexible as the significance of the site has not received any official recognition)
- Grade IIIa sites: 150m. This is mostly related to Iron Age settlements, rock art and graves. This 150m buffer may be reduced at the discretion of the heritage authority once the position of the power line is decided (typically, for graves it could be lowered to 50m).
- Grade IIIb sites: 50m or appropriate mitigation
- Grade IIIc sites: no buffer zone since the sites have already been fully recorded and are of low significance[8].

The majority of the Provincial Heritage Sites were declared as National Monuments under the National Monuments Act of 1969. These sites are mainly buildings located within the urban edge of various towns and cities across the country.

5.1.3 Feature maps

Feature map for heritage excluding palaeontology

This map includes all features which were taken into consideration to create the four-tier sensitivity map. These features are:

- heritage sites (excluding palaeontological sites) with buffers as defined above
- specialist general knowledge
- natural features

Two specialists, Dr Jayson Orton and Mr Jaco van der Walt contributed to the mapping of the specialist general knowledge layer, which identified those areas which, on the basis of previous broader research and field experience of the specialists, were more likely to include heritage resources. Dr Orton focused on the Stone Age sensitivity mapping, while Mr van der Walt contributed the sensitivity mapping of the corridors in terms of Iron Age resources.

The choice of natural features was informed by the extensive field experience and background knowledge of the team, since these are often foci of prehistoric and historic settlement. This aspect of the methodology is broad-based and less granular when assessing the predicted heritage sensitivity of each area but we believe it is useful nonetheless, particularly in the drier parts of the country.

The following buffer zones were implemented for natural features with potential heritage sensitivity:

- Rivers, wetlands and pans: 100m
- Koppies, mountainous areas and coastlines: 1km

Feature map for palaeontology

This map included:

[8] It should be noted that grading can be subjective and that certain heritage authorities may take a different view on how to deal with buffering and/or mitigation on a case by case basis. We believe the guidelines set out here should generally work for most cases.

- palaeontological sites with buffers as indicated above
- SAHRIS palaeosensitvity map consisting of a range of six sensitivity levels and related recommendations.

Although general knowledge in terms of palaeontology is not included in the current map, conversations with Dr John Almond supported the use of the SAHRIS palaeosensitivity map as a primary source of information for recommendations to follow in terms of palaeontological heritage.

Combined feature map

The heritage feature map and the palaeontology feature map were then combined into one map to collate all features which were considered for the four-tier sensitivity map.

5.1.4 Four-tier sensitivity map

According to the terms of reference provided by the CSIR, all features included in the feature maps had to be graded from very high to low sensitivity in order to define specific requirements necessary during the development of electrical infrastructure. The purpose was to reduce requirements for additional work which would be necessary when applying for environmental authorisation through a NEMA process. Because of the nature of heritage resources and the length of many electrical developments, it is virtually impossible to reduce the scope of work for an HIA. For this reason the heritage four-tier sensitivity map did not directly relate to requirements in terms of heritage assessments, but mainly indicated the likelihood that further work would be necessary after a Heritage Impact Assessment is undertaken, therefore increasing costs and timeframes for the project. Thus, in green areas an HIA would most likely conclude with standard best practice recommendations while in red areas further research and/or mitigation work are more likely to be recommended as conditions of authorisation.

Four-tier sensitivity map for heritage without palaeontology

Given the large area included in the SEA Project, the number of sites recorded during surveys and Heritage Impact Assessments thus far completed around the country only represents a small sample of the anticipated level of heritage sensitivity in each corridor. As stated earlier, we therefore included specialist knowledge and certain geographical and physical landscape features.

Very high sensitivity (dark red)

Feature	Requirements and implications
All heritage sites (excluding palaeontological sites) graded I and II; all National and Provincial Heritage Sites (excluding palaeontological sites) with a 1km buffer and all World Heritage Sites with their defined buffer zone.	Proposed electrical infrastructure should avoid these areas. If avoidance cannot be achieved during the planning of routes an application for a permit under S. 27 of the NHRA will be required and a Heritage Impact Assessment would almost certainly be necessary.

High sensitivity (red):

Features	Requirements and implications
All heritage sites (excluding palaeontological sites) graded IIIa with a 150m buffer	These heritage resources are highly significant and they should be conserved. Burials may be relocated if necessary, provided approval is issued by the heritage authority.
Coastline with 1km buffer zone	There is a high probability of encountering highly significant heritage resources in these areas. A Heritage Impact Assessment is typically required. There is a high likelihood that the resources identified are of such significance that conservation or mitigation will be required.
Areas identified in the specialist knowledge sensitivity mapping as having a high likelihood of containing material of high significance.	There is a high probability of encountering significant heritage resources in these areas. A Heritage Impact Assessment is typically required. There is a high likelihood that the resources identified would be of such significance that conservation or mitigation would be required therefore increasing costs and possibly lengthening the time frame of the process.

Medium sensitivity (orange)

Features	Requirements and implications
All heritage sites (excluding palaeontological sites) graded IIIb with a 50m buffer	Heritage resources of medium significance (IIIb) have been recorded and buffered. A buffer zone of at least 50m must be implemented around these sites. If avoidance is not possible, a permit[9] will normally be required before impact and/or mitigation may occur.
Natural features: • All mountainous areas, hills and koppies indicated relative to the surrounding landscape, although it is acknowledged that significant archaeological sites can be associated with rock outcrops too small to have been captured here • All rivers with a 100m buffer zone • All pans with a 100m buffer zone	There is a medium probability of encountering significant heritage resources in these areas. A Heritage Impact Assessment is typically required. There is a high likelihood that if resources are identified, they would be of such significance that conservation or mitigation would be required therefore increasing costs and possibly lengthening the time frame of the process.
Areas identified in the specialist knowledge sensitivity mapping as having a high likelihood of containing material of medium significance.	There is a medium probability of encountering significant heritage resources in these areas. A Heritage Impact Assessment is typically required. There is a high likelihood that if resources are identified, they would be of such significance that conservation or mitigation would be required therefore increasing costs and possibly lengthening the time frame of the process.

[9]Note that Heritage Western Cape currently does not require 'permits' for generally protected heritage resources under the NHRA when developments trigger Section 38 of the NHRA. Instead, a work plan is required which is very similar to a permitting process.

Low sensitivity (green)

Features	Requirements and implications
All heritage sites (excluding palaeontological sites) graded IIIc	Heritage resources of low significance (IIIc) have been recorded sufficiently. No further work is required.
All remaining areas	There is a low probability of encountering significant heritage resources in these areas. A Heritage Impact Assessment is normally required, but it is not expected that developments in these areas would experience delays or additional costs due to significant heritage findings.

Four-tier sensitivity map for palaeontology

The palaeosensitivity map was recoded from 6 levels to three sensitivity levels that were compatible with the methodology used by the CSIR. Only formally declared or graded palaeontological sites were rated with very high sensitivity. A1-3-2 scheme was used (red = very high; orange = high, moderate, unknown; green = low and insignificant formations).

Very high sensitivity (dark red)

Features	Requirements
All palaeontological sites graded I and II; all National and Provincial Heritage Siteswith a 1km buffer and all World Heritage Sites with their defined buffer zone.	Proposed electrical infrastructure should avoid these areas. If avoidance cannot be achieved during the planning of routes an application for a permit under S. 27 of the NHRA will be required and a Heritage Impact Assessment would almost certainly be necessary.

High sensitivity (red)

Features	Requirements
All palaeontological sites graded IIIa with a 150m buffer	These heritage resources are highly significant and they should be conserved. If avoidance cannot be achieved during the planning of routes a Palaeontological Impact Assessment would almost certainly be necessary.
Formations of very high sensitivity in the SAHRIS palaeosensitivity map	Field assessment during the Palaeontological Impact Assessment and further work in the form of monitoring and/or mitigation may well be recommended.

Medium sensitivity (orange)

Features	Requirements
All palaeontological sites graded IIIb with a 50m buffer	Heritage resources of medium significance (IIIb) have been recorded and buffered. A buffer zone of at least 50m must be implemented around these sites. If avoidance is not possible, a permit will normally be required before impact and/or mitigation may occur.
Formations of high, moderate and unknown sensitivity in	A PIA desktop would be required for formations of high,

the SAHRIS palaeosensitivity map	unknown and moderate sensitivity.

Low sensitivity (green)

Features	Requirements
All palaeontological sites graded IIIc	These sites have been sufficiently recorded and may be impacted upon without further requirements being implemented.
Formations of low and insignificant sensitivity in the SAHRIS palaeosensitivity map	Formations of low sensitivity require a palaeo chance find procedure in the EMP.

Combined four-tier sensitivity map

The two four-tier sensitivity maps were combined into a single map in which the layer with the highest sensitivity rating was selected as the dominant score. Specific requirements and implications for palaeontology and other heritage would need to be assessed separately by looking at the individual maps.

5.1.5 Coverage map

The coverage map accounts for areas previously surveyed during Heritage Impact Assessments. It combines sites, coverage of surveys already undertaken and the palaeontological sensitivity map to anticipate the requirements of further heritage assessments. Since the level of coverage was categorised in three levels (high, medium and low), very high sensitivity only applies to sites and areas which are formally protected. We therefore included the site layer in this map so that all four sensitivities could be displayed. In instances in which two reports of the same type were produced for the same survey polygon, the one with the lowest coverage was chosen for the final combined coverage map.

Coverage map 1 - Heritage without palaeontology

Very high sensitivity (dark red)

Feature	Requirements
All heritage sites (excluding palaeontological sites) graded I and II; all National and Provincial Heritage Sites (excluding palaeontological sites) with 1km buffer and all World Heritage Sites with their defined buffer zone.	Proposed electrical infrastructure should avoid these areas. If avoidance cannot be achieved during the planning of routes an application for a permit under S. 27 of the NHRA will be required and a Heritage Impact Assessment would almost certainly be necessary.

High sensitivity (red)

Features	Requirements
All heritage sites (excluding palaeontological sites) graded IIIa with a 150m buffer	These heritage resources are highly significant and they should be conserved. Burials may be relocated if necessary, provided approval is issued by the heritage authority.
Previous surveys with low coverage	A Heritage Impact Assessment is necessary.
Base layer of unsurveyed areas	A Heritage Impact Assessment is necessary.

Medium sensitivity (orange)

Features	Requirements and implications
All heritage sites (excluding palaeontological sites) graded IIIb with a 50m buffer	Heritage resources of medium significance (IIIb) have been recorded and buffered. A buffer zone of at least 50m must be implemented around these sites. If avoidance is not possible, a permit[10]would normally be required before impact and/or mitigation may occur.
Previous surveys with medium coverage	A Heritage Impact Assessment is necessary covering certain components. The new field assessment must address any issues identified in the previous reports, such as: - lack of surface visibility (it may be recommended that the specialist monitors the area during vegetation clearing) - lack of expertise in the previous team - limited assessment of the area

Low sensitivity (green):

Features	Requirements
All heritage sites (excluding palaeontological sites) graded IIIc	Heritage resources of low significance (IIIc) have been recorded sufficiently. No further work is required.
Previous surveys with high coverage	The areas have already been assessed and surveyed in detail. A specialist must be consulted at the planning phases. A walk-down of the electrical infrastructure may be necessary.

Coverage map 2 - Palaeontology

This map is similar to the four-tier sensitivity map with the addition of the layer related to previous palaeontological surveys.

Very high sensitivity (dark red)

Features	Requirements
All palaeontological sites graded I and II; all National and Provincial Heritage Sites with a 1km buffer and all World Heritage Sites with their defined buffer zone.	Proposed electrical infrastructure should avoid these areas. If avoidance cannot be achieved during the planning of routes an application for a permit under S. 27 of the NHRA would be required and a Heritage Impact Assessment would almost certainly be necessary.

[10]Note that Heritage Western Cape currently does not require 'permits' for generally protected heritage resources under theNHRA when developments trigger Section 38 of the NHRA. Instead, a work plan is required which is very similar to a permitting process.

High sensitivity (red)

Features	Requirements
All palaeontological sites graded IIIa with a 150m buffer	These heritage resources are highly significant and they should be conserved. If avoidance cannot be achieved during the planning of routes a Palaeontological Impact Assessment would almost certainly be necessary.
Previous surveys with low coverage	Palaeontological Impact Assessment inclusive of field assessment
Formations of very high sensitivity in the SAHRIS palaeosensitivity map	Palaeontological Impact Assessment inclusive of field assessment and/or monitoring

Medium sensitivity (orange)

Features	Requirements
All palaeontological sites graded IIIb with a 50m buffer	Heritage resources of medium significance (IIIb) have been recorded and buffered. A buffer zone of at least 50m must be implemented around these sites. If avoidance is not possible, a permit will normally be required before impact and/or mitigation may occur.
Previous surveys with medium coverage	A palaeo chance find procedure must be included in the EMP.
Formations of high, moderate and unknown sensitivity in the SAHRIS palaeosensitivity map	A PIA desktop would be required for formations of high, unknown and moderate sensitivity.

Low sensitivity (green)

Features	Requirements
All palaeontological sites graded IIIc	These sites have been sufficiently recorded and may be impacted upon without further requirements being implemented.
Previous surveys with high coverage	No further studies are necessary. A palaeo chance find procedure must be included in the EMP.
Formations of low or insignificant sensitivity in the SAHRIS palaeosensitivity map	No further studies are necessary. A palaeo chance find procedure must be included in the EMP.

Combined coverage map

The two layers described above were merged into a *combined survey coverage sensitivity map* by identifying overlapping polygons where HIAs and PIAs had been done. The polygon with the lowest coverage/highest sensitivity rating was selected as the dominant score. The base layer for the HIAs excluding palaeontology was replaced by recoding the palaeosensitivity map according to a 4-2-0 scheme (red =very high, high, moderate, unknown; orange = low and insignificant formations, green = not applicable). This means that the palaeontological component of the HIA process has been screened out in areas of orange (medium) sensitivity, leaving only certain components of the HIA to be completed (built environment, archaeology etc).

5.1.6 Heritage screeners

To retain a meaningful level of detail in the assessment of heritage resources, the team divided each corridor into segments of approximately 10 000km^2. This allowed the specialists to provide more detailed descriptions of the heritage character of each area and to provide more specific recommendations for each segment in terms of the heritage requirements necessary for each segment.

The segments have been coded and described in the data pack as follows:
Western Corridor, WC01 – WC05, 5 segments
Central Corridor, CC01 – CC14, 14 segments
Northern Corridor, NC01 – NC11, 11 segments
International Corridor, IC01 – IC05, 5 segments
Eastern Corridor, EC01 – EC10, 10 segments

Total number of segments = 45

A separate screening and sensitivity document for each of these segments was compiled to provide:

- recommendations for managing heritage resources affected by proposed developments of electrical infrastructure within the segment
- satellite image of the study area
- map of cultural Heritage Impact Assessments undertaken in the segment (archaeology, built environment, visual, other heritage)
- map of Palaeontological Impact Assessments undertaken in the segment
- palaeosensitivity map of the segment
- map of sites recorded thus far in the segment denoted by grading level and site category
- short heritage statement and character of the area
- list of references related to heritage surveys and work in the segment

After considering the information available for each segment, each segment was assigned an overall colour:

Red recommendations:

- the information available for this segment is minimal and it is expected that Heritage Impact Assessments will be required in most proposed areas for development.

Orange recommendations:

- the information available for this segment provides the ability to characterize the expected heritage resources sufficiently but ground truthing during surveys will be required in certain areas of the segment or a Palaeontological Desktop study is required.

Green recommendations:

- a significant portion of the segment has been studied in detail. The information available is sufficient to establish, with confidence at a desktop level, where proposed power lines may impact on significant heritage resources. These segments provide planners with a much greater degree of confidence in deciding routes which minimize the impact on heritage resources.

5.2 Data Sources

Data title	Source and date of publication	Data Description
SAHRIS	2012 onwards with records dating back to the 19th century	Online South African national heritage management system. Very large archive of digitised Heritage Impact Assessments and other data. Single references of each report taken from SAHRIS will be provided in the list of references at the end of each segment
Palaeosensitivity Map (PSM) / Fossil Heritage Layer Browser	SAHRA & The Council for Geoscience, October 2014, accessed on SAHRIS	Significance of geological formations based on the CGS 1:250 000 geological formations of South Africa
eCRAG	Eastern Cederberg Rock Art Group, part of the Western Cape branch of the South African Archaeological Society, 2007 onwards	Site records compiled by professional archaeologists and volunteers led by Dr Janette Deacon
KZN Museum	KwaZulu-Natal Museum sites database	Site records compiled by professional archaeologists working at the KZN Museum in Pietermaritzburg
UCT Spatial Archaeology Research Unit (SARU)	University of Cape Town, 1960 - 2015 accessed on SAHRIS	Site records compiled by students and staff of the Department of Archaeology at the University of Cape Town
CSIR EGI SEA Shapefiles	CSIR 2015	Shapefiles supplied by CSIR
Strategic Environmental Assessment for Wind and Solar Photovoltaic Energy in South Africa – Appendix 3 Heritage Scoping Assessment Report	CSIR, Confidential draft. 2014	Information on heritage included in Focus areas falling within the five corridors of the proposed Electrical Grid Infrastructure SEA

5.3 Assumptions and Limitations

Limitation	Included in the scope of this study	Excluded from the scope of this study	Assumption
Data availability.	Heritage Impact Assessments and research data on SAHRIS were used but a large amount of published and unpublished data has not been uploaded to SAHRIS.	Field verification of datasets and outcomes, and extensive local expert consultation. Because it is so widely scattered, data from published work would have required several years to extract and could therefore not be consulted.	Assessments undertaken by the heritage practitioners are correct and a reliable description of what was identified on site. Data collected from impact assessment reports comprise the majority of the data potentially available.
Limited site extraction time - SAHRIS issues.	We aimed for at least a 50 % minimum extraction rate for reports identified in each corridor. In almost all corridors we managed to achieve 70% or higher.	We had to stop extraction at a certain cut off date in order to provide enough time to process the data.	The data extracted will be a representative sample of each of the areas concerned. More extraction will lead to better coverage and density of identified heritage resources. This is an ongoing process.
PAIA application submitted to HWC on the 12th of March was only approved in April. The requested digital reports are currently still being prepared by HWC.	Most of the data from the Western Cape came from reports dating between 1990 and 2009. A large amount of data from this period was processed for inclusion in the SEA.	The majority of HIAs from the Western Cape between 2010 and 2015 could not be consulted.	The data extracted will be a representative sample of the province's heritage resources. Once we receive these newer reports, future screening will be more reliable in certain areas of the Western Cape.
Fossil heritage browser does not match the palaeosensitivity map for certain formations.	The PSM and the fossil heritage browser were used for assessment as they are informed by each other.	Further field assessment and/or desktop work to verify and correct the sensitivity levels described in the fossil heritage browser.	The fossil heritage layer browser is not updated according to the palaeosensitivity map on SAHRIS. Frequent discrepancies are recorded between the two. Since the palaeosensitivity map contains the most updated information, the colour of the map takes precedence over the sensitivity defined in the fossil heritage browser. These discrepancies mostly occur in the Northern Cape, Western Cape and Eastern Cape.

5.4 Relevant Regulatory Instruments

Instrument	Key objective	Feature
International Instrument		
Unesco Convention on the Protection of World Cultural and Natural Heritage, 1972 (applicable in all corridors)	Protection of natural and cultural heritage sites which demonstrate importance for all the peoples of the world	Declared WHSs: Mapungubwe Cultural Landscape Fossil Hominid Sites of South Africa (also known as the Cradle of Humankind) Vredefort Dome Robben Island Cape Floral Region Protected Areas[11]
National Instrument		
National Heritage Resources Act 25 of 1999 (applicable in all corridors)	Identification, management, protection, conservation and promotion of the national heritage resources within the country	All heritage sites except for World Heritage Sites
National Environmental Management: Protected Areas Act 57 of 2003	Protection and conservation of ecologically viable areas representative of South Africa's biological diversity and its natural landscapes and seascape	World Heritage Sites
Integrated Coastal Management Act 24 of 2008	Promotion, conservation and sustainable development of the coastal environment	Heritage sites within 1km of the coastline
National Environmental Management Act 107 of 1998	Environmental governance within the country	Heritage sites identified during the environmental process
Provincial Instrument		
KwaZulu-Natal Heritage Act 4 of 2008 (applicable in that part of the Eastern Corridor falling within KZN)	Conservation, protection and administration of both the physical and the living or intangible heritage resources of the Province of KwaZulu-Natal	Heritage sites falling within the boundaries of KZN

[11]The Cape Floral Region Protected Areas is declared as a 'natural' heritage site by Unesco but it is not subjected to the same treatment as other heritage sites in South Africa by Heritage Western Cape and SAHRA.

6 CORRIDOR DESCRIPTION

Site	Brief description
Western Corridor	This corridor was divided into five segments (WC01 to WC05). The southernmost segment of the Western Corridor along the West Coast (WC05) has been extensively studied and data is readily available. The main characteristics of this corridor include: • The abundance of shell middens along the coastline, possibly with associated unmarked graves • The abundance of rock art sites and Stone Age archaeological deposits in the Cederberg mountains • The high concentration of PHSs (formerly National Monuments) found in historic towns of the Western Cape • Clear gaps creating unknowns/less predictability due to the paucity of surveys conducted in the northern segments of this corridor • Very highly significant archaeological sites such as Baboon Point, Diepkloof, Paternoster North Site A and Elandsfontein are found near the coast. • Most PHSs are buildings which are within the urban edges of towns and cities
Northern Corridor	This corridor was divided into eleven segments (NC01 to NC11). Most of the corridor has not been surveyed yet. The majority of the Heritage Impact Assessments undertaken in these segments are related to mining and the development of renewable energy facilities which have become increasingly common in the last 5 years. The main characteristics of this corridor include: • Abundant Stone Age material is easily recorded in this corridor. This is due to high visibility from a lack of vegetation cover in this arid region and the fact that large areas have experienced sheet erosion over many millennia • Highly sensitive areas occur along the coastline where shell middens are abundant • There are relatively fewer built environment sites due to low population density • Important sites: Kathu Archaeological Complex, Wonderwerk Cave • Iron Age sites in North West/Gauteng • Burial grounds and graves (mostly unmarked)
International Corridor	This corridor was divided into five segments (IC01 to IC05). Most of this corridor, specifically segments IC02, 03 and 04, have not been studied in detail. The main characteristics of this corridor include: • Various Iron Age sites of high to very high significance. • Large numbers of rock art sites in the various mountainous areas • Mapungubwe Cultural Landscape (WHS and NHS) • Makapansgat (NHS), part of the Fossil Hominid Sites (also known as the Cradle of Humankind) (WHS) of South Africa

	• 21 Provincial Heritage Sites are recorded in this corridor. A few of them are structures, buildings and monuments within urban boundaries. Amongst the other PHSs are Tjate Living Heritage Site, Mapoch's Cave, the Dwars River Geological Occurrence, the First Gold Crushing Site and Plant in Eersteling, Verdun Ruins, Baobab Trees and Machemma Ruins. • High number of graves encountered during construction and mining activities which often lead to extensive delays and protracted negotiations with the affected communities
Central Corridor	This corridor was divided into fourteen segments (CC01 to CC14) The Cape Town (CC01) and Johannesburg (CC14) metropolitan areas are both included in this corridor - these fall within two segments of this corridor which have been surveyed and studied in detail. The main characteristics of this corridor include: • WHS of the Fossil Hominid Site (Cradle of Humankind) of South Africa inclusive of 12 NHSs (in Gauteng and North West) • Robben Island NHS and WHS • Numerous PHSs, mainly located within the urban edge of towns and cities • Relatively little heritage work undertaken in the central segments of this corridor (or data is not currently available).
Eastern Corridor	This corridor runs from the mountain ranges above Graaff-Reinet to the Durban coastline, covering a total of 10 segments (EC01 to EC10). The main characteristics of this corridor include: • The presence of numerous rock art sites (both identified and anticipated) mainly in mountainous areas • Numerous (about 200) Provincial heritage sites within the town of Graaff-Reinet and a few others within the urban edges of other towns • Numerous unmarked burial grounds • High amount of data available for segments in KwaZulu-Natal: shell middens along the coast, numerous graded and ungraded buildings older than 60 years, rock art and Iron Age settlements • Various important battlefields • High number of significant fossil sites

7 FEATURE SENSITIVITY MAPPING

7.1 Identification of feature sensitivity criteria

Sensitivity Feature Class	*Data Source + Date of Publications*	*Data Description, Preparation and Processing*	*Relevant Corridors*
Sites	Amafa's records uploaded to SAHRIS	Some of the sites related to buildings recorded by Amafa on SAHRIS are incorrectly mapped. All Grade I and II sites have been corrected but the total number of records is 3526 sites. It was not possible to check the coordinates for every single site. When working in KwaZulu-Natal caution must be paid to the level of accuracy for certain Grade III sites.	Eastern Corridor
Sites	KZN Museum	Over 6000 archaeological and palaeontological sites have been uploaded by the KZN Museum to SAHRIS. The RAMP (Rock Art Mapping Project) significantly improved the mapping of these sites in certain areas but some sites still require moderation.	Eastern Corridor
Sites	eCRAG	The sites captured by eCRAG are highly accurate as they have gone through various rounds of moderation by their members. They provide some of the most reliable records on SAHRIS.	Western Corridor
Sites	University of Cape Town	Most of the sites recorded by the Spatial Archaeology Unit are accurately mapped. However, some were mapped pre-GPS on 1:50 000 topographical maps. These sites are therefore not accurate to more than 50m in some instances.	Western Corridor
Sites	SAHRIS HIAs	The HIAs are highly variable and span a period of over 25 years. The standards and methods of recording have shifted and this has to be taken into account when interpreting the data. Over 8300 additional sites were extracted, mapped and moderated on SAHRIS by CTS; these have been made available to the SEA Project.	All corridors
Sites	Umlando Sites	Almost 2000 sites uploaded to SAHRIS from CRM and research work carried out by Gavin Anderson do not have the associated documentation (HIAs) on SAHRIS. CTS has recently obtained copies of these reports so that they can be uploaded to SAHRIS. This helps to contextualize the sites recorded in various areas.	Eastern Corridor

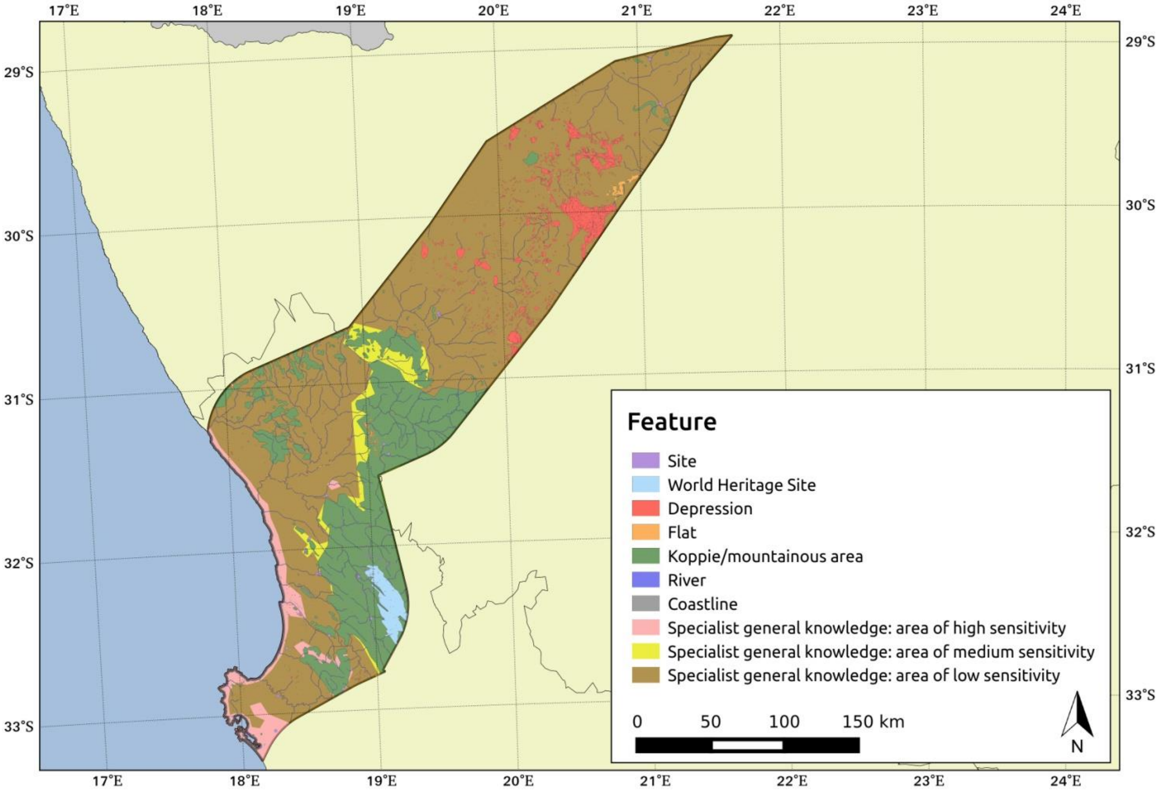
Sites	Declared sites from SAHRA	About 3600 sites have been declared as Provincial or National Heritage Sites. The majority of these were former National Monuments. SAHRA improved the mapping of these sites from 2012-2014 but inaccuracies are still found from time to time given the fact that the extraction and linking of the SAHRA registry is a long term project.	All corridors
World Heritage Sites and related buffer zones	CSIR 2015	World Heritage sites within the five corridors. The core and buffer zones were rated as having very high significance.	All corridors
Rivers	CSIR 2015	Rivers included in the shapefile provided by SANBI. A buffer zone of 100m was added to each river.	All corridors
Depressions (natural)	CSIR 2015	Natural depressions included in the shapefile provided by SANBI. A buffer zone of 100m was added to each pan.	All corridors
Flat (natural)	CSIR 2015	Naturally flat areas included in the shapefile provided by SANBI. A buffer zone of 100m was added to each pan/wetland.	All corridors
Koppies and mountainous areas	CSIR 2015	Koppies and mountainous areas included in the shapefiles provided by SANBI. A buffer zone of 1km was added to these features.	All corridors
Coastlines	CSIR 2015	Coastline areas included in the shapefiles provided by SANBI. A buffer zone of 1km was added to these features.	Western Northern, Easter, Central corridors.

Corridor	Feature Class	Feature Class Sensitivity	Buffer Distance Sensitivity
All Corridors	*World Heritage Sites*	*Very High*	*Buffer zone of WHS*
	Grade I sites	*Very High*	*1km: Very high*
	Grade II sites	*Very High*	*1km: Very high*
	Grade IIIa sites	*High*	*150m: High*
	Grade IIIb sites	*Medium*	*50m: Medium*
	Grade IIIc sites	*Low*	*No buffer: Low*

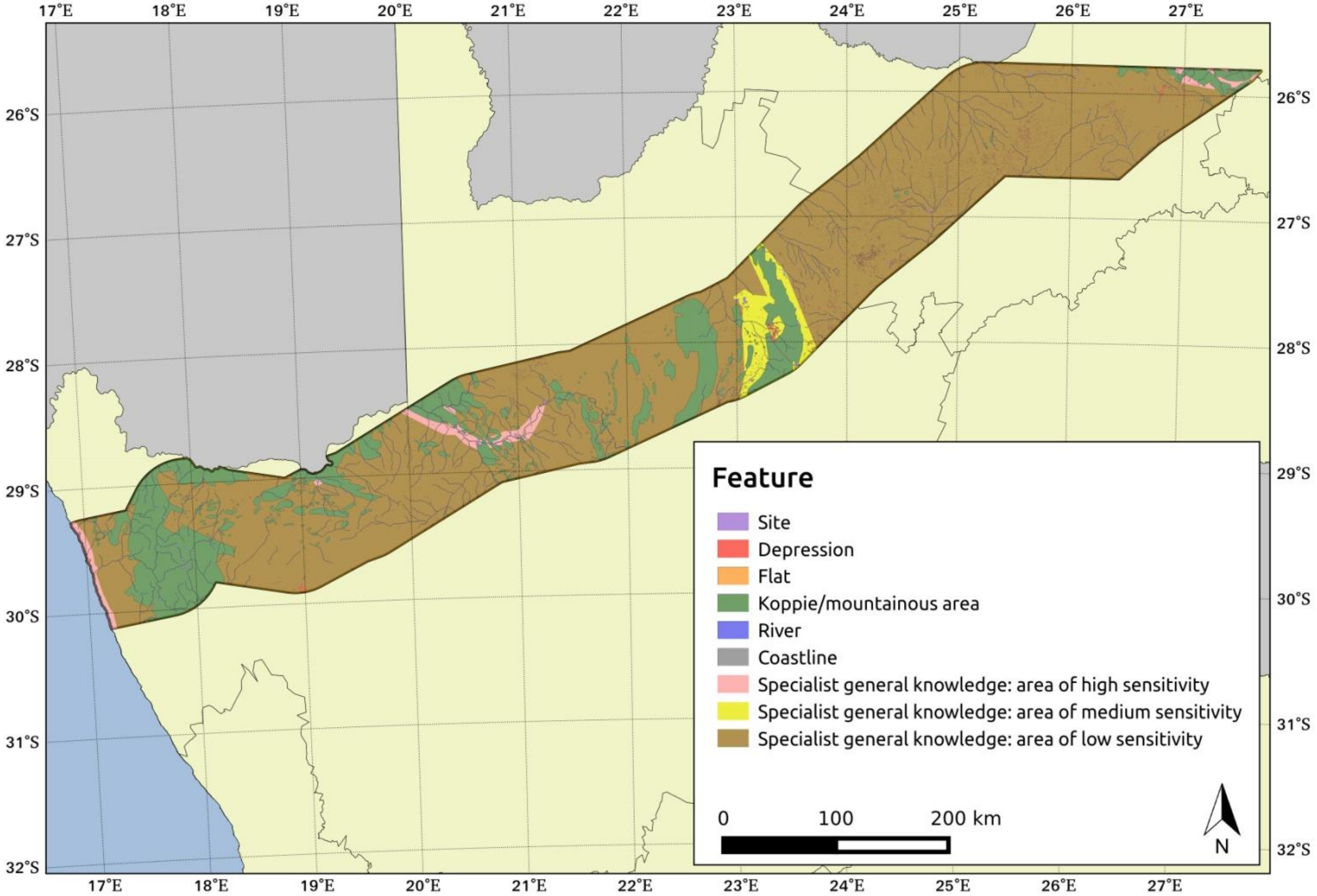
7.2 Feature maps

7.2.1 Heritage without palaeontology

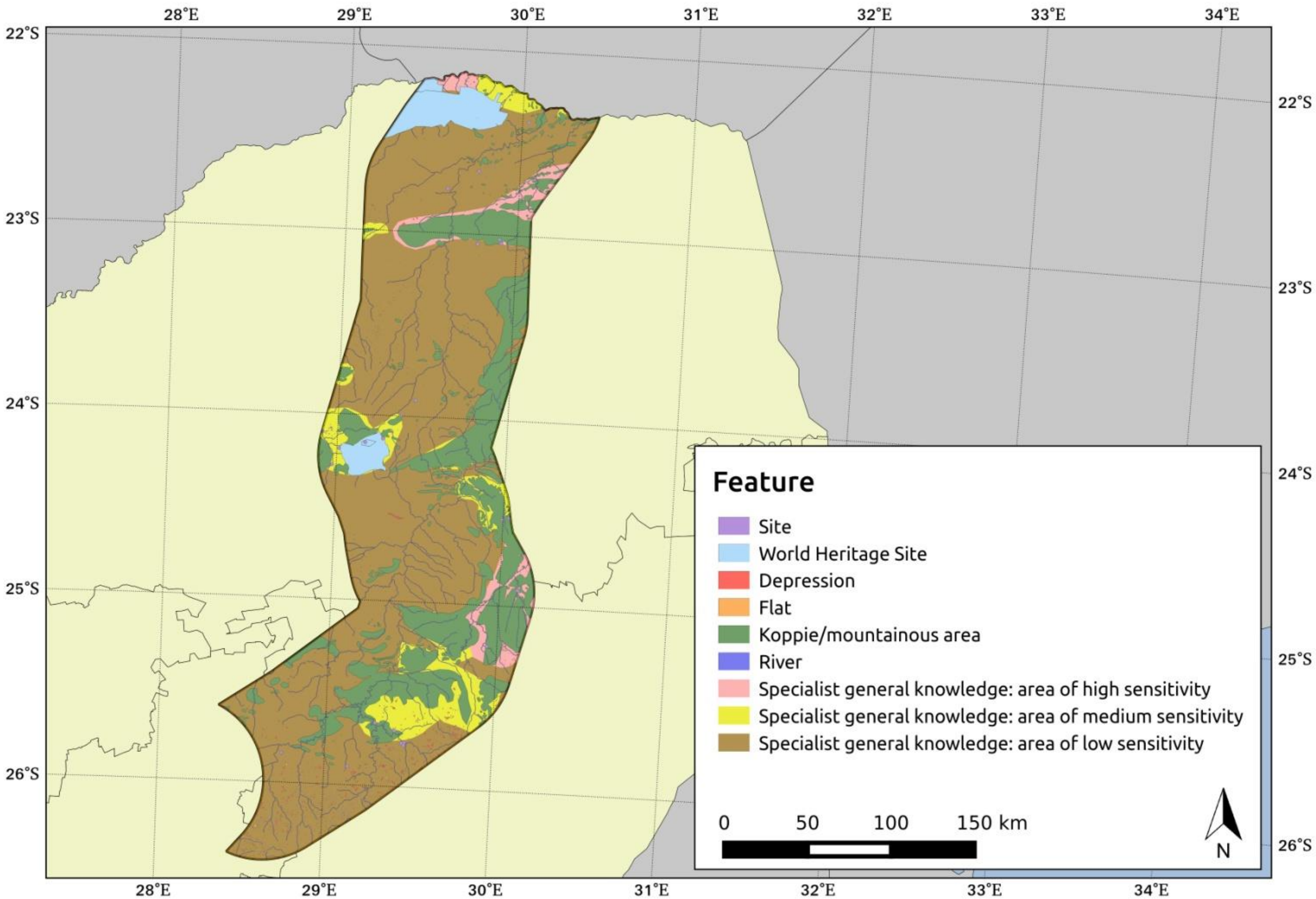
7.2.1.1 Western Corridor



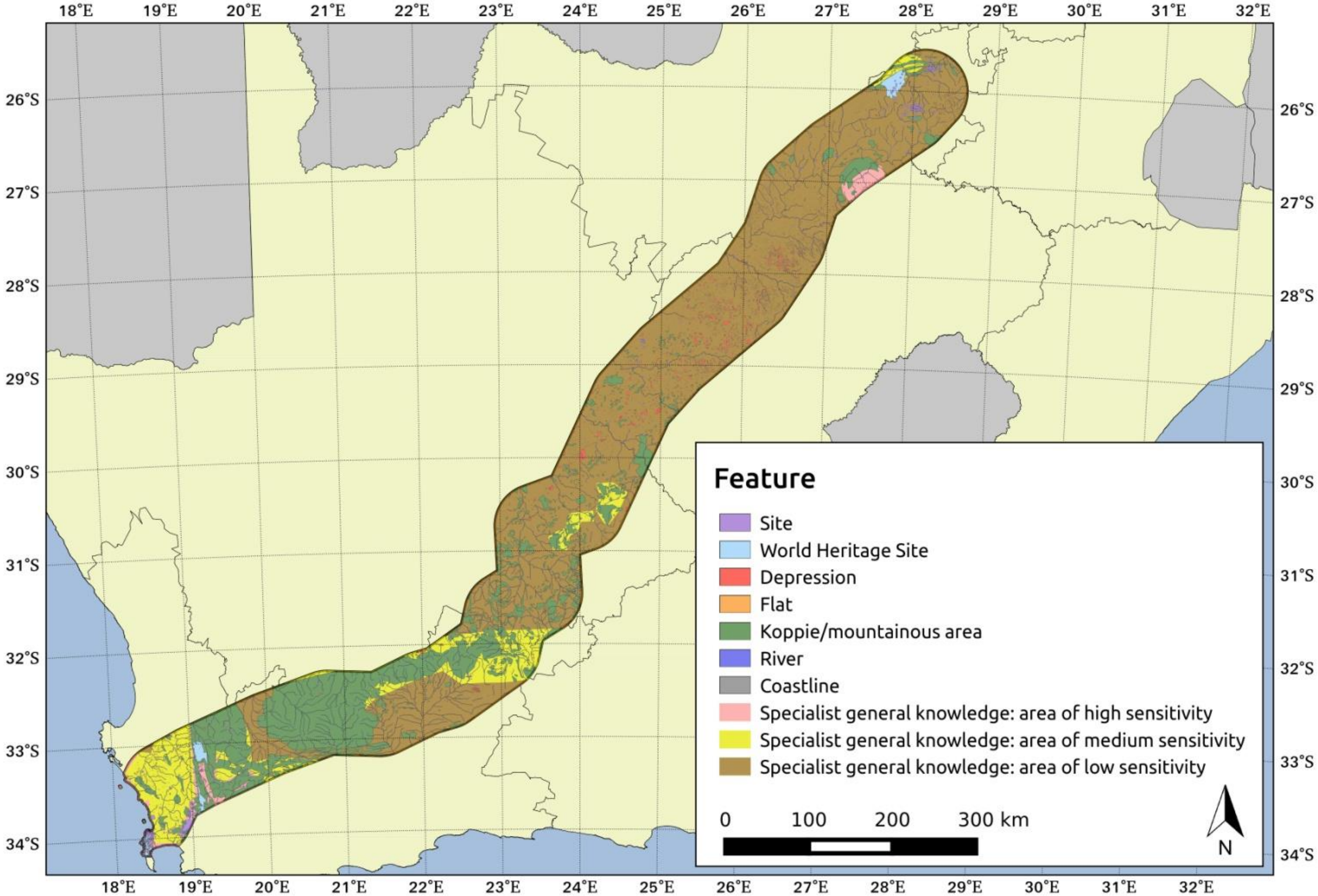
7.2.1.2 Northern Corridor



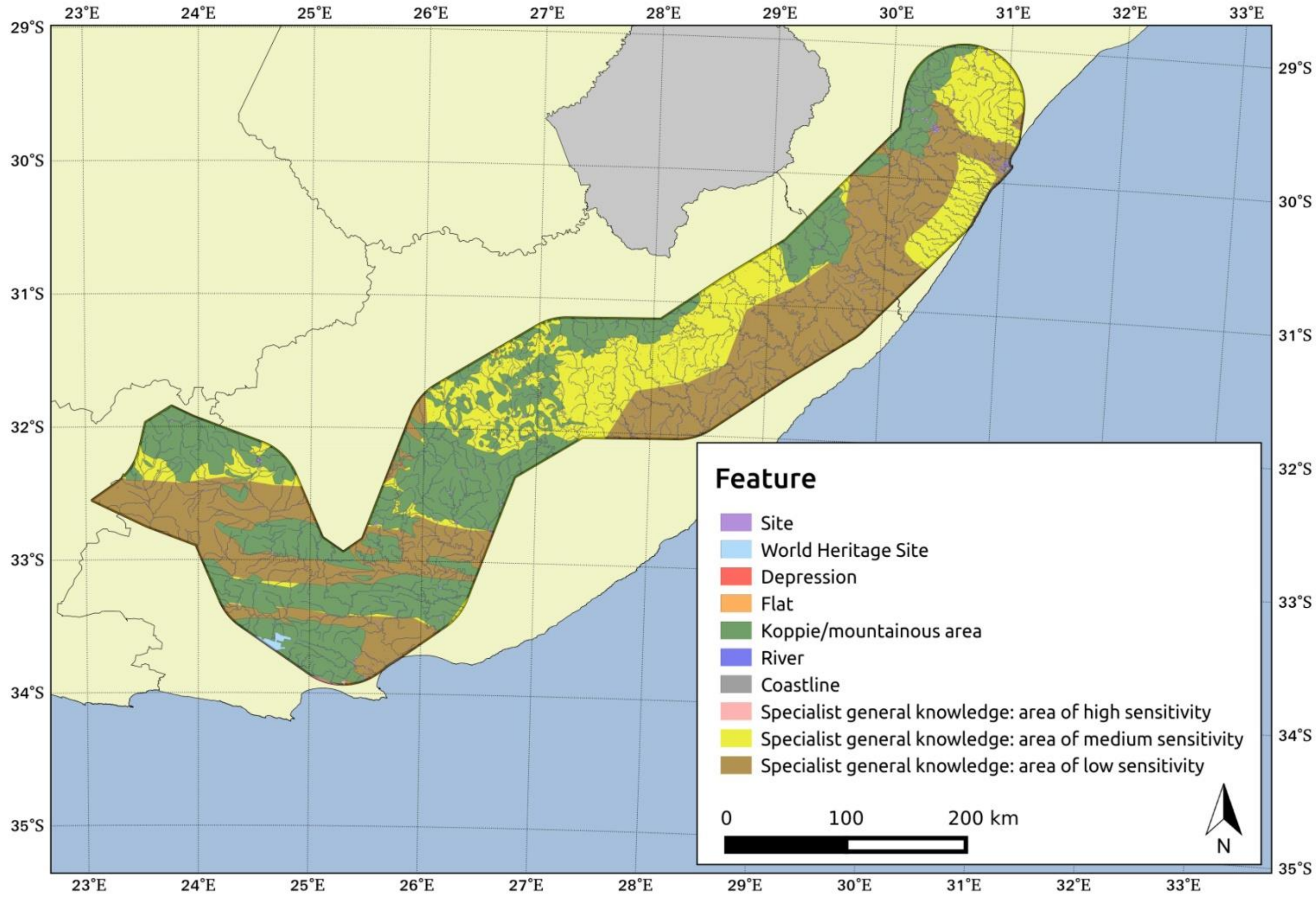
7.2.1.3 International Corridor



7.2.1.4 Central Corridor

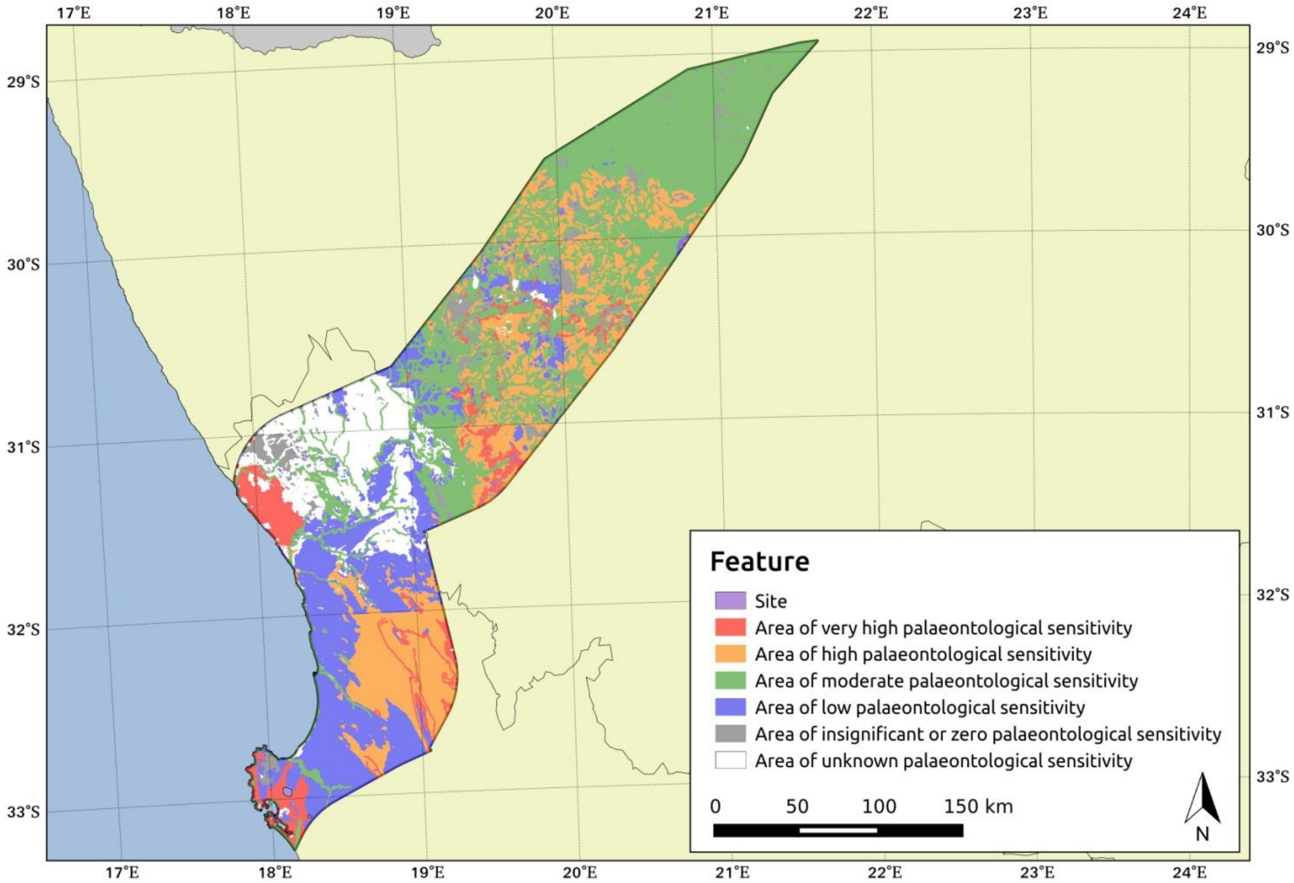


7.2.1.5 Eastern Corridor



7.2.2 Palaeontology

7.2.2.1 Western Corridor



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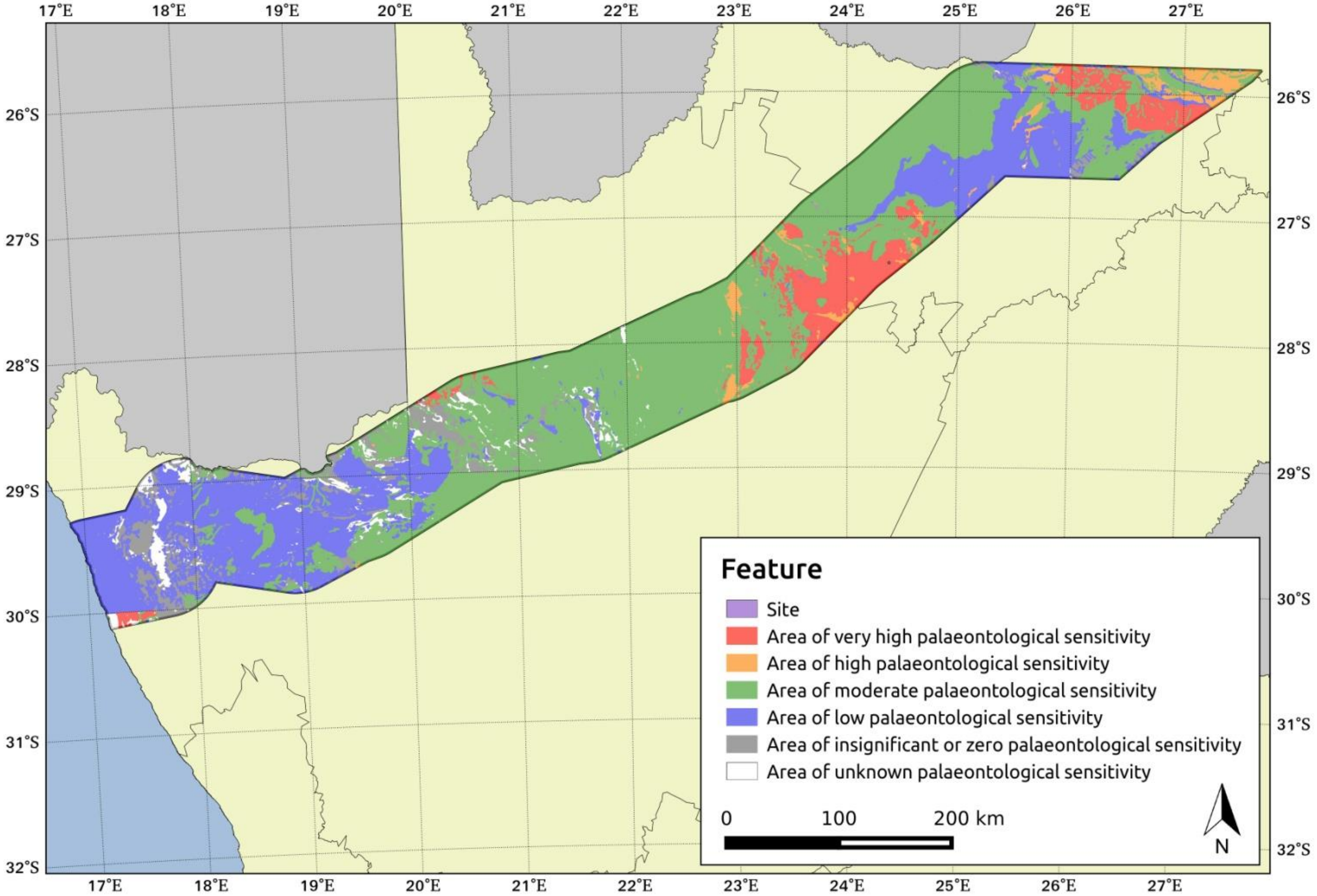
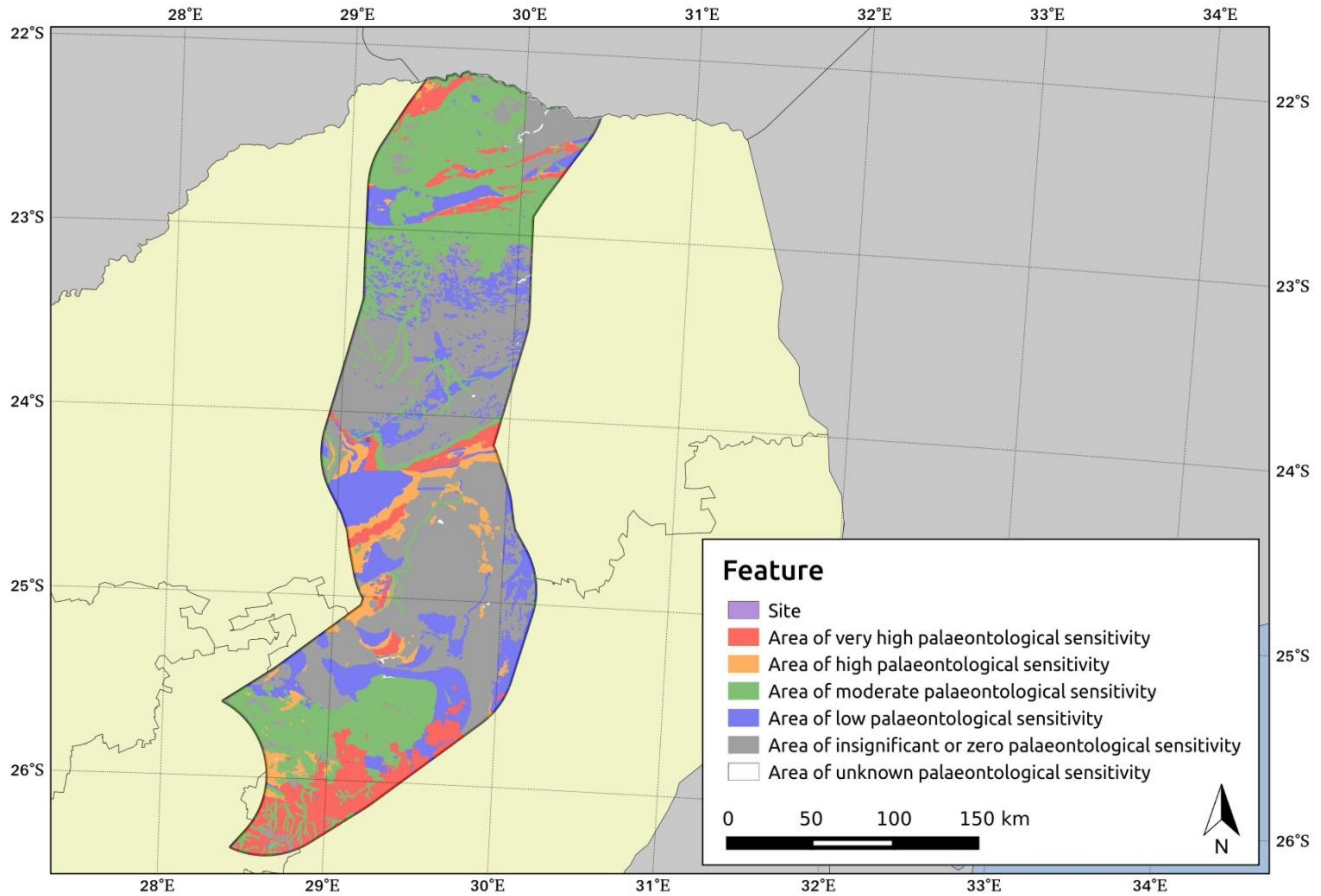
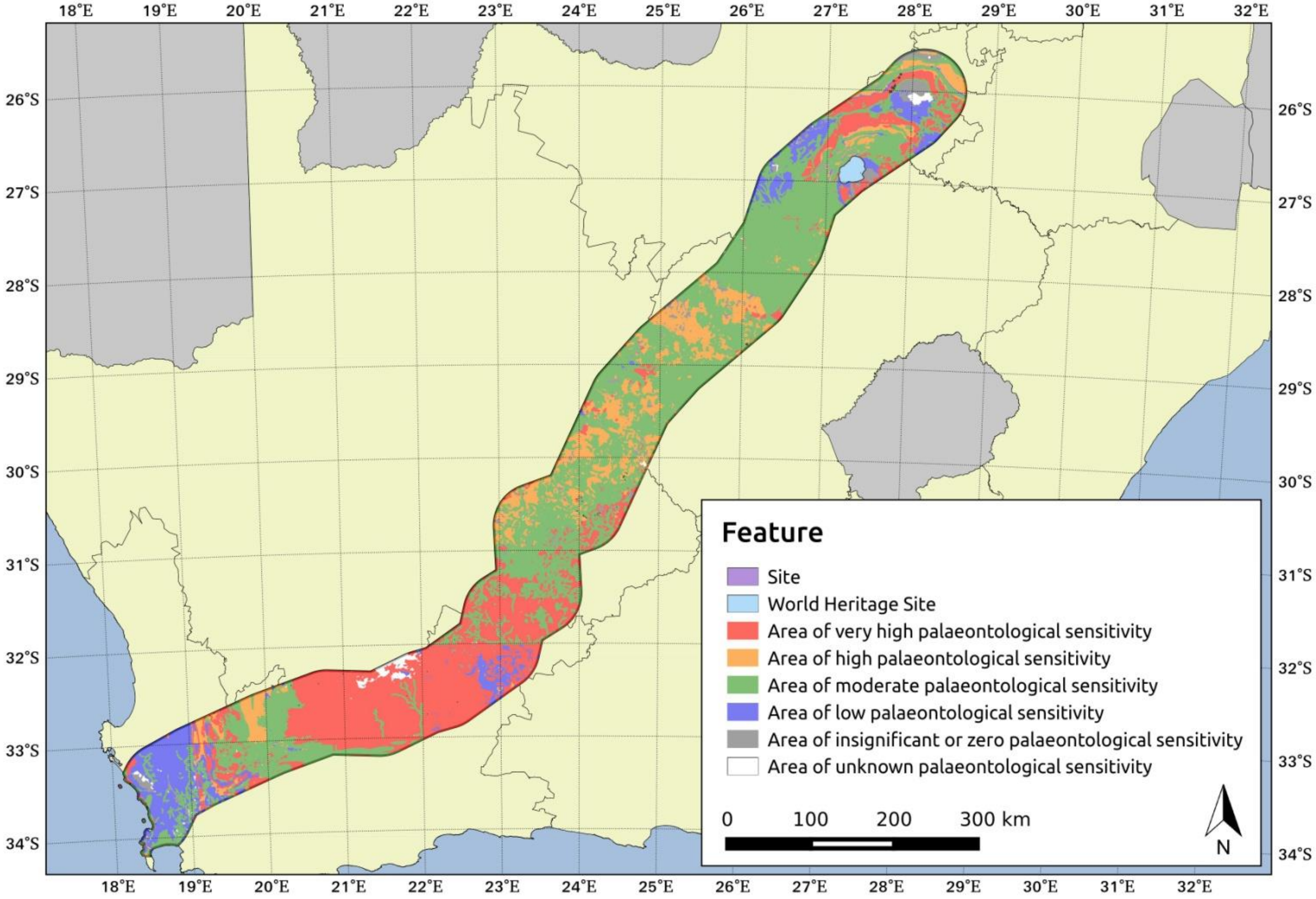


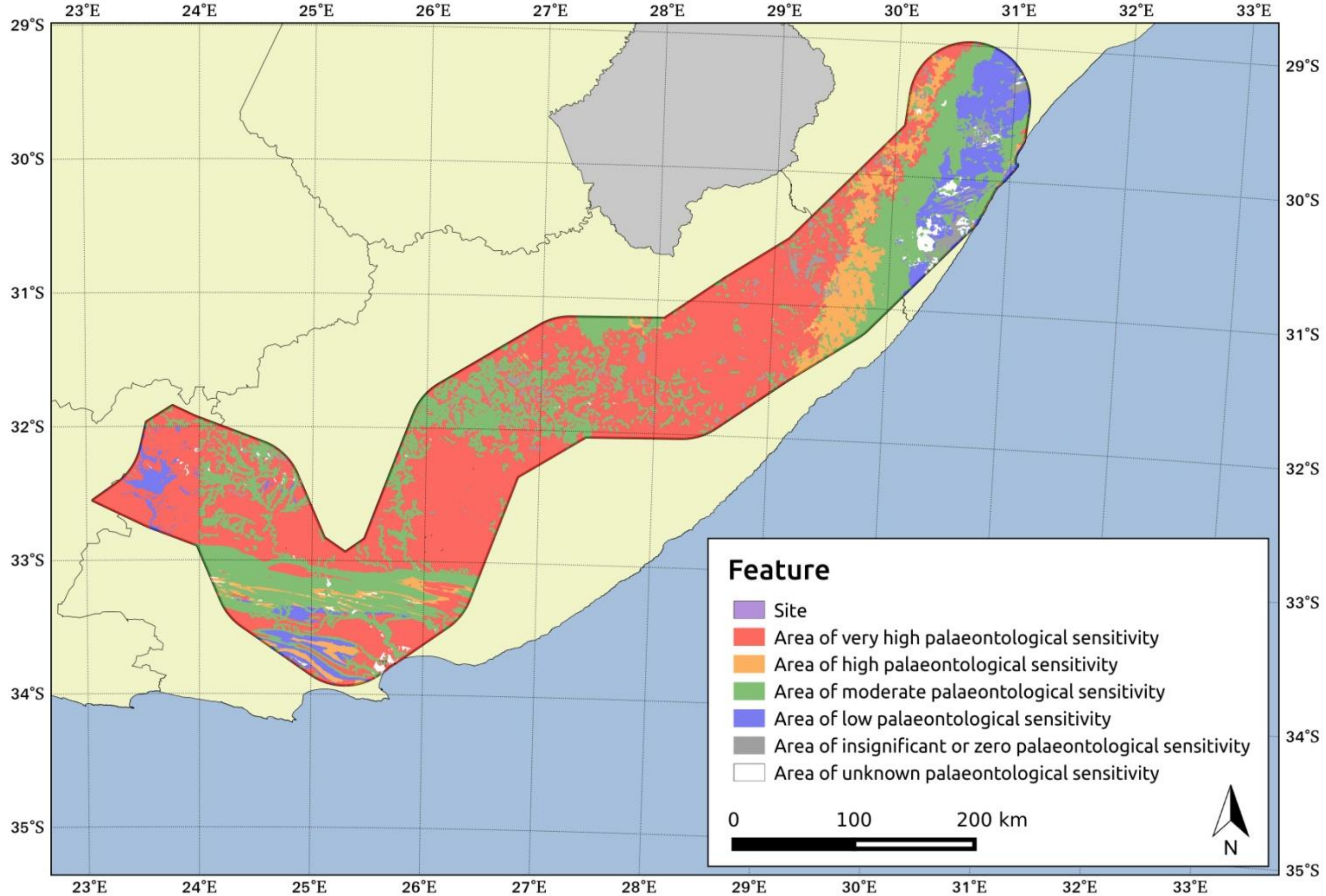
7.2.2.3 International Corridor



7.2.2.4 Central Corridor



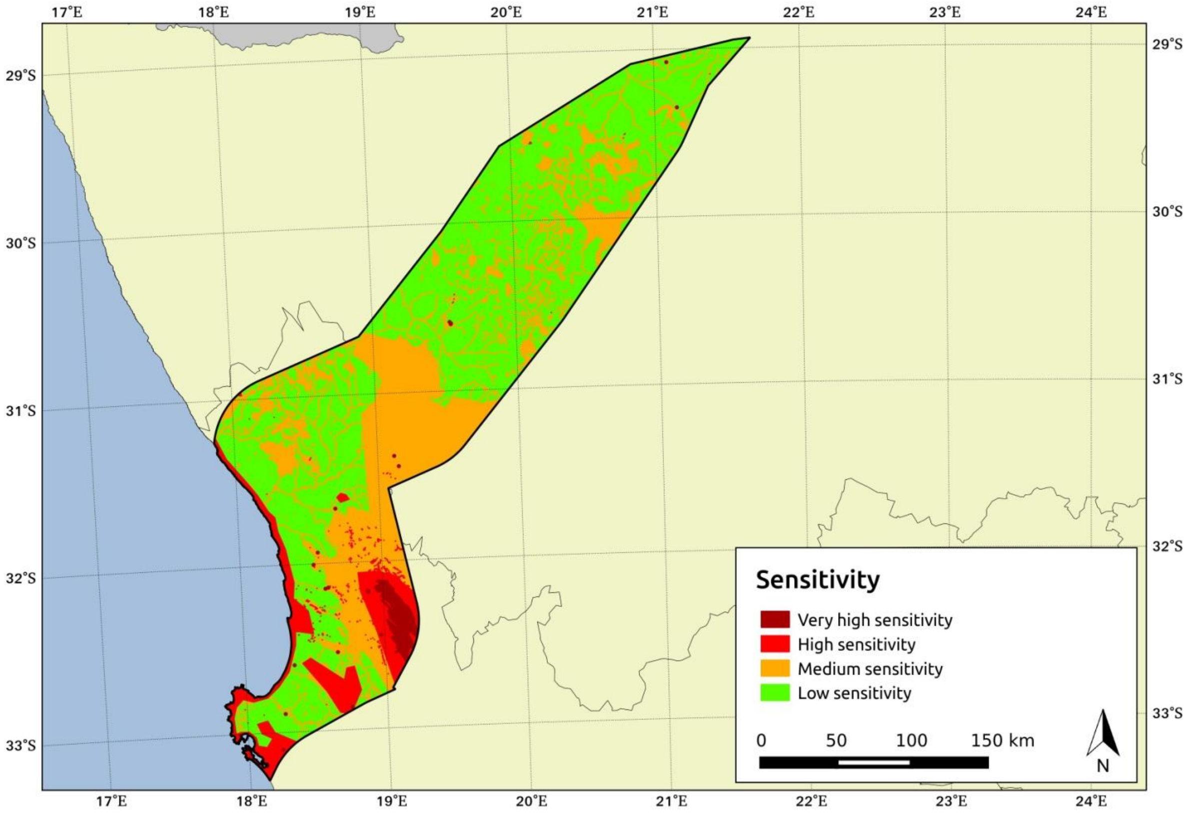
7.2.2.5 Eastern Corridor



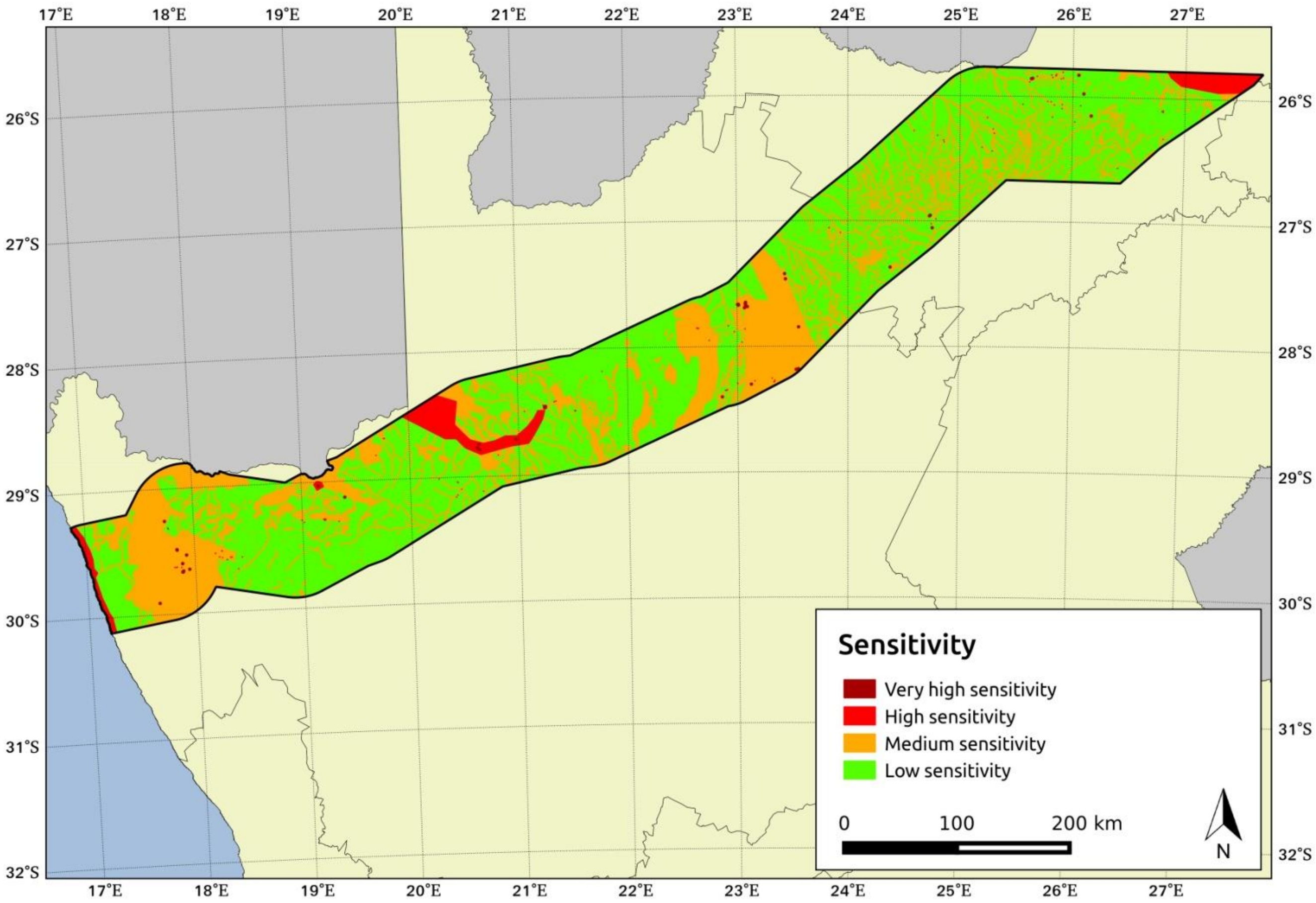
8 FOUR- TIER SENSITIVITY MAPPING

8.1.1 Four-tier sensitivity map: Heritage without palaeontology

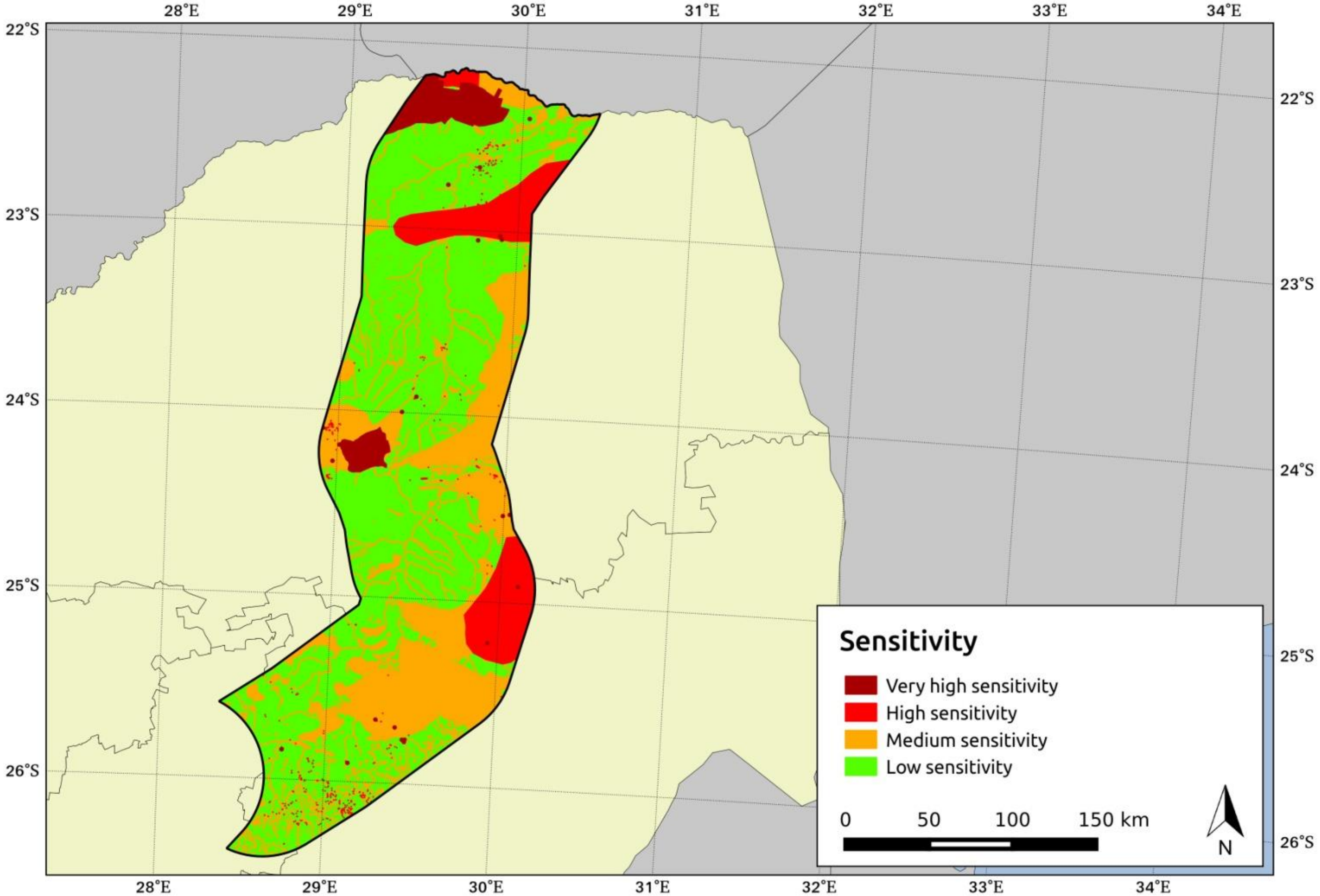
8.1.1.1 Western Corridor



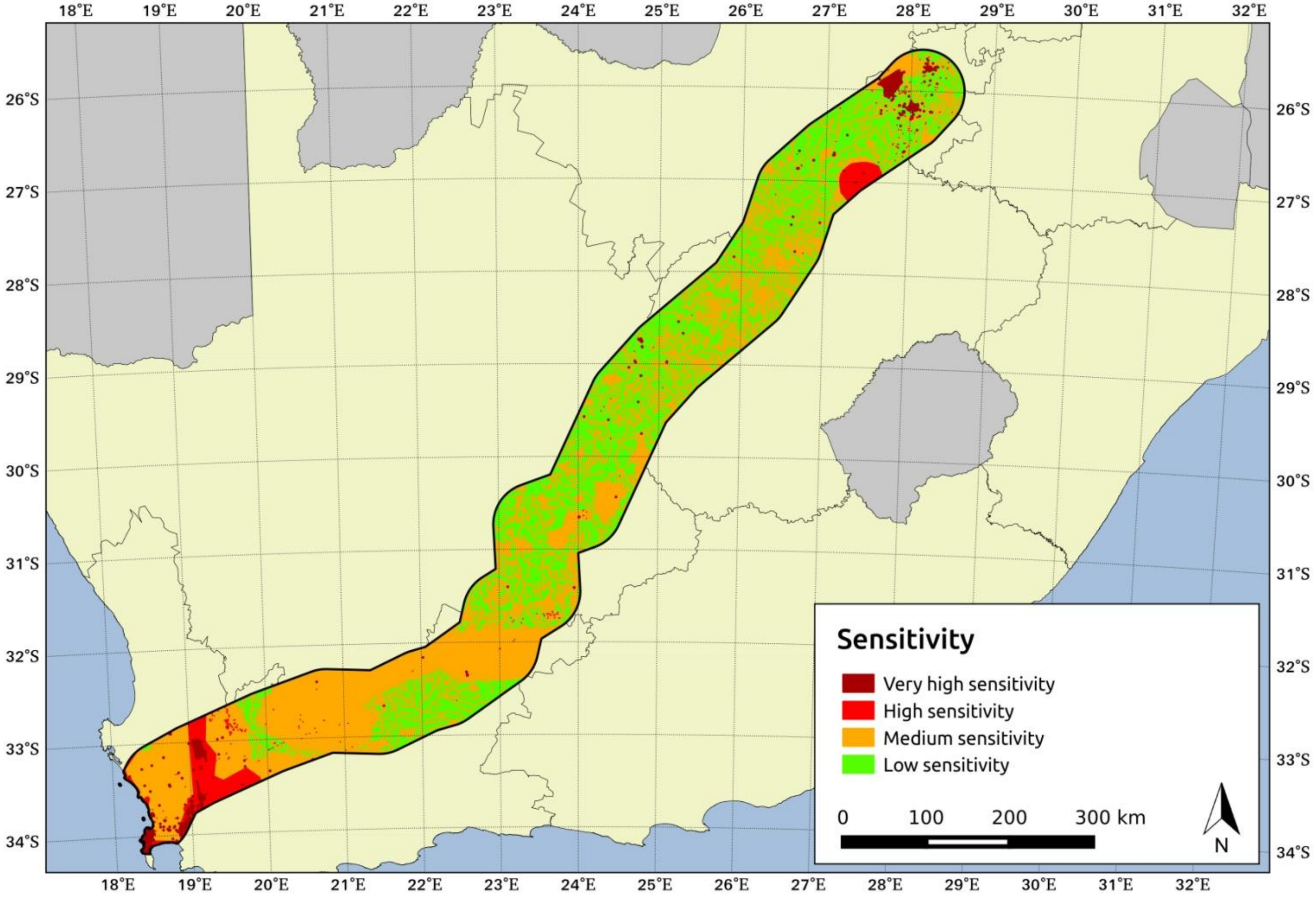
8.1.1.2 Northern Corridor



8.1.1.3 International Corridor



8.1.1.4 Central Corridor



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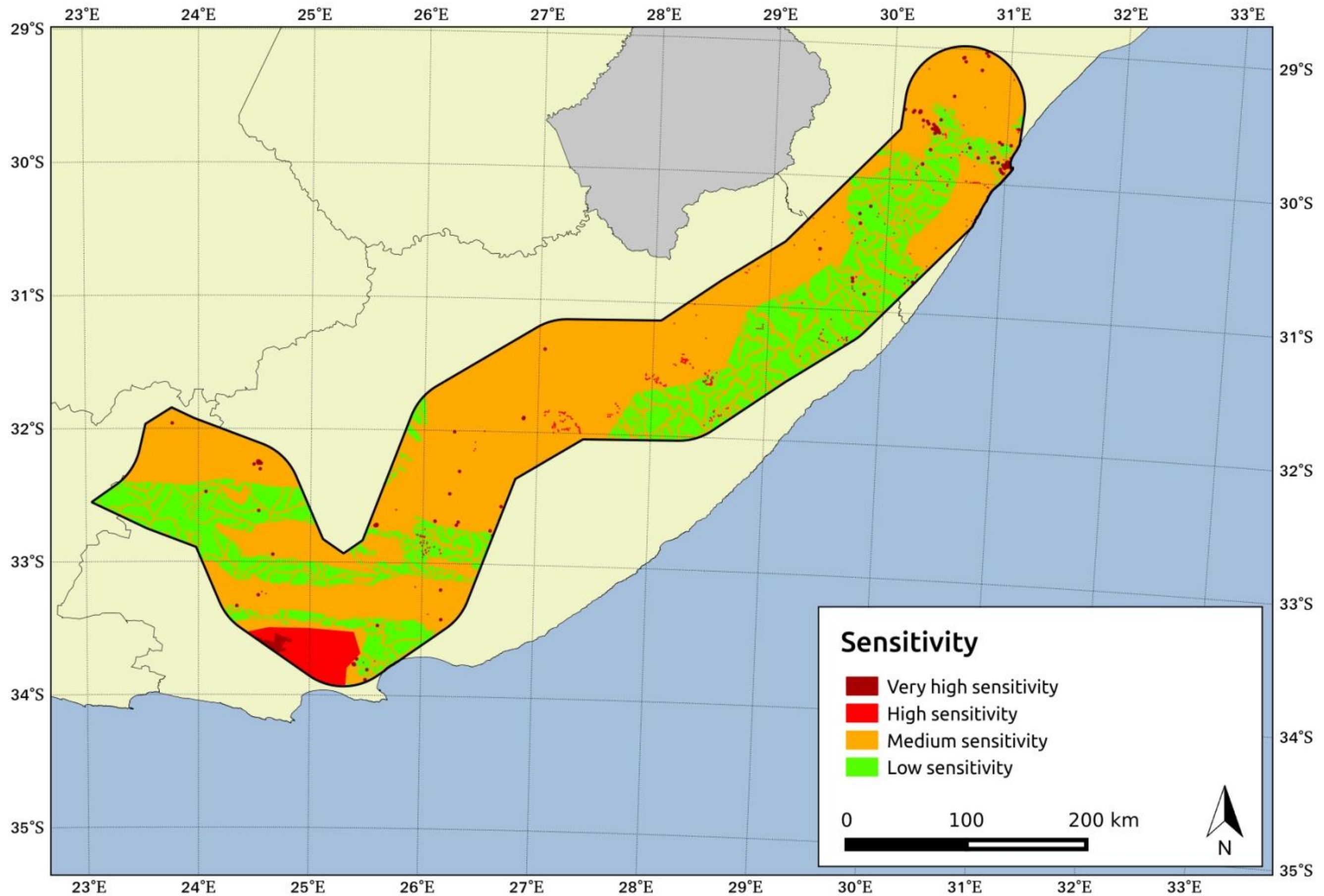
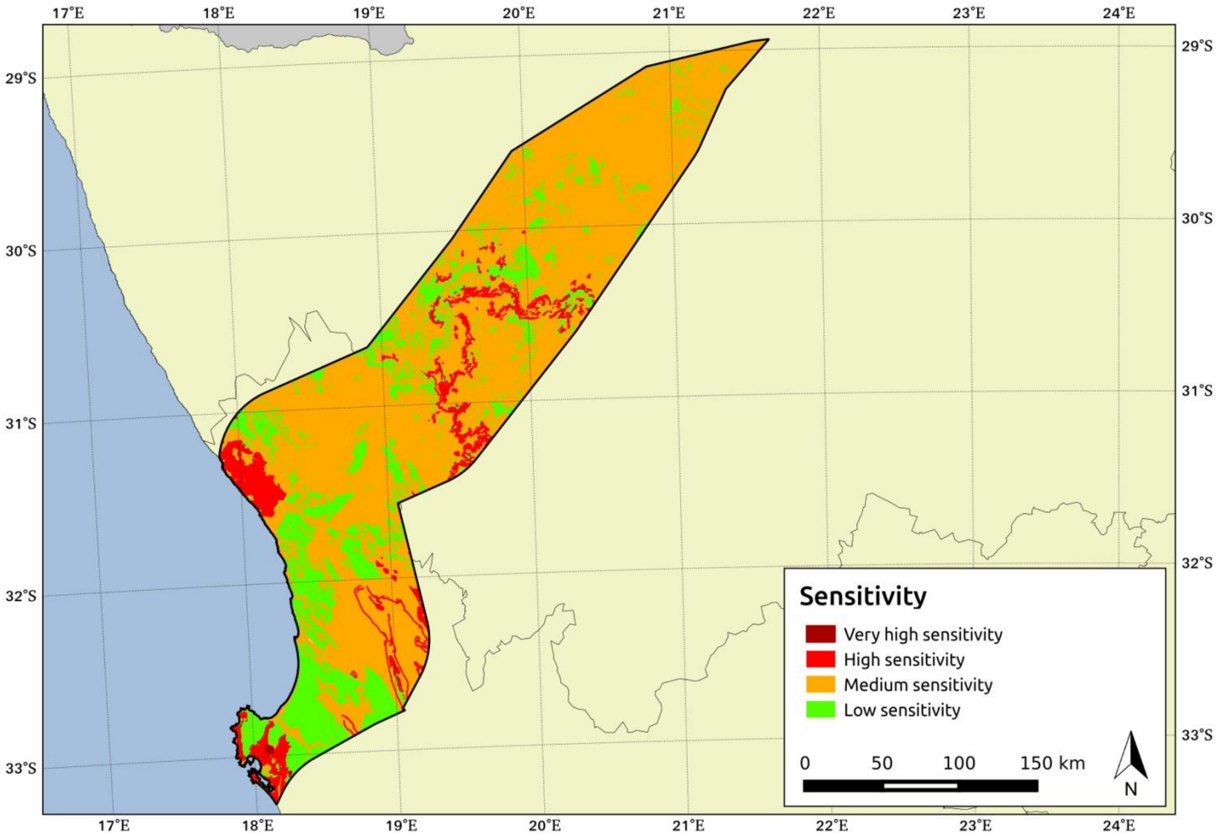
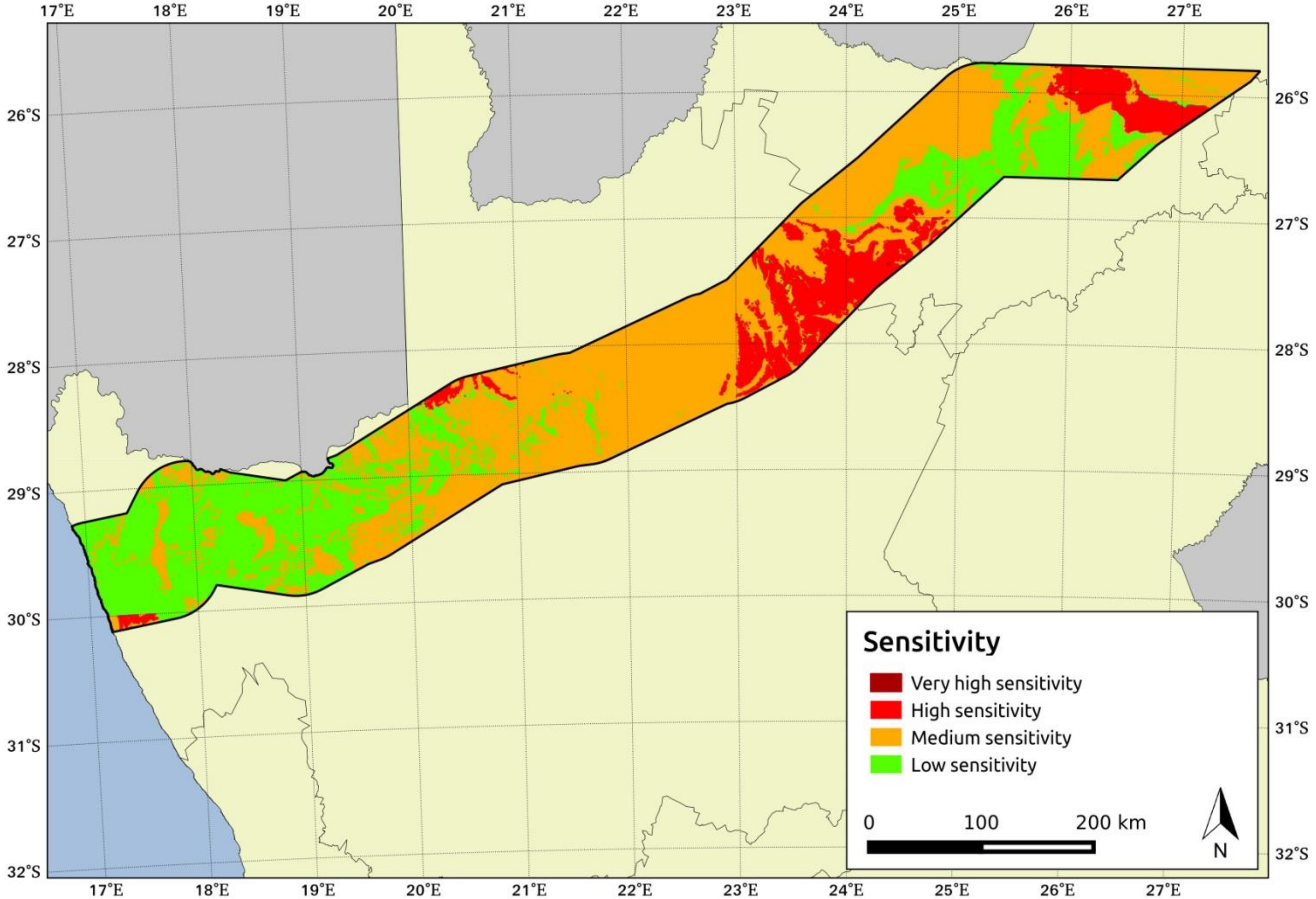


8.1.2 Palaeontology

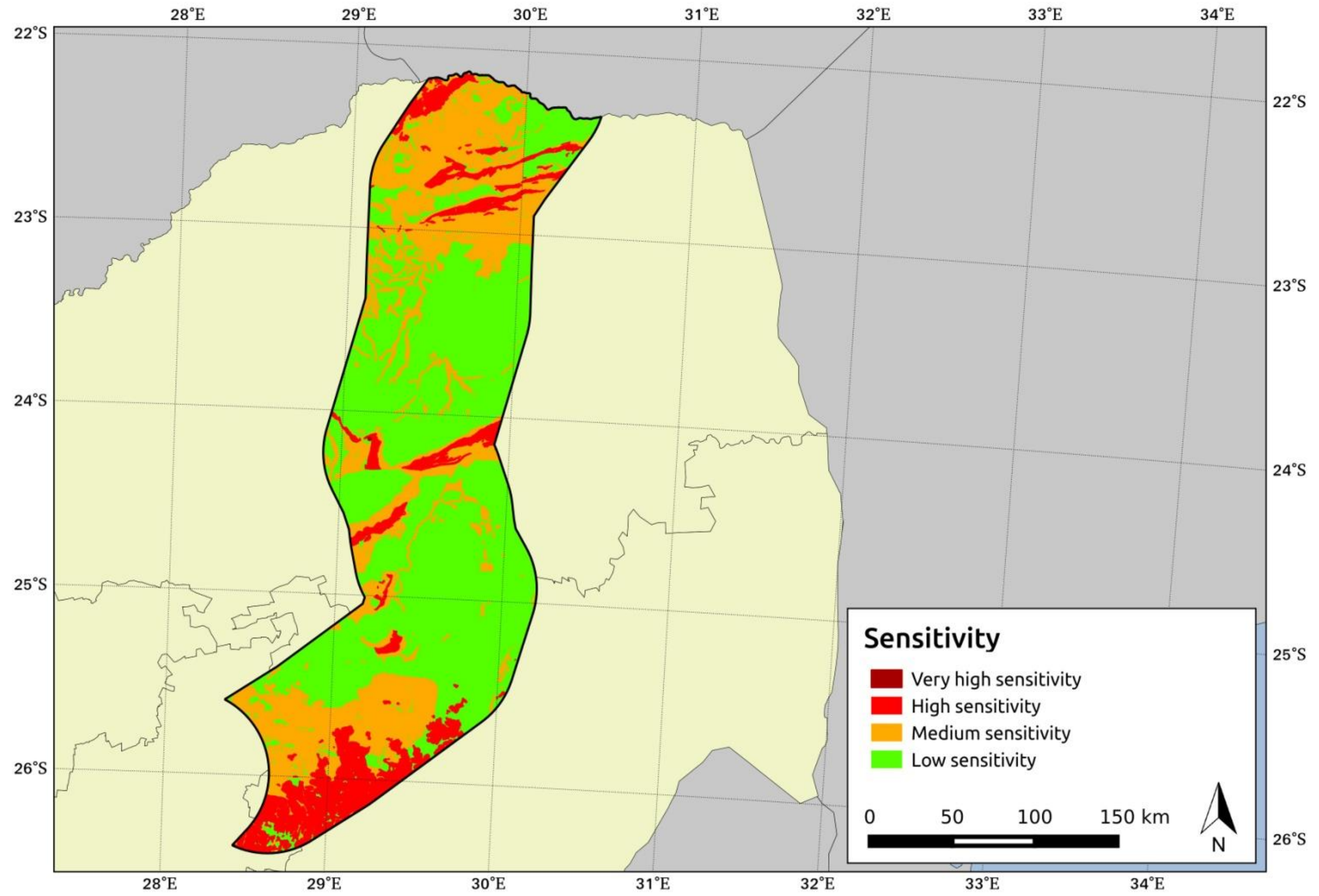
8.1.2.1 Western Corridor



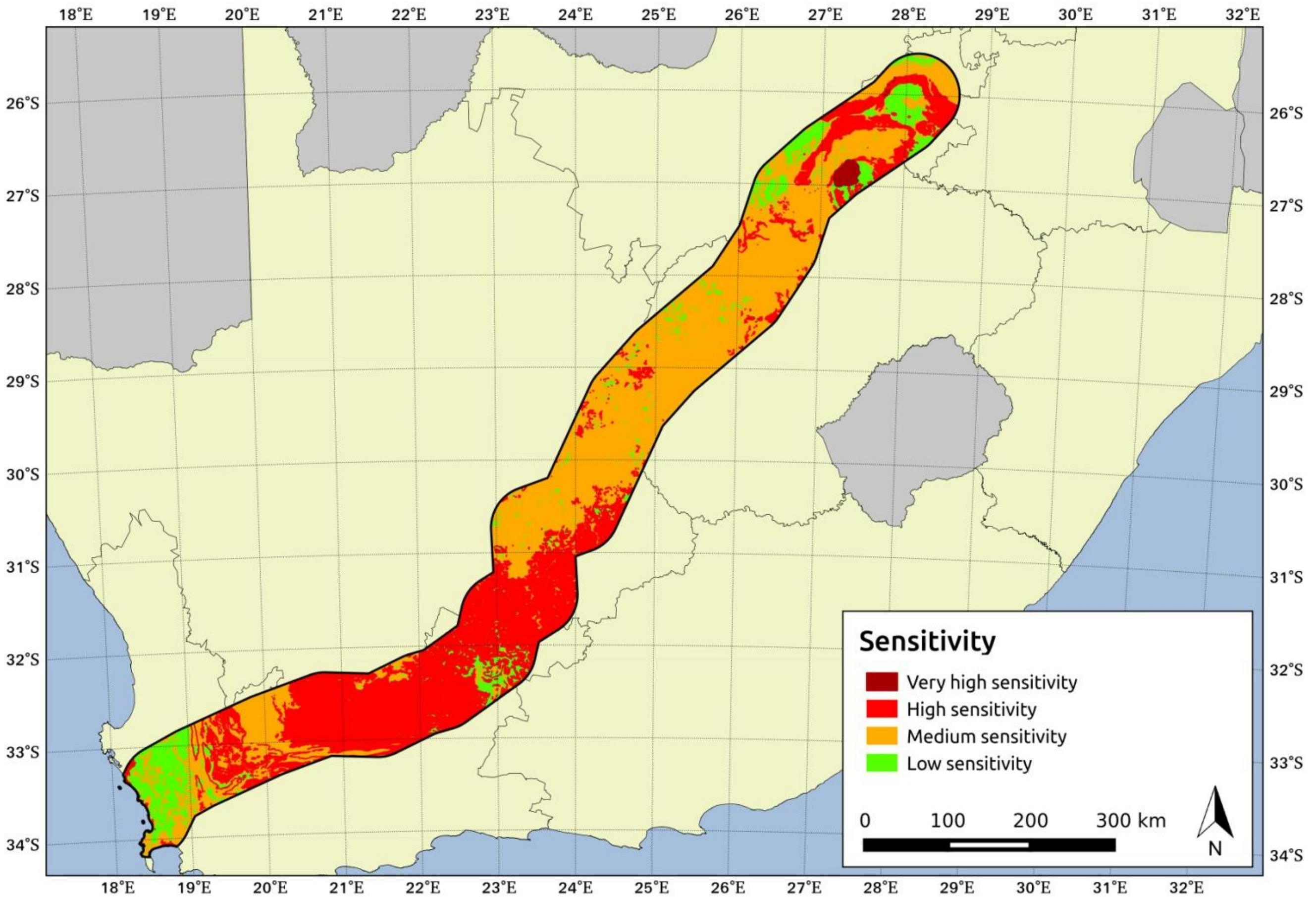
8.1.2.2 Northern Corridor



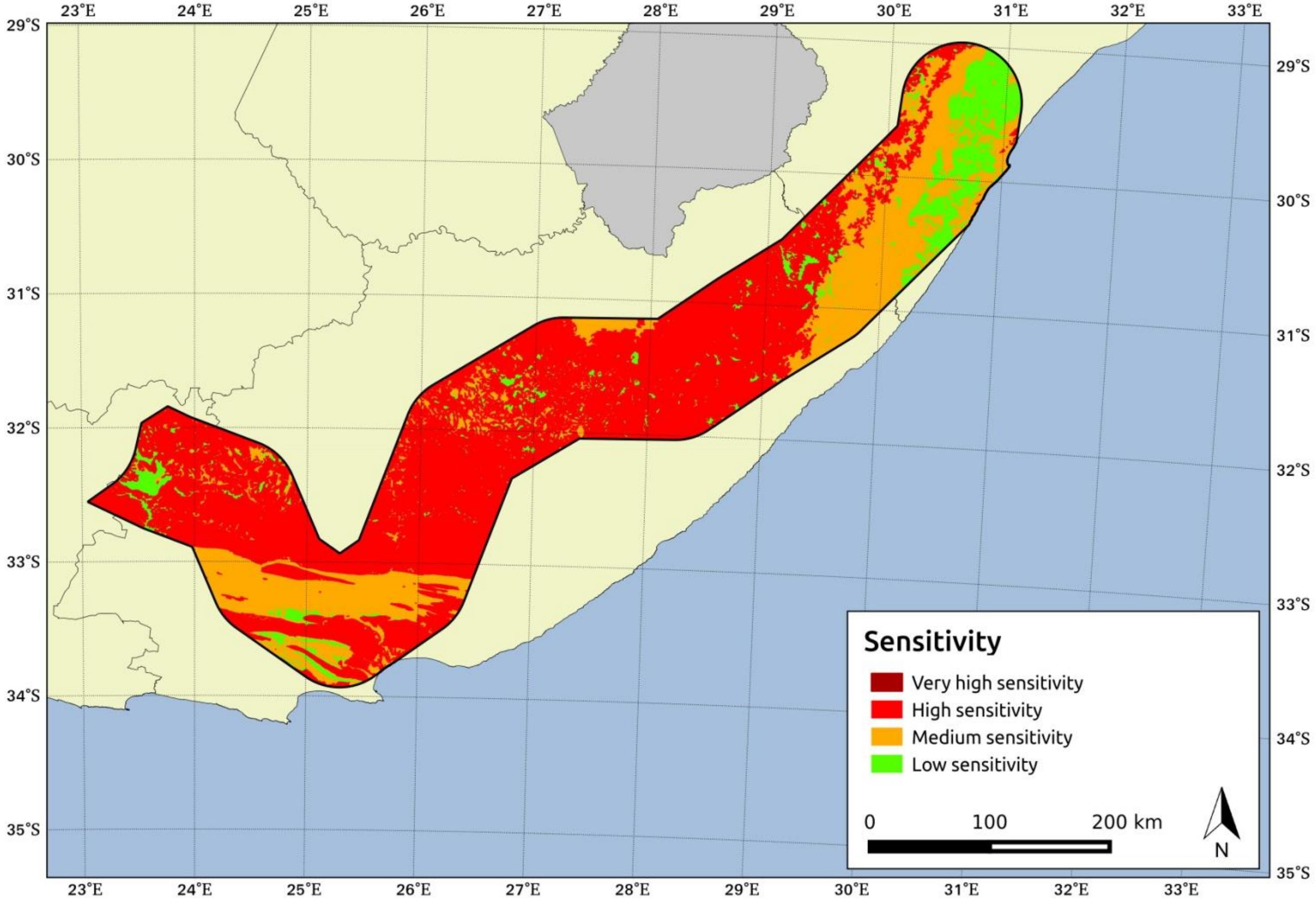
8.1.2.3 International Corridor



8.1.2.4 Central Corridor

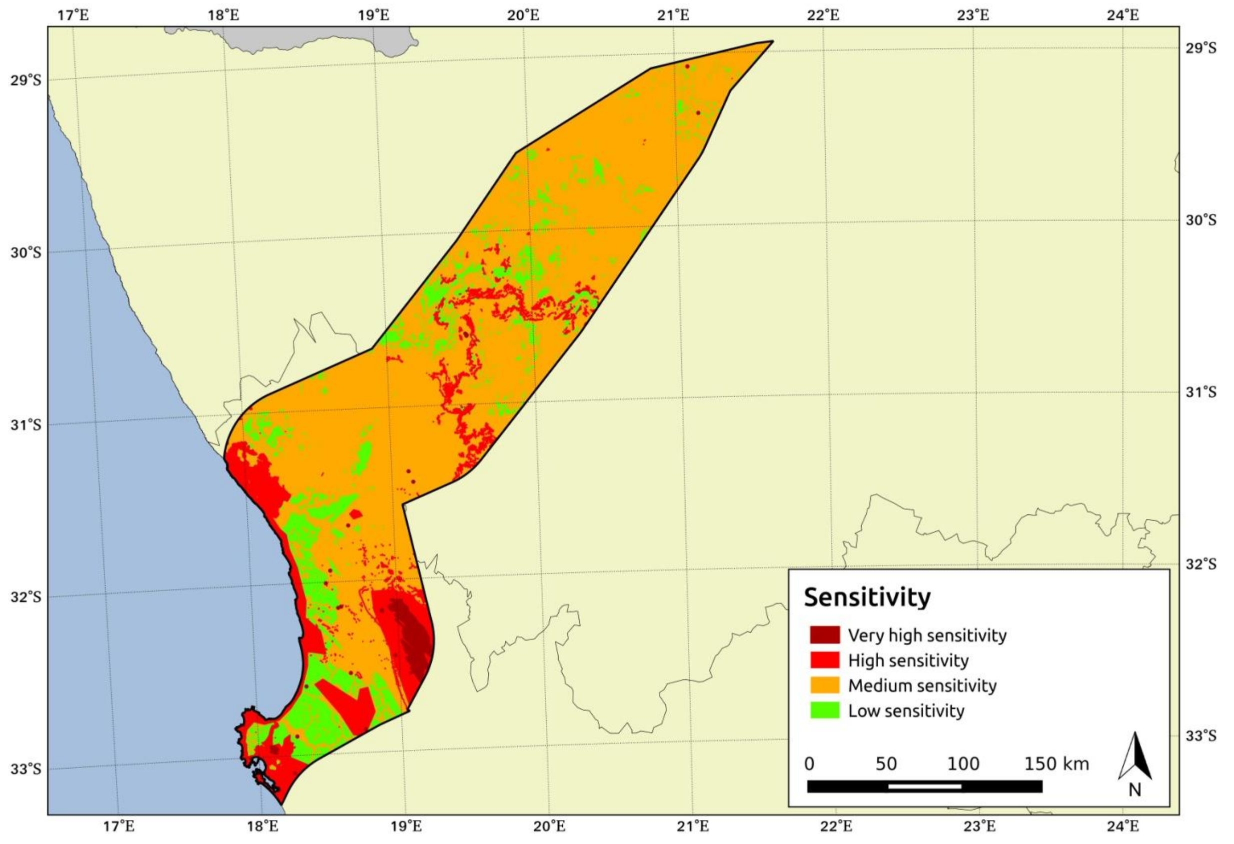


8.1.2.5 Eastern Corridor

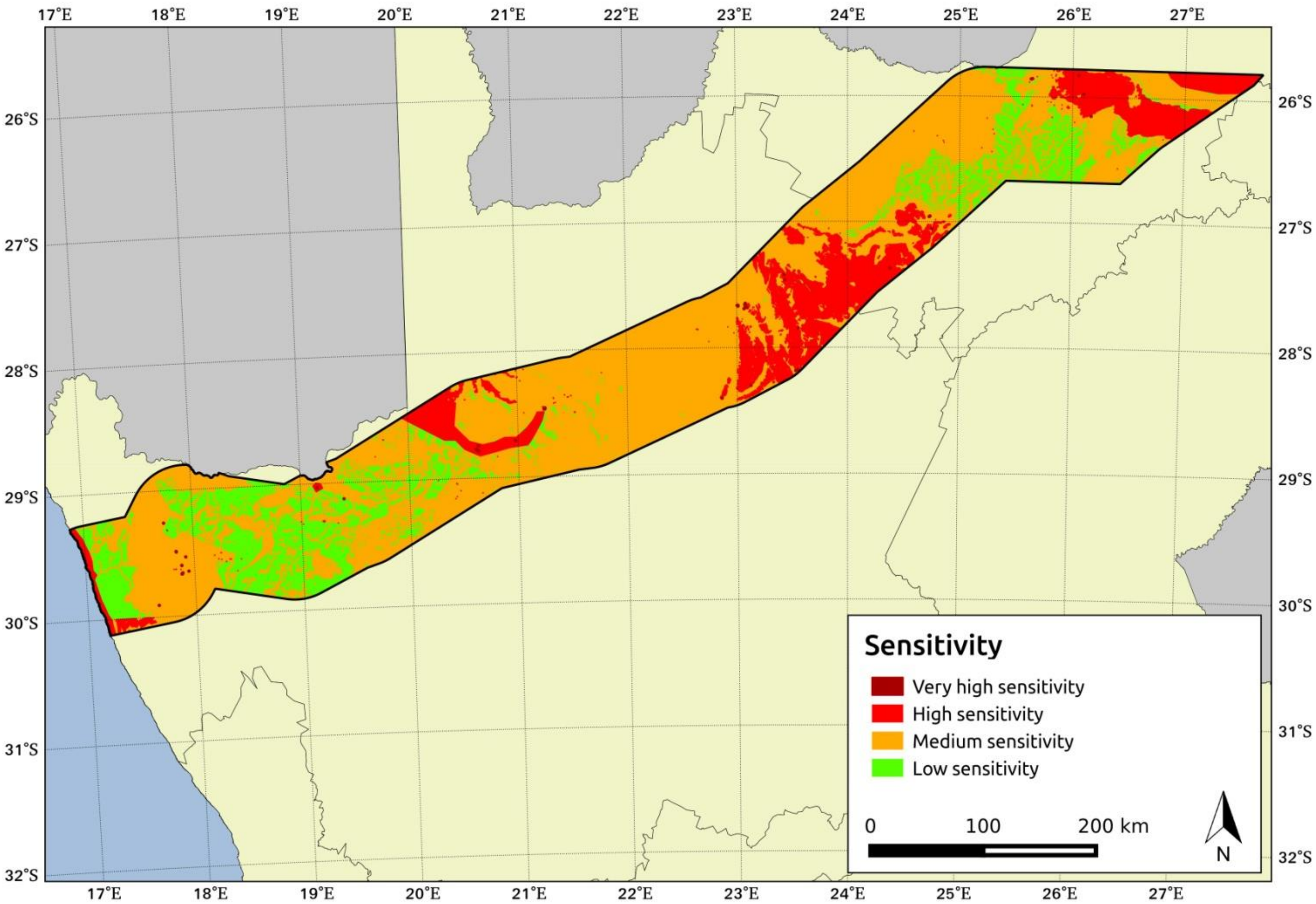


8.1.3 Four-tier sensitivity map

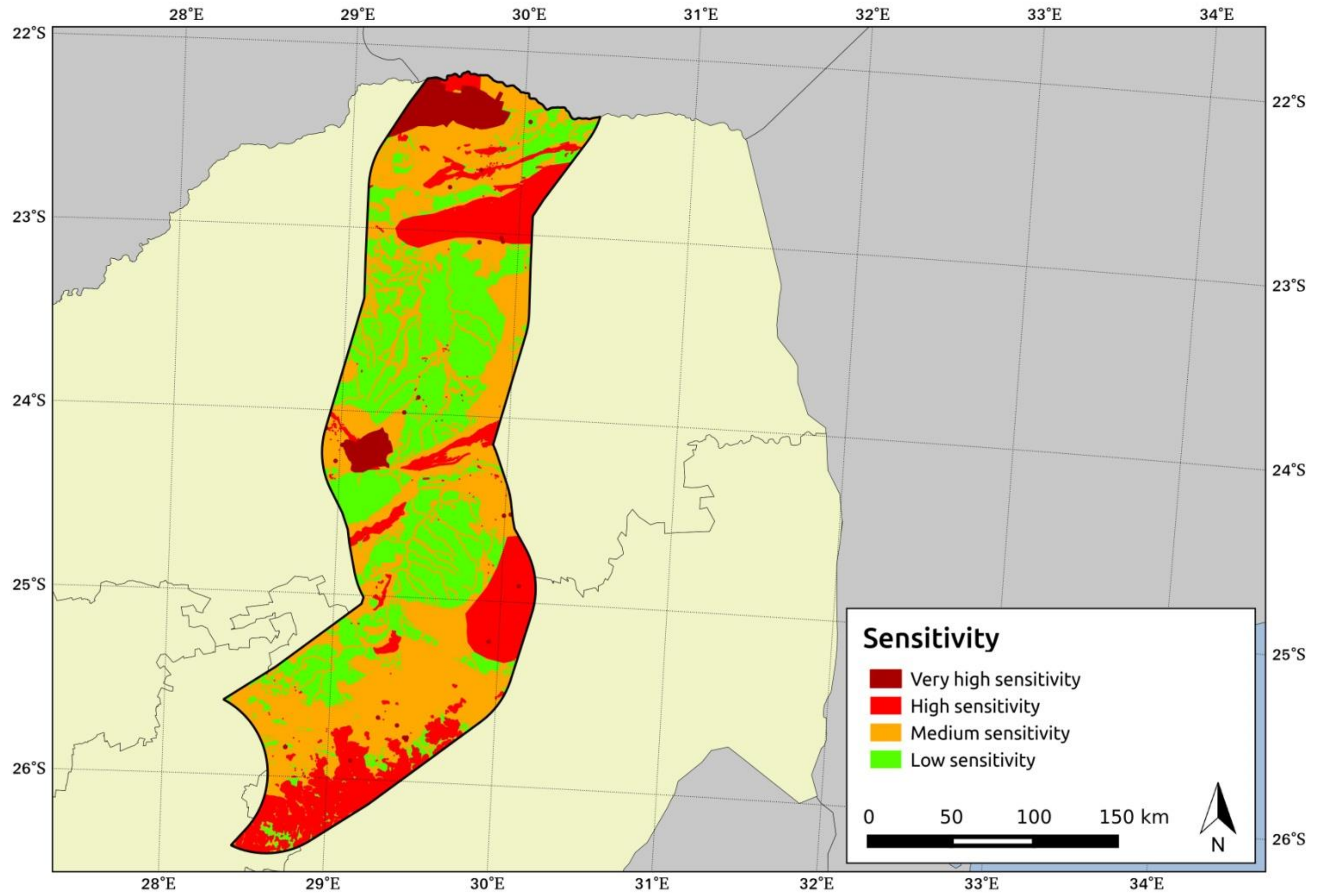
8.1.3.1 Western Corridor



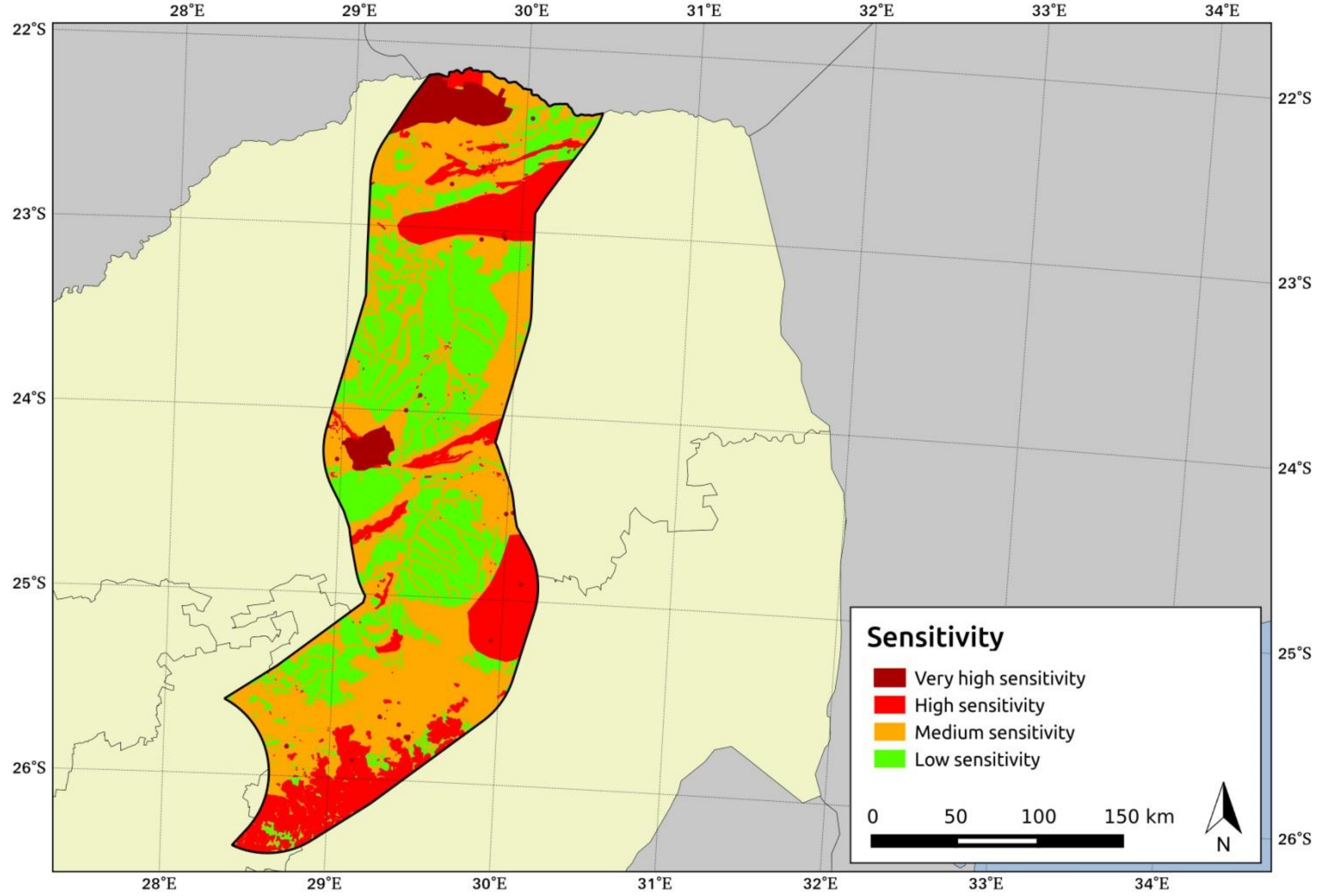
8.1.3.2 Northern Corridor



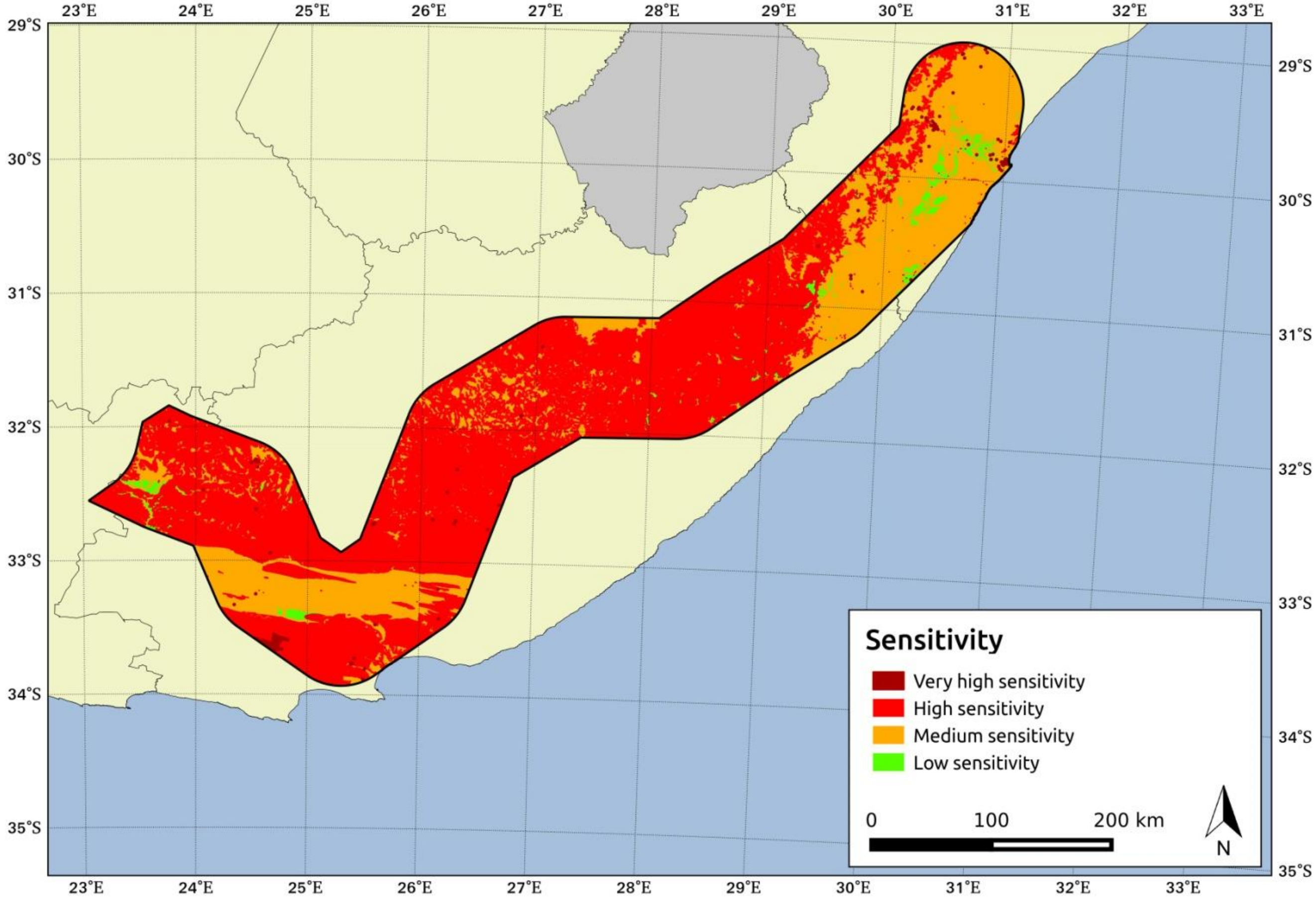
8.1.3.3 International Corridor



8.1.3.4 Central Corridor



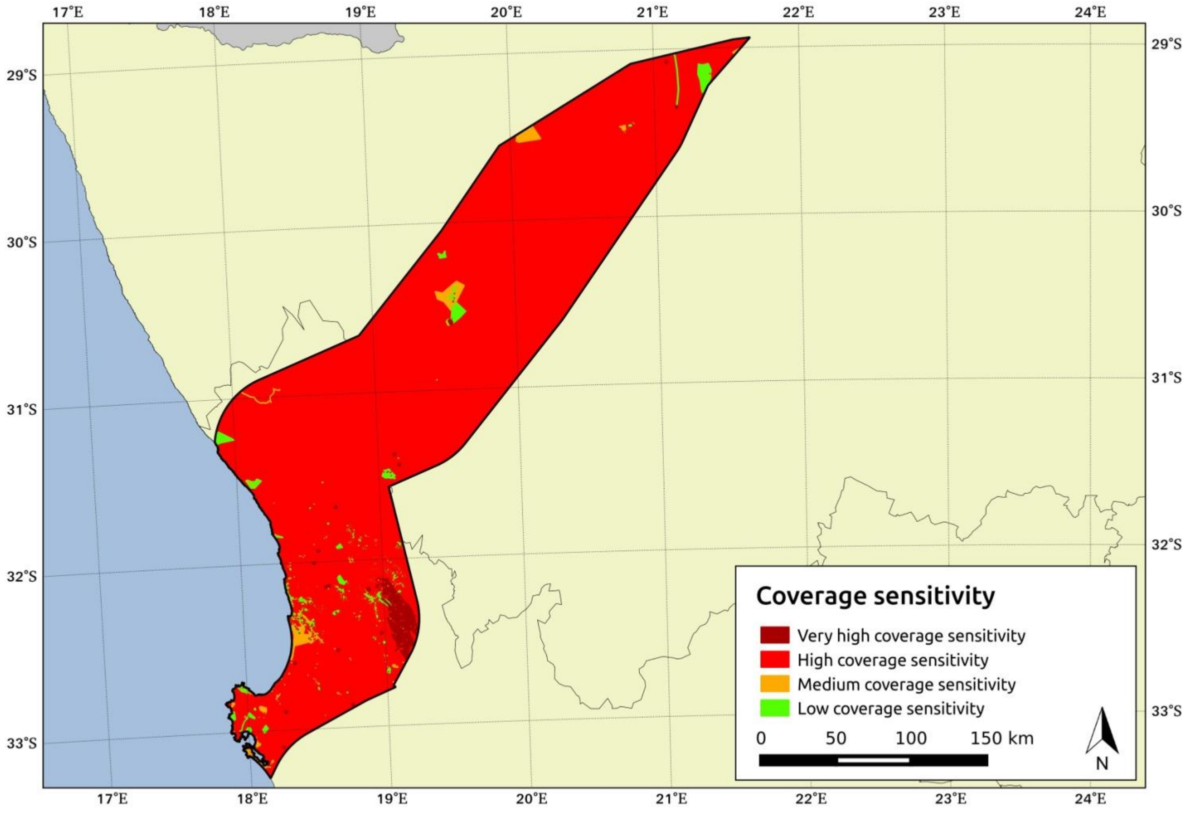
8.1.3.5 Eastern Corridor



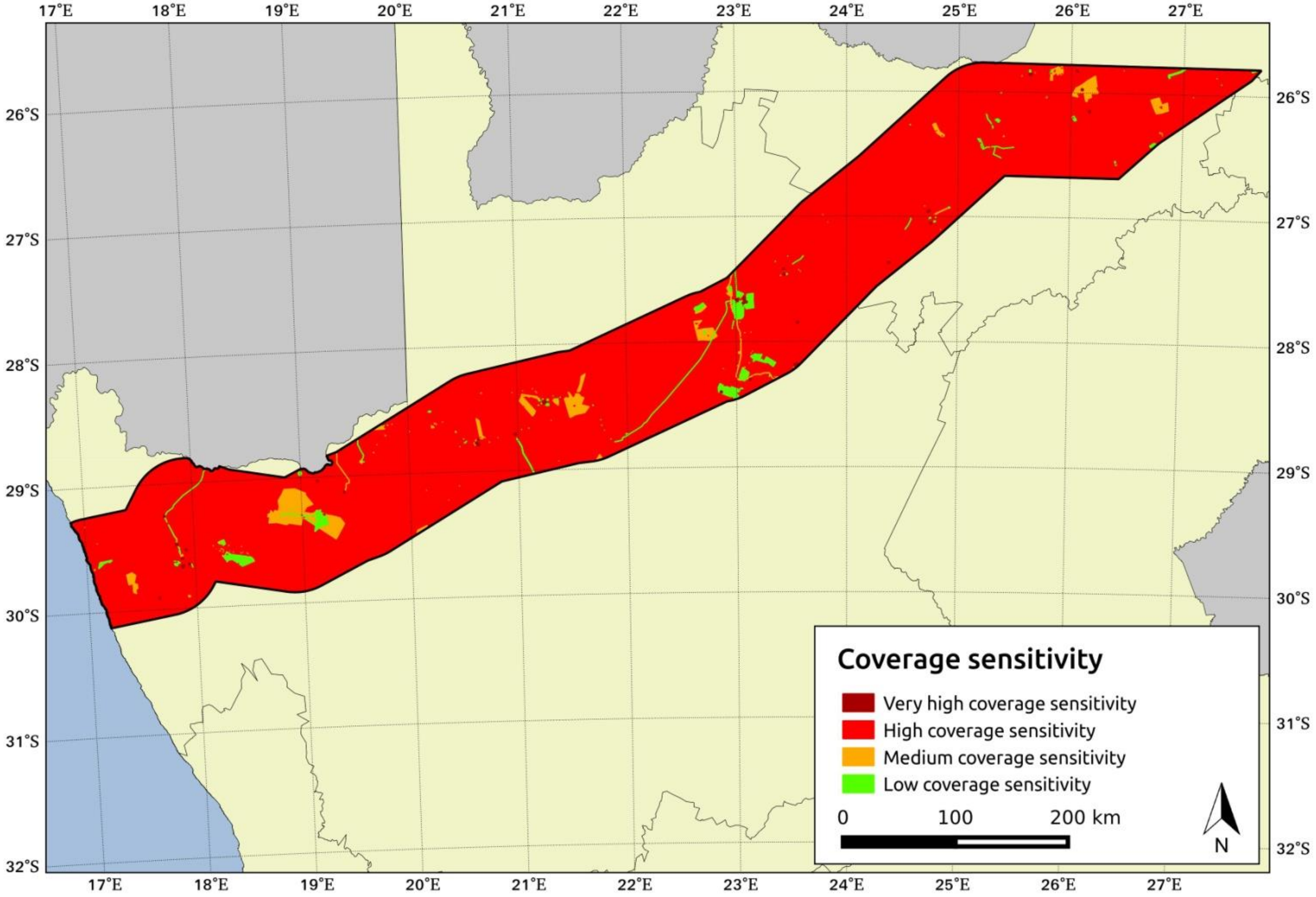
9 SURVEY COVERAGE SENSITIVITY MAPPING

9.1.1 Survey coverage sensitivity map – Heritage without palaeontology

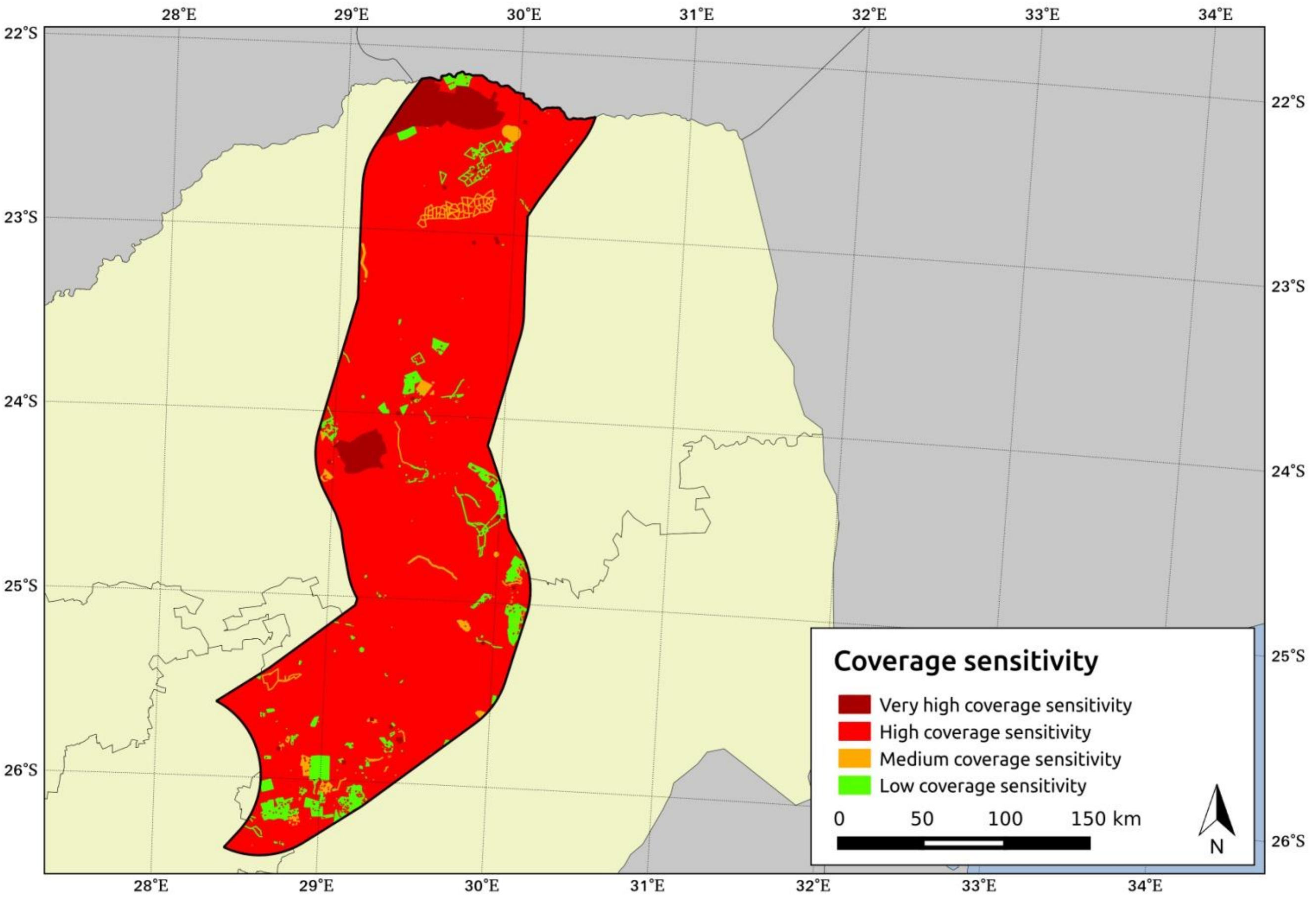
9.1.1.1 Western Corridor



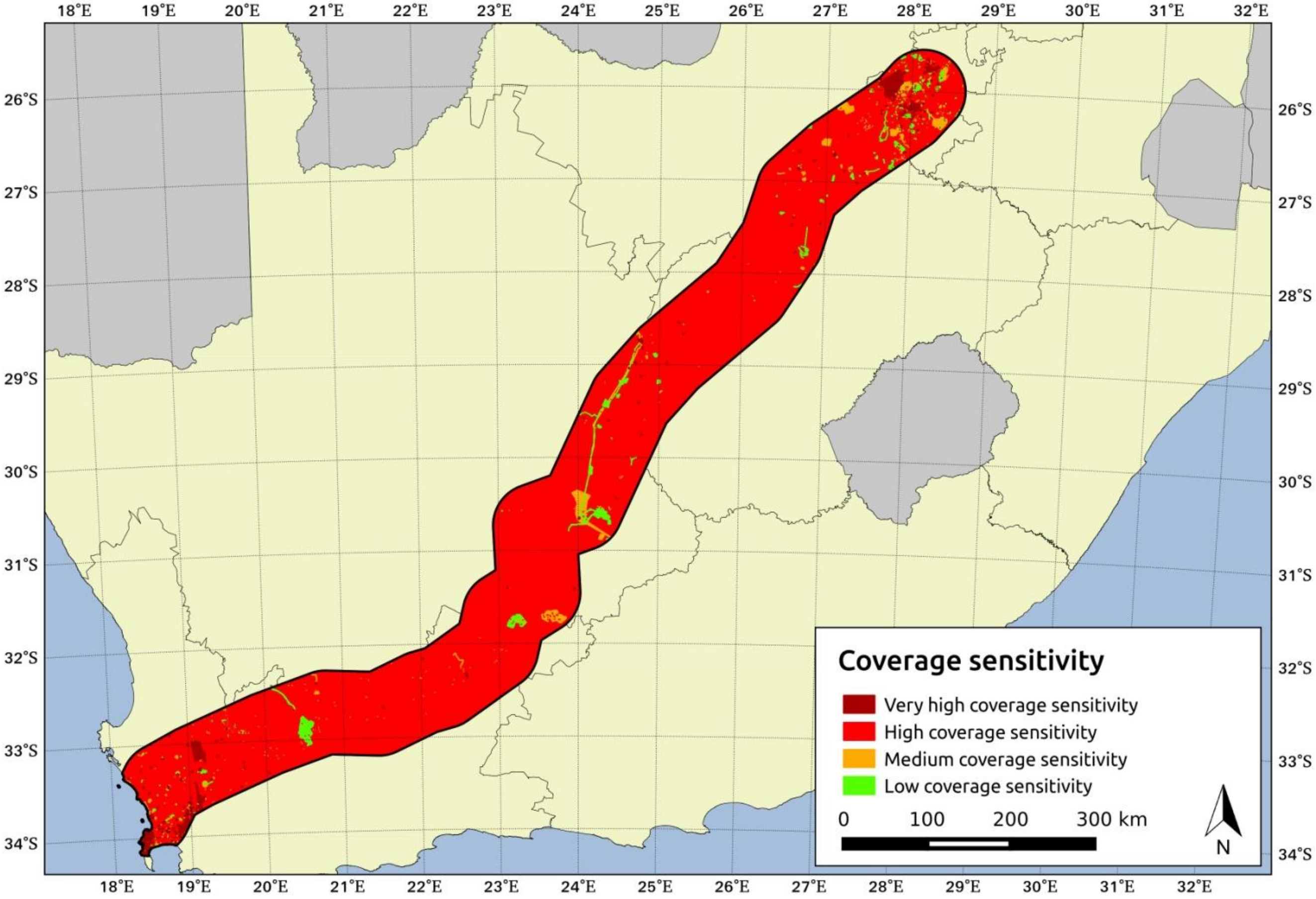
9.1.1.2 Northern Corridor



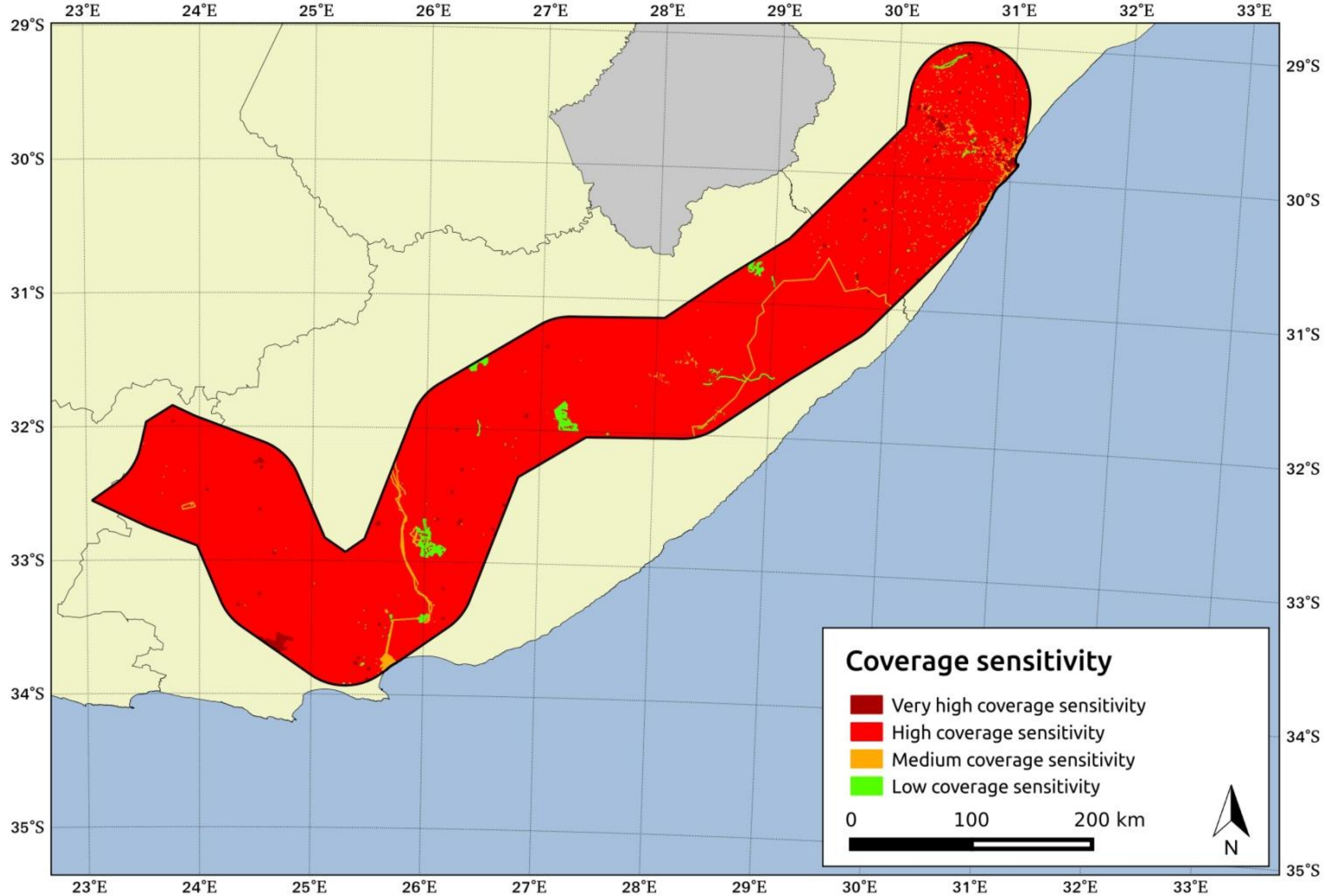
9.1.1.3 International Corridor



9.1.1.4 Central Corridor

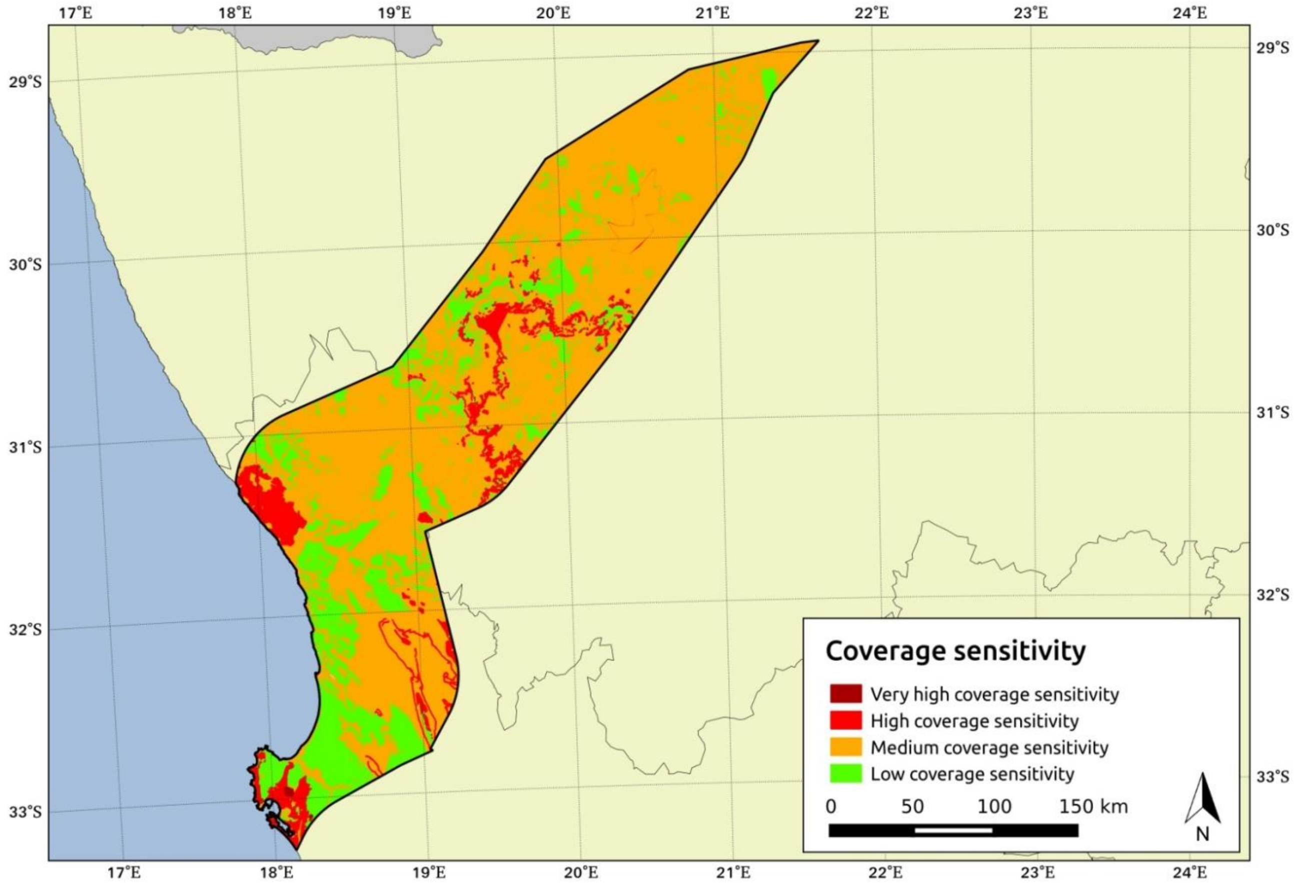


9.1.1.5 Eastern Corridor



9.1.2 Survey coverage sensitivity map – Palaeontology

9.1.2.1 Western Corridor



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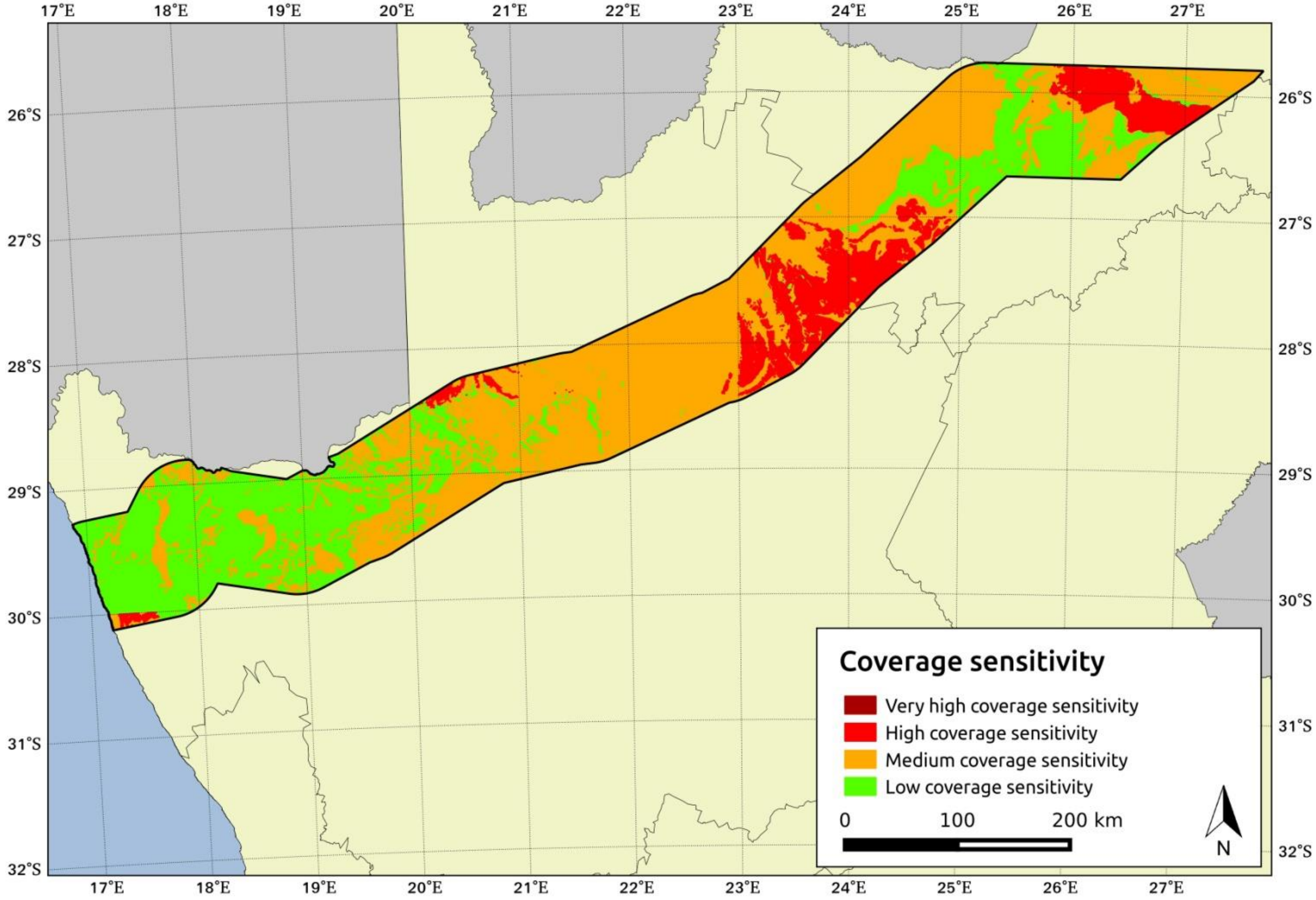
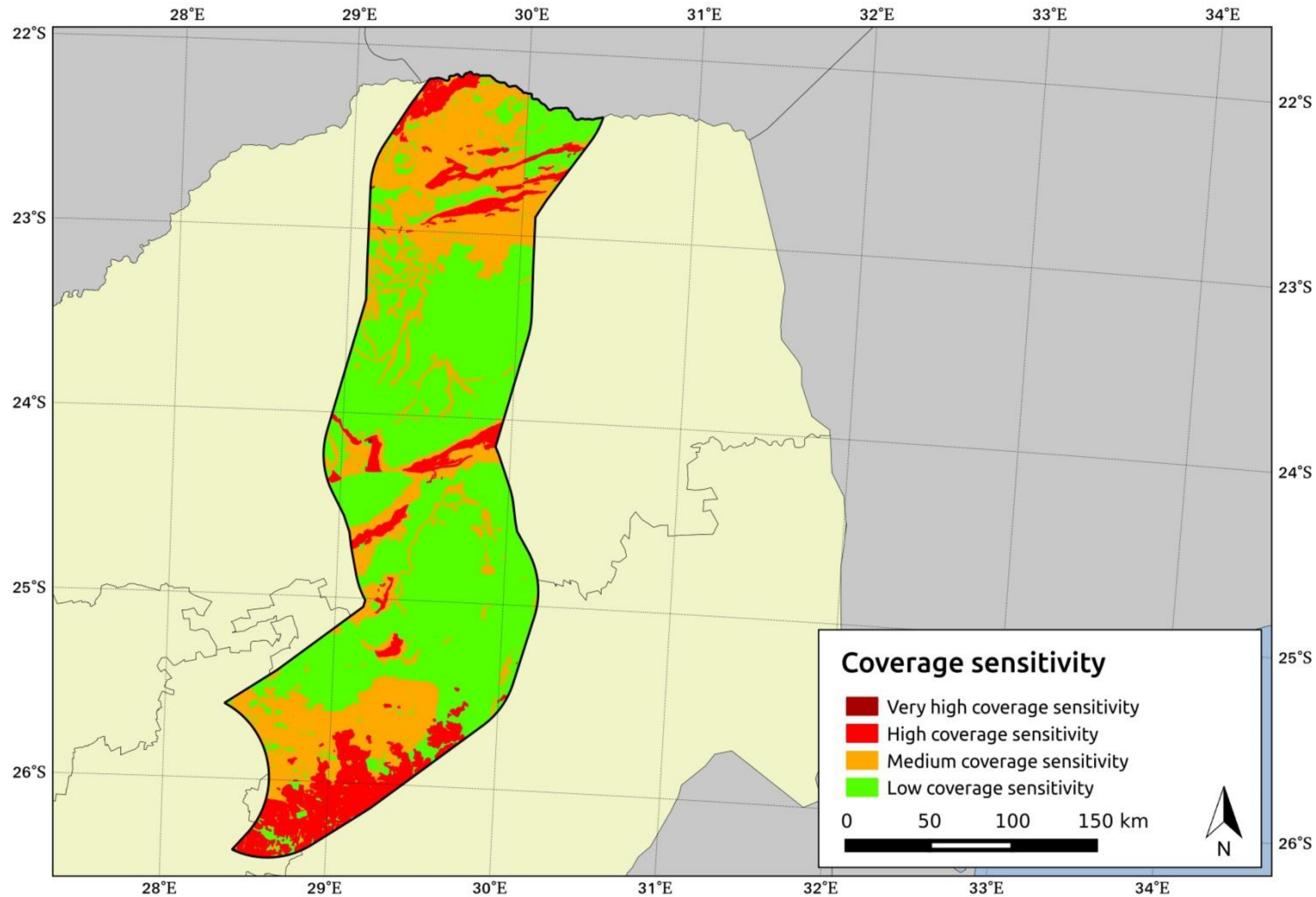
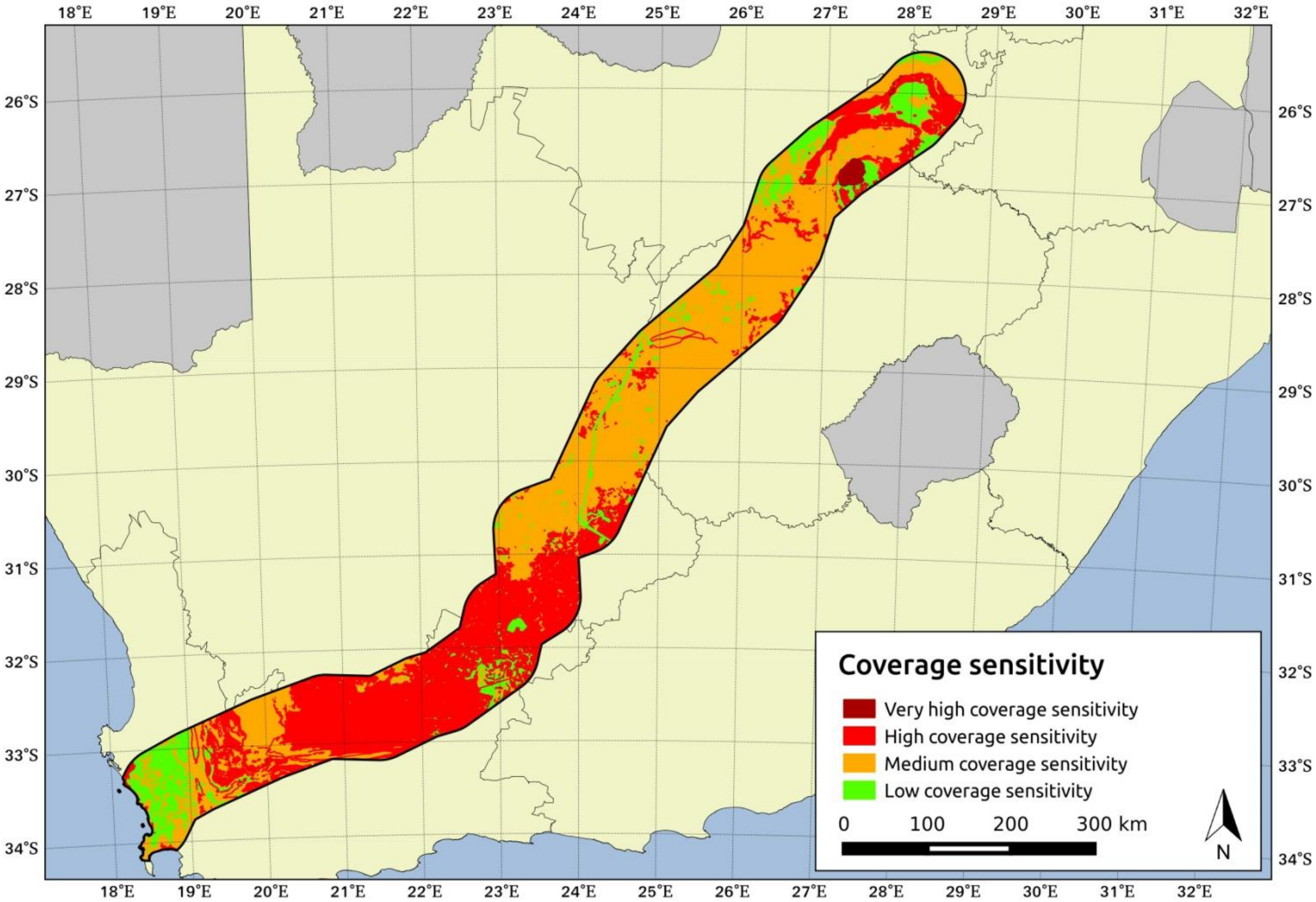


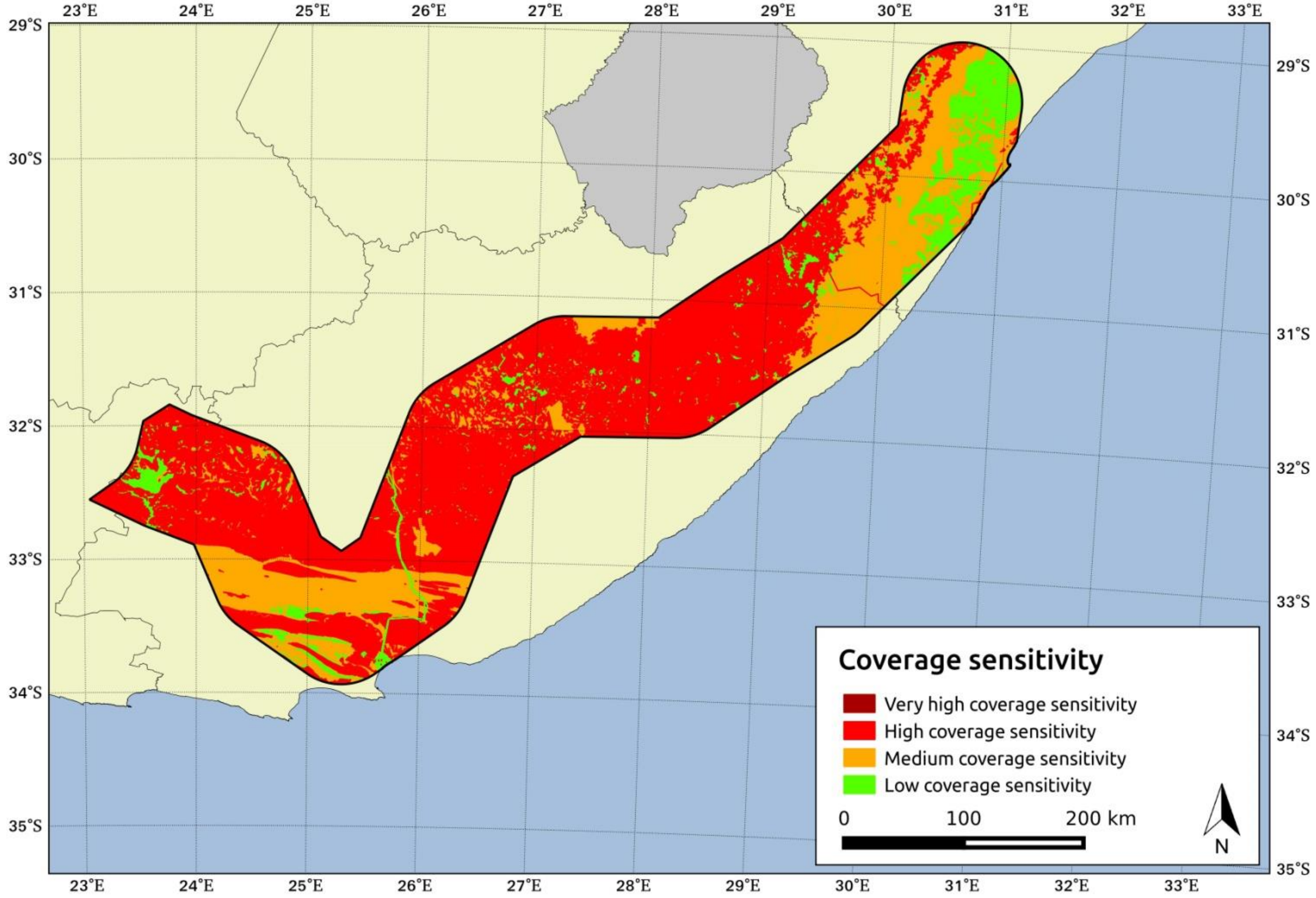
9.1.2.3 International Corridor



9.1.2.4 Central Corridor

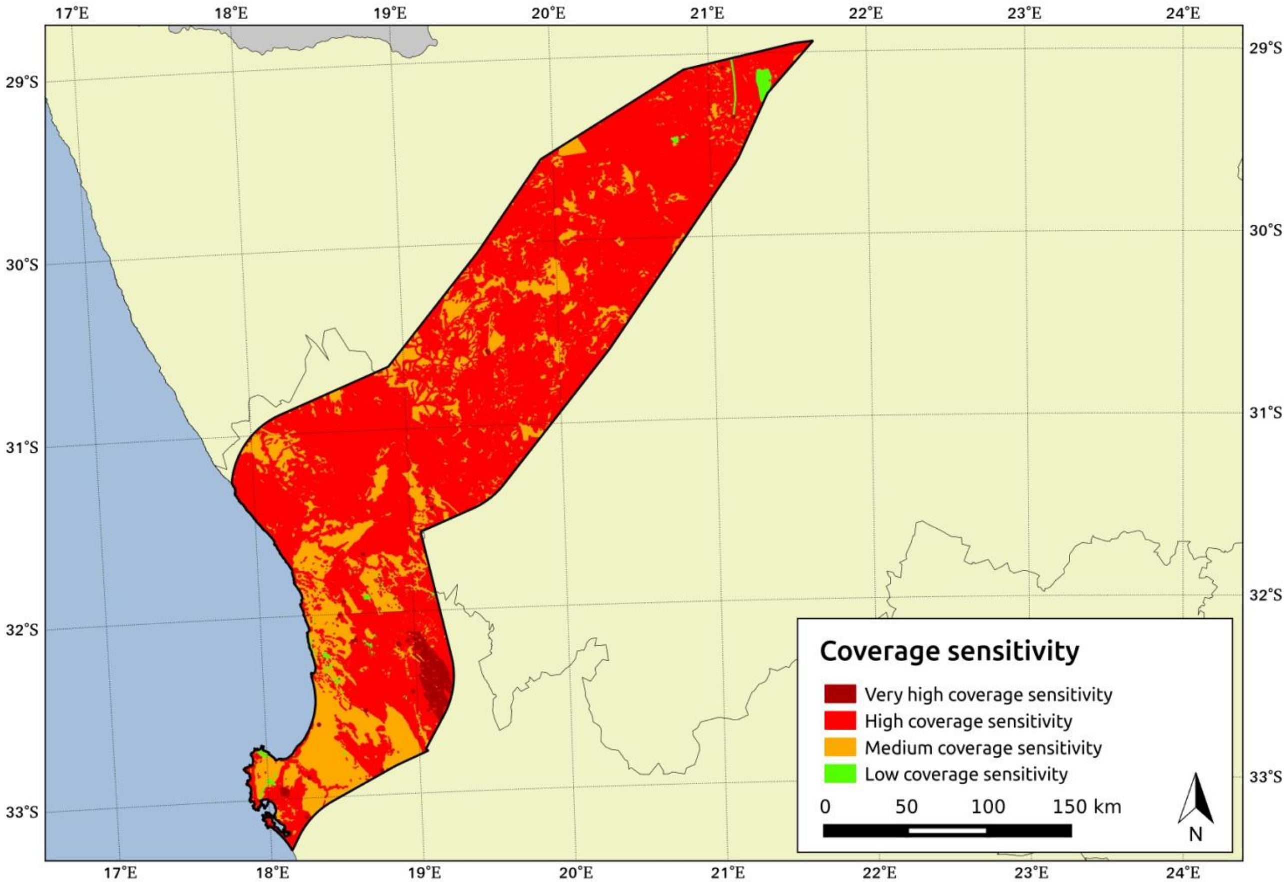


9.1.2.5 Eastern Corridor

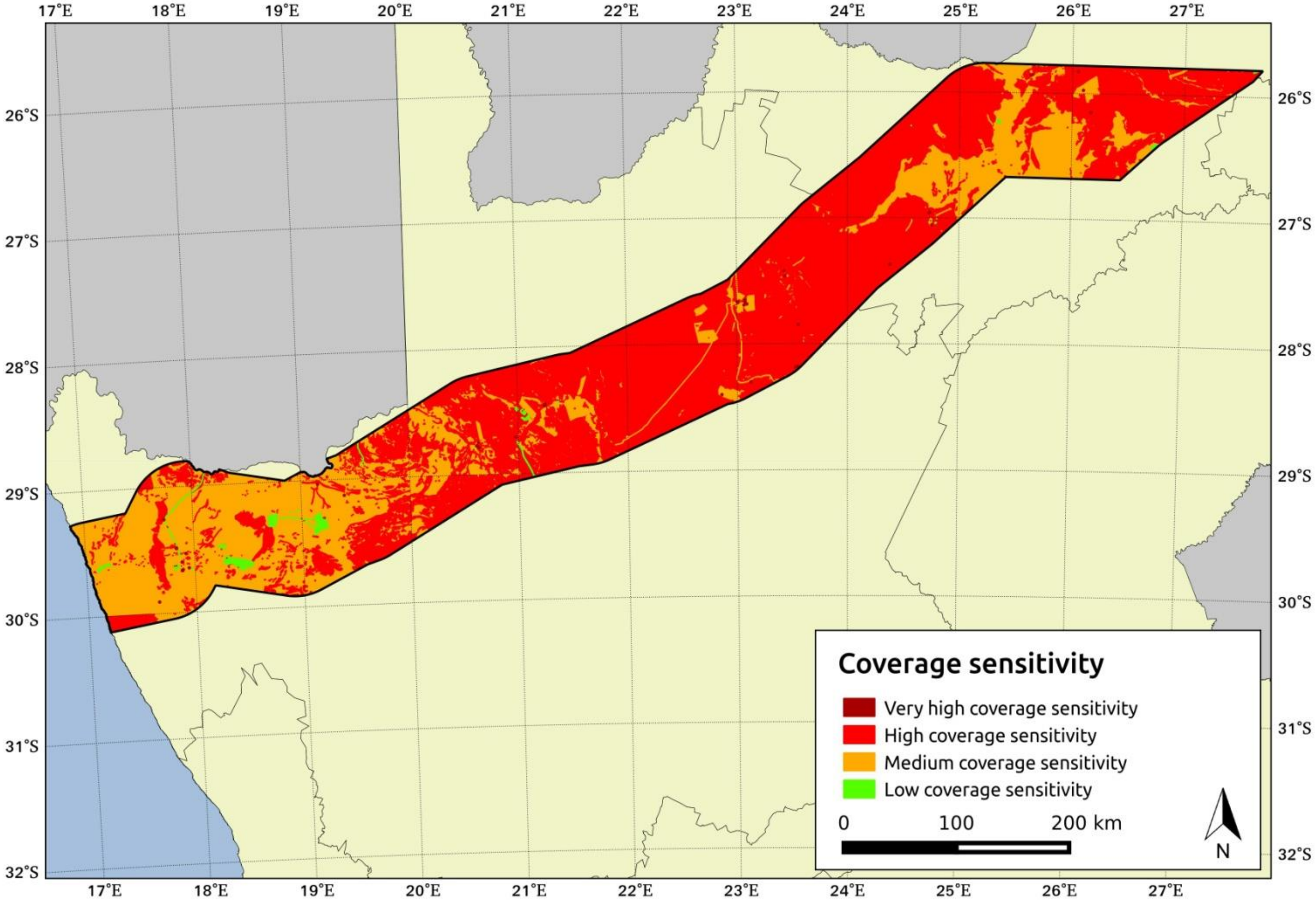


9.1.3 Survey coverage sensitivity map – Combined

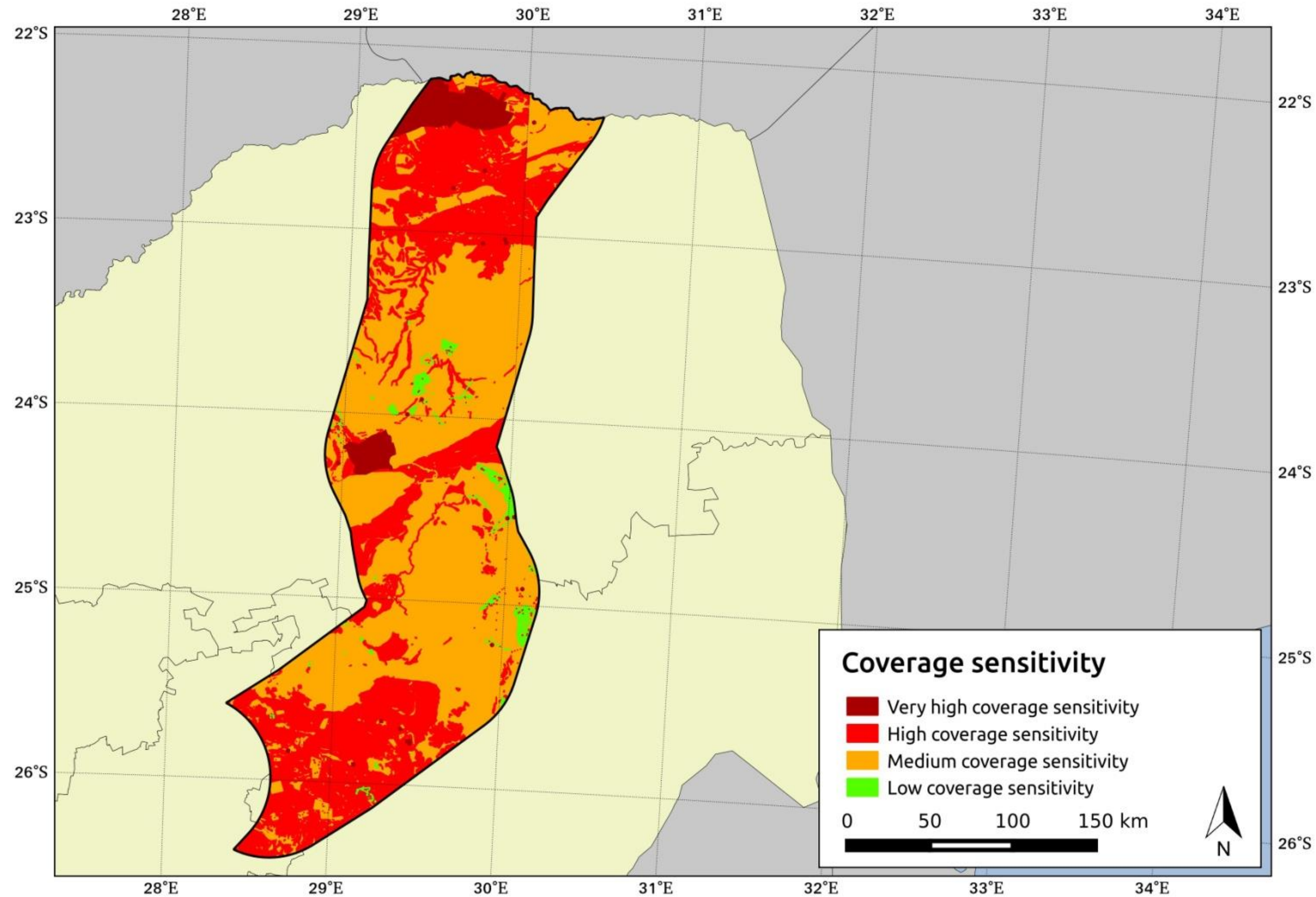
9.1.3.1 Western Corridor



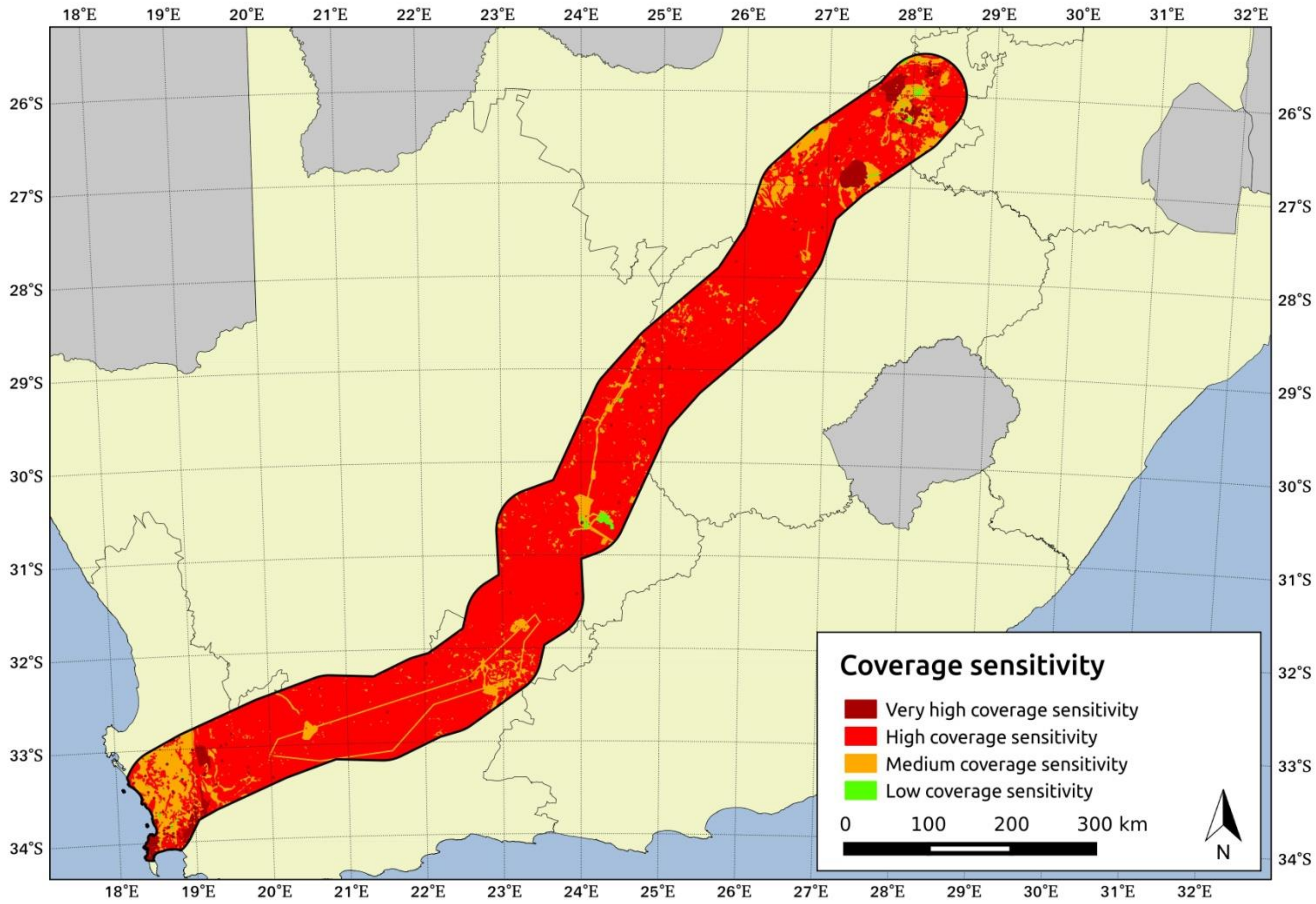
9.1.3.2 Northern Corridor



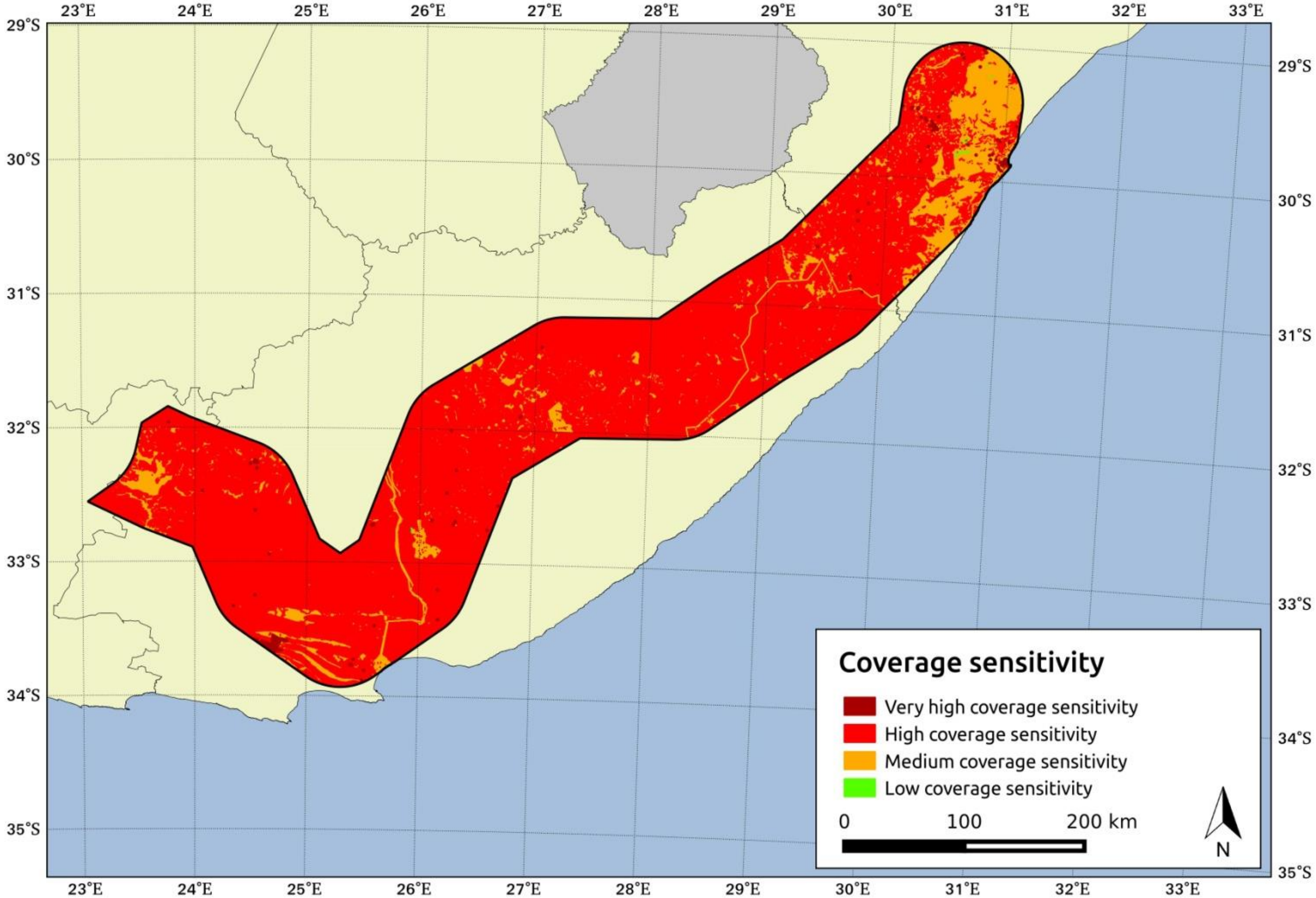
9.1.3.3 International Corridor



9.1.3.4 Central Corridor



9.1.3.5 Eastern Corridor



10 INTERPRETATION AND IMPLEMENTATION OF SENSITIVITY MAPS

10.1 Interpretation and implementation of the four tier map

Sensitivity Class	Colour	Interpretation	Implementation and additional assessments at project level	Permit requirements (if any)
Very High	*Dark Red*	These areas should be avoided and a buffer zone of 1km implemented around these sites. WHSs have their own defined buffer zones[12].	Areas identified in dark red are areas which are formally protected under the National Heritage Resources Act and the World Heritage Convention. A Heritage Impact Assessment must be undertaken within these areas and their prescribed buffer zones.	Permit from SAHRA for any possible impact on Grade I National Heritage Sites. Permit from PHRAs for impact on Grade II Provincial Heritage Sites. Additional permit from the Management Authority of the Fossil Hominid Sites of South Africa. Additional permit from SanParks for any impact on the Mapungubwe Cultural Landscape.
High	*Red*	These indicate areas where we would expect to have high possibilities of identifying sites of medium to high significance.	It is expected that Heritage Impact Assessments will be required for proposed developments in these areas and that some sites may be identified which will require mitigation, thereby increasing costs and lengthening the timeframes of the applications.	Note no permits are required for surveys. For sites of significance identified during future surveys, permits will normally be required from the relevant heritage authority if impacts are envisaged[13].
		Sites indicated in red are of high significance: IIIa sites with 150m		A general avoidance strategy should be taken but mitigation might be allowed

[12]Previous discussion between Eskom and the Management Authority of the Fossil Hominid Sites of South Africa (Cradle of Humankind) has requested no further development of power lines within the area.
[13]See previous footnote about HWC's process for handling the permitting process under Section 38 of the NHRA

Sensitivity Class	Colour	Interpretation	Implementation and additional assessments at project level	Permit requirements (if any)
		buffer zone.		under certain circumstances if avoidance is not possible. For significant sites already recorded or identified during future surveys, permits will normally be required from the relevant heritage authority if impacts are envisaged.
Medium	*Orange*	These indicate areas where we would expect to have moderate possibilities of identifying sites of medium to high significance.	It is expected that Heritage Impact Assessments will be required for proposed developments in these areas and that some sites may be identified which will require mitigation, thereby increasing costs and lengthening the timeframes of the applications. However, such sites are expected to be less sensitive or extensive than in areas shaded in red (high sensitivity).	Note no permits are required for surveys. For sites of significance already recorded or identified during future surveys, permits will normally be required from the relevant heritage authority if impacts are envisaged.
		Sites indicated in orange are of medium significance: IIIb sites with 50m buffer zone.		For significant sites already recorded or identified during future surveys, permits will normally be required from the relevant heritage authority if impacts are envisaged.
Low	*Green*	These indicate areas where we would expect to have low possibilities of identifying sites of medium to high significance.	It is expected that Heritage Impact Assessments will be required for proposed developments in these areas and that some sites may be identified which will require mitigation, thereby increasing costs and lengthening the timeframes of the applications. However, it is anticipated that further studies following the Heritage Impact Assessment would be minimal.	For sites of significance identified during future surveys, permits will normally be required from the relevant heritage authority if impacts are envisaged.
		Sites indicated in green are of low significance: IIIc sites with no buffer zone.		Where Grade IIIc sites occur the sites have generally been recorded sufficiently and are of low significance – no further mitigation is normally required for these sites.

11 INTERPRETATION AND IMPLEMENTATION OF THE COMBINED SURVEY COVERAGE MAP

Sensitivity Class	Colour	Interpretation	Implementation and additional assessments at project level	Permit requirements (if any)
Very High	*Dark Red*	These areas should be avoided and a buffer zone of 1km implemented around these sites. WHSs have their own defined buffer zones[14].	Areas identified in dark red are areas which are formally protected under the National Heritage Resources Act and the World Heritage Convention. A Heritage Impact Assessment must be undertaken within these areas and their prescribed buffer zones.	Permit from SAHRA for any possible impact on Grade I National Heritage Sites. Permit from PHRAs for impact on Grade II Provincial Heritage Sites. Additional permit from the Management Authority of the Fossil Hominid Sites of South Africa. Additional permit from SanParks for any impact on the Mapungubwe Cultural Landscape.
High	*Red*	These indicate areas which have either not been assessed for heritage resources or the assessments conducted have been very limited. These areas have at least moderate or higher palaeontological sensitivity.	It is expected that Heritage Impact Assessments will be required for proposed developments in these areas and that some sites may be identified which will require mitigation, thereby increasing costs and lengthening the timeframes of the applications.	Note no permits are required for surveys.
		Sites indicated in red are of high significance: IIIa sites with 150m buffer zone.		A general avoidance strategy should be taken but mitigation might be allowed under certain circumstances if avoidance is not possible. For sites of significance already recorded or identified during future surveys, permits will normally be required from the relevant

[14]Previous discussion between Eskom and the Management Authority of the Fossil Hominid Sites of South Africa (Cradle of Humankind) has requested no further development of power lines within the area.

Sensitivity Class	Colour	Interpretation	Implementation and additional assessments at project level	Permit requirements (if any)
				heritage authority if impacts are envisaged.
Medium	*Orange*	These include: areas which have already been assessed but require either further specific studies and/ or mitigation; areas with low or insignificant palaeontological sensitivity where only the cultural components of the HIA process are required.	Further studies will be necessary but these will be limited to specific components. These may include: • a walk-through of the area during vegetation clearing • a walk-through by specific team members (e.g. expert in built environment, Stone Age, etc) • an assessment of a section of the area which was not surveyed during previous assessments • a palaeontological desktop study • a palaeo chance find procedure	Note no permits are required for surveys. For sites of significance already recorded or identified during future surveys, permits will normally be required from the relevant heritage authority if impacts are envisaged. Consultation with relevant heritage specialists and the heritage authorities will be required in order to determine the applicability of further studies.
		Sites indicated in orange are of medium significance: IIIb sites with 50m buffer zone.		For sites of significance already recorded or identified during future surveys, permits will normally be required from the relevant heritage authority if impacts are envisaged.
Low	*Green*	Full assessment of the area has already been undertaken or the area has already been disturbed and transformed.	The area has already been surveyed sufficiently. A Heritage Impact Assessment will only be required if there is reason to believe that heritage resources will be affected by proposed electrical infrastructure.	
		Sites indicated in green are of low significance: IIIc sites with no buffer zone.		

Corridor	Key Impacts	Site Specific Descriptions	Possible Effect	Opportunities to avoid/reduce/offset
Western Corridor	Possible contextual impacts on rock art sites and historic farmhouse complexes. Physical impact in certain hotspots for highly significant and abundant fossils during pylon excavations and access road construction.	The area around the Verlorenvlei and the southern Sandveld contains many very highly significant archaeological and built environment sites. Parts of the Vredenburg Peninsula and certain formations in the Cederberg contain significant fossils. The Cederberg contains thousands of rock art sites. Engravings are abundant on the dolerite outcrops in the northernmost segments of this corridor.	Loss of sense of place and heritage tourism value (rock art and built environment sites); loss of scientific value (direct disturbance of archaeological and palaeontological remains and their contexts).	The Cederberg Mountains, the Sandveld koppies and the 1km buffer zone along the coastline must be avoided where possible. Following the routes of existing power lines will reduce cultural landscape impacts to a degree. Shell middens and artefact scatters are not visually sensitive but have scientific value and should be avoided during pylon and road construction. Contrastingly rock art sites and historic farmhouse complexes are much more visually sensitive and should be buffered.
Northern Corridor	Physical impact on open archaeological and palaeontological sites during pylon excavations or construction of access roads.	Very highly significant archaeological sites occur at Wonderwerk and in the Kathu Archaeological Complex; rock engravings and geometric paintings scattered throughout the corridor; historic copper mines near Springbok, iron mines near Postmasburg and asbestos mines near Kuruman.	Loss of sense of place and heritage tourism value (rock art and historic mines); loss of scientific value (direct disturbance of archaeological and palaeontological remains and their contexts and of geological sites).	Most important heritage sites are small in spatial extent and will be protected through implementation of buffers. Significant subsurface heritage resources occur in places and proper briefing of ECOs will be required to prevent loss of highly significant palaeontological, archaeological and palaeoanthropological resources (such as the Taung Skull). Buffering of rock art, built environment and historic sites will ensure protection of the sites and their contexts. Community consultation regarding living heritage sites and graves will be important.
International Corridor	Physical impacts to archaeological sites (especially Iron Age settlements).	Mapungubwe Cultural Landscape and other Iron Age settlements; Makapansgat; living heritage sites; rock art sites in the mountainous areas of Limpopo.	Loss of sense of place and heritage tourism value (rock art and Iron Age sites); loss of scientific value (direct disturbance of archaeological and palaeontological remains and their contexts).	Avoiding the Mapungubwe Cultural Landscape (WHS) is critical. Buffering of rock art sites, Iron Age settlements and other sites should ensure protection of their contexts. Community consultation regarding living heritage sites and graves will be important.
Central Corridor	Physical impacts to archaeological sites (especially Iron Age settlements in the	The Fossil Hominid Sites of South Africa; Iron Age settlements in the northern part of the corridor; rock engravings and paintings;	Loss of sense of place and heritage tourism value (rock art, Iron Age and built environment	Avoidance of the Fossil Hominid Sites of South Africa is critical, while buffering of known rock art, Iron Age and built environment sites will ensure their

Corridor	Key Impacts	Site Specific Descriptions	Possible Effect	Opportunities to avoid/reduce/offset
	north), palaeontological sites and built structures	historic towns and battlefields; built structures in rural contexts.	sites); loss of scientific value (direct disturbance of archaeological and palaeontological remains and their contexts).	protection. Although irreversible and unmitigatable impacts outside of the areas marked as very highly sensitive are unlikely in this corridor, focused surveys are expected to document many more important engravings, archaeological artefact scatters, vernacular architecture, ruins and Iron Age settlements that will require buffering or mitigation as relevant. Monitoring of excavations in highly sensitive fossil areas will prevent loss of data and greatly contribute to the scientific understanding of these heritage resources.
Eastern Corridor	Visual impacts on cultural landscapes, rock art sites, Iron Age settlements and living heritage sites. Physical impacts to archaeological sites (especially Iron Age settlements in the east) and palaeontological sites.	Iron Age settlements in EC and KZN; rock engravings in the far west and paintings throughout; historic towns and battlefields; living heritage in EC and KZN.	Loss of sense of place and heritage tourism value (rock art and living heritage sites); loss of scientific value (direct disturbance of archaeological and palaeontological remains and their contexts).	Heritage resources in the KZN part of this corridor are well understood and well mapped – careful planning with the heritage practitioners and authorities will greatly reduce the overall impact on heritage resources in that area. Other areas of this corridor are poorly researched. Buffering of known sites and any others recorded during future assessments will reduce impacts. There will also be unmarked burials encountered during construction activities. Community consultation regarding living heritage sites and graves will be important. Monitoring of excavations in highly sensitive fossil areas will prevent loss of data and greatly contribute to the scientific understanding of these heritage resources.

12 GENERAL COMMENTS AND DISCUSSION

12.1 General comments

Site	Overall Suitability	Comment
Western Corridor	Generally good, provided that a few key areas of very high significance are avoided. Depending on the length of the power lines proposed, approvals will require varying degrees of heritage input ranging from a full HIA (all components of heritage: archaeological, palaeontological, visual, historical, living heritage where applicable)(generally for poorly studied areas) to a walk-down survey that aims to locate specific sites that may require avoidance or mitigation in the less sensitive, better studied or more predictable areas. From the palaeontological perspective the southern parts of the corridor are sensitive and many areas will require detailed assessment. Areas of very high sensitivity occur on the Vredenburg Peninsula, in pockets around the Olifants River Valley and in formations of the West Coast Group and the Ceres Subgroup. The central and northern parts have relatively few constraints to development but, because of patches of moderate sensitivity, desktop studies would usually be required.	State of knowledge: Only the southern sections of the Western Corridor (segments 5 and 4) have been extensively studied. Further data for this area is available from rock art and archaeological surveys undertaken by eCRAG and UCT. The northern parts of the corridor are poorly surveyed, but large areas are expected to be relatively predictable for the types of heritage resources that are likely to be encountered. Regional heritage characteristics: • Stone Age artefact scatters dating to the Earlier, Middle and Later Stone Age will likely be found throughout the corridor, although in the northern parts they will likely cluster around water features (springs, streams and pans) and dolerite outcrops • Shell middens are abundant along the coastline, mostly of IIIb significance • Artefact scatters, rock art sites and archaeological deposits are common in the Sandveld and Cederberg Mountains but are far more sparsely distributed in the Kamiesberg and granite hills of Namaqualand and Bushmanland, mostly IIIa significance • The central parts of the corridor are important because the informants interviewed by Bleek & Lloyd in their extensive studies of indigenous San communities originated from there. The region was home to some of the last surviving Bushmen communities • Surface sites in the Bushmanland area are likely to be focused around ephemeral water sources such as pans and seasonal streams with the intervening areas likely to be of very low sensitivity • Historical buildings are encountered in rural areas throughout the corridor but are most prevalent in the southern half. More are likely to be encountered during surveys and may require buffering

Site	Overall Suitability	Comment
		Key heritage sites: Several Provincial Heritage Sites are located within this corridor. Most of them are buildings which were declared as National Monuments under the previous heritage legislation and are considered PHSs under the current Act • Other PHSs include the Dumortierite Occurrence between Keimoes and Kenhardt, the Heerenlogement Cave and the Anglo-Boer War Fort on the farm Aties 308 near Vanrhynsdorp, Paternoster North Site A, Baboon Point/Cape Deseada in Elands Bay and Mussel Point Midden just south of Elands Bay • The town of Vanrhynsdorp is a sensitive historic town with many protected structures • West Coast Fossil Park (National Heritage Site) • The landscape around the Verlorenvlei is sensitive and, besides the Baboon Point PHS near its mouth, the Stone Age site of Diepkloof Rock Shelter and the historic Verlorenvlei settlement are important heritage sites. From a palaeontological perspective, most of the corridor includes hotspots of sensitive formations and a PIA Desktop will mostly be sufficient outside of these zones. Areas of very high sensitivity occur on the Vredenburg Peninsula, in pockets around the Olifants River Valley and in formations of the West Coast Group and the Ceres Subgroup.
Northern Corridor	Generally good. Although many areas have not been assessed yet, the predictability in the area is quite good due to the high visibility of sites on the ground and often strong association with landscape features (e.g. rivers, rocky areas), especially for Stone Age sites. Areas of very high significance (dark red) are recorded within the corridor, but they are far less common than in other corridors. Depending on the length of the proposed power lines, approval will require varying degrees of heritage input ranging from a full HIA (for poorly studied areas) to a walk-down survey that aims to locate specific sites that may require avoidance or mitigation in less sensitive, better studied or more predictable areas. Palaeontologically NC07 to 11 are underlain by sensitive formations. While this will not affect the position of the power lines, care must be taken that a Palaeontological Impact Assessment and/or monitoring during	State of knowledge: The Northern Corridor covers sections of the Northern Cape and North West Provinces for a total of about 1100km in length. Most of the data known about this corridor resides at the McGregor Museum and this has not been fed into SAHRIS yet. Areas already surveyed within the corridor include intensively mined zones around towns such as Kathu and zones related to the numerous renewable energy developments proposed mostly in the western segment of the corridor (NC02). The coastal strip has also been intensively surveyed but the sites are not yet available on SAHRIS. Much of the rest of the area has not been assessed yet, although the predictability is quite good. Most of the areas are grazing land and agricultural activities are limited to river valleys, especially along the Orange River.

Site	Overall Suitability	Comment
	excavation be undertaken on the sensitive formations to ensure that no damage to fossil material occurs.	<u>Regional heritage characteristics:</u> • Shell middens, mostly of IIIb significance, are abundant along the Namaqualand coastline • Stone Age artefact scatters dating to the Earlier, Middle and Later Stone Age will likely be found throughout the corridor, especially in the Northern Cape section (NC01-08). These sites will likely cluster around water features (springs, streams and pans) and dolerite outcrops • Numerous rock engravings on dolerite boulders in the Northern Cape • Burial grounds and graves encountered along this corridor are mostly informal and poorly mapped. They relate to farm workers, former inhabitants of settlements now abandoned, miners anonymously buried and historical cemeteries related to farmsteads • The easternmost section of the corridor is characterised by the presence of Iron Age settlements. Although not many sites are formally recorded in segments 8, 9 and 10 the proximity of the National Heritage Site of Kaditshwene (less than 50km north) is indicative of the likelihood of an abundance of more sites in the area • It is expected that farmsteads and other structures older than 60 years may be located in rural areas. These will also require assessment and possibly buffering From a palaeontological perspective segments 1, 2, 3 and 4 are mostly underlain by bedrock of zero to low sensitivity (e.g. Vredefontein and Mbizane Formations), whereas segments 7, 8, 9 and 11 are largely underlain by bedrock of high to very high sensitivity (e.g. Boomplaas Formation, Ghaap Group and Reivilo Formation). Late Caenozoic and Quaternary alluvium (e.g. Gordonia Formation) covers most of the bedrock in the Northern Cape portion of the corridor. It is recommended that ECOs be informed of the possibility of identifying rare but important fossils during excavations. <u>Key heritage sites</u>: • Kathu Archaeological Complex is comprised of a series of sites presenting a

Site	Overall Suitability	Comment
		unique record of open air Earlier and Middle Stone Age occupation. Although the significance of the sites has been established and endorsed by SAHRA, its declaration as a National Heritage Site is pending. Due to the very high sensitivity of this area and the ongoing process of declaration, it is recommended that SAHRA be contacted before finalizing proposed electrical infrastructure to avoid unforeseen additional requirements and damage to the sites • A small number of Provincial Heritage Sites (about 40). Most of these are buildings within the urban edge of Okiep, Springbok and Kakamas; but they also include a battlefield close to Kakamas; a specularite mine at Gatkoppies, Postmasburg and an Anglo-Boer War Blockhouse at Danielskuil.
International Corridor	The overall sensitivity of the International Corridor is considered as medium with some very highly sensitive areas to be avoided. Construction of power lines in the Limpopo and Mpumalanga Provinces in the past has involuntarily affected informal burial grounds and graves. Community consultation must be undertaken during the planning phase of the power lines to reduce the chances of such occurrences and should also occur in the event of accidental discovery of graves. Depending on the length of the proposed power lines, approval will require varying degrees of heritage input ranging from a full HIA (for poorly studied areas) to a walk-down survey that aims to locate specific sites that may require avoidance or mitigation in less sensitive, better studied or more predictable areas.	<u>State of knowledge:</u> A fair number of surveys and studies have been undertaken in the northernmost segment (IC05) and the southernmost segment (IC01) of the corridor. The central portion (IC02 to 04) has been studied in less detail and specifically segment 4 has scarce coverage of both sites and impact assessments previously undertaken in the area. Sections of this corridor have been mined for the last century and therefore they may be highly disturbed. <u>Regional heritage characteristics:</u> • The landscape in the area is punctuated by Iron Age settlements. These include the Mapungubwe Cultural Landscape with sites such as Mapungubwe, K2 and Schroda; Historic Cave and Ficus Cave within the boundaries of the Makapansgat National Heritage Site and the Ruins of Verdun and Machemma which are PHSs • Unmarked and informal burial grounds and graves are very frequently found in this corridor • It is expected that farmsteads and other structures older than 60 years may be located in rural areas. These will also require assessment and possibly buffering

Site	Overall Suitability	Comment
		From a palaeontological perspective most of the corridor (IC02, 03 and 04) is underlain by formations of igneous origin with no fossil sensitivity. Segment 05 is mostly of moderate sensitivity while IC01 is underlain by formations of moderate to very high fossil sensitivity. <u>Key heritage sites:</u> • Mapungubwe Cultural Landscape, WHS and NHS • Makapansgat Valley which is part of the Fossil Hominid Sites of South Africa, WHS and NHS • Important Provincial Heritage Sites include structures, buildings and monuments within the urban edge of towns and cities • Mapoch's Cave (a testament to the Ndebele struggle) • The Dwars River Geological Occurrence • The First Gold Crushing Site and Plant in Eersteling • Verdun and Machemma Ruins (the settlement is one of several between the Soutpansberg and the Limpopo associated with the southward migration of Shona and Venda people from south-eastern Zimbabwe) • Baobab Trees
Central Corridor	The general sensitivity of this corridor is medium, with areas which have been studied in great detail such as the Cape Town and Johannesburg metropolitan areas, while others (such as segments CC06 to 08 and CC10 to 12) have been assessed in much less detail. It is expected that the construction of large power line infrastructure will generally take place outside of the urban edges of towns and the historic core of cities and will therefore not significantly affect these sites. In the Karoo (CC03 to 06), the predictability of the likely kinds of heritage resources encountered is reasonably good, with surface visibility expected to be high.	<u>State of knowledge:</u> The Central corridor spans about 1400km and occupies almost the entire length of the country. It includes the two main metropolitan areas, Johannesburg and Cape Town, which, from a heritage perspective, have been studied in great detail when compared to more rural areas of the country. Other areas, such as the central Karoo, have had less work undertaken but the predictability of the likely kinds of heritage resources encountered in this area is reasonably good. <u>Regional heritage characteristics:</u> • Stone Age artefact scatters dating to the Earlier, Middle and Later Stone Age will likely be found throughout the corridor. These sites will likely cluster around water features (springs, streams and pans) and dolerite outcrops

Site	Overall Suitability	Comment
	Depending on the length of the proposed power lines, approval will require varying degrees of heritage input ranging from a full HIA (for poorly studied areas) to a walk-down survey that aims to locate specific sites that may require avoidance or mitigation in less sensitive, better studied or more predictable areas.	• Shell middens, mostly of IIIb significance, are abundant along the coastline • More than 3650 sites were recorded along this corridor. About half of these sites are buildings within the urban edge of towns and cities which were previously declared as National Monuments under the previous legislation or they were protected in the former Heritage Register • More than 3000 rock art sites were also recorded in segment 1 and segment 2 in the Ceres, Winterhoek, Cederberg and Matroosberg mountains. The high number of recorded sites in this area is due to the high number of surveys and research undertaken that have been made publicly available on SAHRIS • Rock engravings are expected to be identified in the Karoo area on dolerite boulders • The landscape included in segments CC12, 13 and 14 is punctuated by the presence of many Iron Age sites and more of them are expected to be identified in Gauteng, North West and the Free State • It is expected that farmsteads and other structures older than 60 years may be located in rural areas, along with unmarked burials. These will also require assessment and possibly buffering. As this is the longest corridor, the palaeontological sensitivity is quite varied. While segment 1 is mostly of low palaeontological significance, the area north of Duynefontein is known for its very high palaeontological sensitivity. Other segments of significance will include the central Karoo where some of the most important fossil findings within the country have occurred. <u>Key heritage sites</u>: • Robben Island, NHS and WHS • WHS of the Fossil Hominid Site of South Africa inclusive of 12 NHSs (in Gauteng and North West) • NHSs - the Union Buildings in Pretoria, the graves of RahimaMoosa, Charlotte Maxeke, Dr Naude, Dr Xuma; the Voortrekker Monument; Table Mountain; Victor Verster Prison, Daljosafat, Cape Winelands (Grade I), District Six (Grade I) • Florisbad (CC10) PHS (nominated for NHS)

Site	Overall Suitability	Comment
		• Numerous other PHSs (over 1600 sites) • Cultural landscapes in and around historic towns such as Tulbagh Palaeontologically the most sensitive areas are CC03 to 06 (Karoo) and CC13 and 14. Sensitive formations include the Abrahamskraal, Whitehill and Teekloof Formations and the formations within the Poortje Member. Monitoring during construction and/or inspection of the exposed cuttings once the bedrock has been exposed will often be required.
Eastern Corridor	Most of the area is lacking in extracted and mapped data except for the eastern section of the corridor where the import of the KZN Museum, Amafa and Umlando databases have contributed to the greater abundance of plotted sites in this area. Palaeontologically, this is the most sensitive corridor along with the central section of the Central corridor and monitoring during construction and/or inspection of the exposed cuttings once the bedrock has been exposed will often be required. Depending on the length of the proposed power lines, approval will require varying degrees of heritage input ranging from a full HIA (for poorly studied areas) to a walk-down survey that aims to locate specific sites that may require avoidance or mitigation in less sensitive, better studied or more predictable areas.	<u>State of knowledge:</u> This corridor encompasses areas surveyed by researchers based at the Albany Museum in Grahamstown and a number of site recordings are expected to be found in their repositories. While additional recordings will contribute to more precise locations of sites, the current information provides at least proxy evidence about the type and location of as yet unrecorded sites. <u>Regional heritage characteristics:</u> • Numerous (about 430 in total) Provincial Heritage Sites are located within the towns of Graaff-Reinet, Port Elizabeth, Pietermaritzburg, Durban and a few other towns. These sites are unlikely to be affected during the construction of large power lines • Numerous rock art sites (both identified and anticipated) mainly in mountainous areas • Numerous unmarked and informal burial grounds are located in the rural areas of this corridor • Various battlefields, some recorded and many to be recorded • It is expected that farmsteads and other structures older than 60 years may be located in rural areas, along with graveyards and informal burials • Shell middens, mostly of IIIb significance, are abundant along the coastline around Port Elizabeth and between Port Shepstone and Umhlanga • High number of significant fossil sites (mostly IIIa)

Site	Overall Suitability	Comment
		• Numerous Iron Age settlements in the Eastern Cape and KwaZulu-Natal Although quite a bit of work has already been undertaken during Palaeontological Impact Assessments and for academic research, most excavations in the area will require a PIA/monitoring during construction and/or inspection of the exposed cuttings once the bedrock has been exposed. This will be highly dependent on the depth of the alluvium and the type of excavation. If the bedrock is not going to be impacted, a PIA will not be necessary. <u>Key heritage sites</u>: • NHS, the grave of Robert Sobukwe, is found at the western end of the corridor in Umasizakhe, Graaff-Reinet • OR Tambo Memorial Site/Garden of Remembrance and the OR Tambo Homestead sites - nominated as Grade I sites • Provincial Heritage Sites include the Joseph Baynes Mausoleum (Baynesfield Estate Museum) and the adjacent Lynmouth/Baynesfield Glacial Pavement • Numerous PHSs (about 430 within the urban boundaries (mostly in Uitenhage, Port Elizabeth, Queenstown, Kokstad, Durban and Pietermaritzburg) • Umhlatuzana Rock Shelter

13 CONCLUSIONS AND FURTHER RECOMMENDATIONS

CSIR was contracted to compile a National Electricity Grid Infrastructure Strategic Environmental Assessment along five corridors to map out the environmental, engineering and heritage sensitivity for future power lines and other related electrical infrastructure within the country. ASHA Consulting and CTS collaborated to assess the heritage constraints of the five corridors. The recommendations derived from this study aim to contribute to shortening the overall Environmental Impact Assessment process necessary prior to the development of electrical infrastructure.

Because of the nature of heritage and the uncertainty related to the presence of heritage resources on the landscape, the specialists, in agreement with CSIR, compiled two separate sets of map: a four-tier sensitivity map and a coverage sensitivity map.

The four-tier sensitivity map and its recommendations

The four-tier sensitivity map identified the presence of known heritage resources and the areas in which the likelihood of longer and more expensive Heritage Impact Assessments involving mitigation of heritage resources is higher. It should be noted that a Heritage Impact Assessment is required when it is anticipated that there will be impacts on significant heritage resources for a particular development proposal. This differs from a heritage survey which identifies, records and grades heritage resources with no particular development proposal in mind. Given the large size of South Africa, most HIAs incorporate a heritage survey but the two activities are not necessarily synonymous. The four-tier sensitivity map does not account for areas already thoroughly surveyed (either through research or during HIAs).The coverage sensitivity map must therefore be consulted in order to identify areas requiring no further heritage surveys. Depending on the development proposal, an HIA may or may not be required in these areas. Here below is a short summary of the explanation of the combined four-tier sensitivity map.

Areas of very high sensitivity (dark red) on the four-tier sensitivity map along the five corridors indicate World, National and Provincial Heritage Sites with their related buffer zones. Avoidance of these sites is recommended.

Areas of high sensitivity (red) on the four-tier sensitivity map indicate:

- sites that require avoidance (150m buffer) or mitigation. Avoidance of a highly significant site is always the preferred option, but if a site cannot be avoided, a heritage specialist must be contracted for its mitigation. The final decision about the scale and nature of the mitigation will be handled by the relevant heritage authority. It is important that suitably qualified and experienced heritage practitioners are utilised depending on the type of sites to be mitigated.
- areas where there is a high chance of finding heritage resources of significance and therefore it is likely that further studies and mitigation will be required.
- areas of very high palaeosensitivity which require a Palaeontological Impact Assessment inclusive of a field assessment.

Areas of moderate sensitivity on the four-tier sensitivity map indicate:

- sites that require avoidance (50m buffer) or mitigation. The final decision about the scale and nature of the mitigation will be handled by the relevant heritage authority. It is important that suitably qualified and experienced heritage practitioners are utilised depending on the type of sites to be mitigated
- areas where there is a reasonable possibility of identifying heritage material of significance and therefore it is likely that the developer will require further studies and mitigation.
- areas of high, moderate and unknown palaeontological sensitivity which will require desktop studies. For areas of moderate, high and unknown palaeontological sensitivity a desktop

Palaeontological Impact Assessment.

Areas of low sensitivity on the four-tier sensitivity map indicate:

- sites that do not require further mitigation.
- areas where there is a low chance of finding heritage material of significance (the majority of the lowlands and areas already fully assessed). A Heritage Impact Assessment is required but it is expected that no material of significance requiring extensive mitigation will be identified.
- areas of low and insignificant palaeontological significance. For areas of low sensitivity a palaeo chance find procedure will be enough. These areas can be identified in the palaeosensitivity maps on SAHRIS since they will be shaded in blue.

The coverage sensitivity map and its recommendations

The combined coverage map outlines areas already surveyed and assessed during previous heritage surveys and Heritage Impact Assessments. The degree to which these areas have been fully assessed has been graded in high, medium and low levels of coverage.

The four sensitivities and coverage of this map indicate:

Areas of very high sensitivity (dark red) on the combined coverage map along the five corridors indicate World, National and Provincial Heritage Sites with their related buffer zones. Avoidance of these sites is recommended.

Areas of high sensitivity/coverage (red) on the combined coverage map indicate that:

- a Heritage Impact Assessment inclusive of a field survey is necessary. The shapefile related to the survey coverage maps will specify which type of recommendations is linked to each polygon.

Areas of medium coverage/sensitivity (orange) on the combined coverage map indicate that:

- the area has been assessed previously, but further studies are necessary. These may include a walk-through focussed on specific areas not properly assessed previously because of low visibility or because of their extent or because of the lack certain expertise on the team. The shapefile related to the survey coverage maps will specify which type of recommendations is linked to each polygon.
  and/or
- a palaeontological desktop study or a palaeo chance find procedure is necessary.

Areas of low sensitivity (green) on the combined coverage map indicate that:

- the area has been previously assessed thoroughly. A heritage survey is not necessary but a Heritage Impact Assessment may be required if proposed developments are going to impact significant heritage resources. The advice of a specialist is recommended at the planning phase. No Palaeontological Impact Assessment is necessary.

14 APPENDIX 1

(see separate spreadsheet)

STRATEGIC ENVIRONMENTAL ASSESSMENT FOR ELECTRICITY GRID INFRASTRUCTURE IN SOUTH AFRICA

Appendix C.5

Socio-economic Scoping Assessment Report

Hugo Van Zyl and Tony Barbour
Independent Economic Researchers

CONTENTS

TABLES

FIGURES

1 SPECIALIST CV

Hugo van Zyl

Dr Hugo van Zyl holds a PhD in economics and has seventeen years' experience in socio-economic assessment with a particular focus on making inputs to environmental authorisation processes (EIAs and SEAs). He has been involved in over 60 socio-economic appraisals of infrastructure projects, industrial developments, mixed use developments, mining, energy projects, conservation projects and eco-tourism initiatives throughout Southern Africa. He has lead, participated in and co-ordinated research in environmental resource economics, socio-economic impact assessment, strategic assessment and protected area financing strategy. He has provided economic inputs and guidance to national water tariff, air pollution, biodiversity conservation, biofuels, mine closure funding and climate change policy. Dr Van Zyl is also the lead author of the Western Cape Provincial Government guidelines on economic specialist inputs into EIAs. These guidelines have been accepted at a national level and are applied throughout the country.

Dr van Zyl's experience with particular relevance to the transmission infrastructure and SEA includes:

- Provision of selected socio-economic data to CSIR to assist with Phase I of the wind and solar PV SEA undertaken for DEA.
- Socio-economic specialist studies to form part of EIAs for various energy sector projects focused on renewable energy. Most of these projects included the need to consider impacts associated with transmission lines. They include:
    - Wind – SWE near Vleesbaai, Western Cape (2013); SAGIT Energy Ventures near Bot River and Wolesley, Western Cape (2012). Windcurrent near Jeffrey's Bay, Eastern Cape (2011); InnoWind near Mossel Bay, Western Cape (2011); Mainstream near Jeffrey's Bay, Eastern Cape (2010).
    - Solar - Mainstream near Douglas and Keimoes, Northern Cape (2012); Thupela Energy near Vaalwater, Limpopo (2011).
- Socio-economic specialist studies to form part of EIAs for other infrastructure projects including significant transmission line components. They include:
    - Desalination plant for West Coast District Municipality, Western Cape (2012).
    - Saldanha Regional Marine Outfall Project (SRMOP) in Danger Bay near Saldanha Bay, Western Cape (2014)
- Environmental resource economic and socio-economic specialist study to form part of the Strategic Environmental Assessment and accompanying management plan for the Port of Saldanha, Western Cape (2013).
- Lead author of a Strategic Environmental Assessment (SEA) of the potential production of biofuels based on Jatropha in the Kavango and Caprivi regions of Namibia (2010).
- Environmental resource economics specialist study to form part of the Strategic Environmental Assessment and accompanying Environmental Management Framework for the Pixley ka Seme municipality in Mpumalanga (2010).
- Environmental resource economics specialist study to form part of the Strategic Environmental Assessment and accompanying Environmental Management Framework for the Albert Luthuli and Msukaligwa municipalities in Mpumalanga (2008).

Tony Barbour

Tony Barbour holds a master's degree in environmental science and has 23 years' experience in the environmental sector. His experience includes ten years as an environmental consultant in the private sector in South Africa followed by four and a half years at the University of Cape Town's Environmental Evaluation Unit. In 2004 he established his own environmental consulting company, Tony Barbour Environmental Consulting and Research, with a focus on Social Impact Assessment (SIA), Strategic Environmental Assessment (SEA), Independent Review Work, Training and Capacity Building and Environmental Project Management. Tony has conducted over 40 Social Impact Assessments and is the lead author of the Western Cape Provincial Government guidelines on social specialist inputs into EIAs.

Tony Barbour's experience with particular relevance to the transmission infrastructure and SEA includes:

- Social Assessment Specialist for Scoping Level Assessment of Eskom transmission lines from proposed Bantamsklip Nuclear Power Station, Western Cape (2010).
- Social Assessment Specialist for EIA undertaken for Eskom transmission lines from Koeberg Nuclear Power Station, Western Cape (2010).
- Social Assessment Specialist for EIA for Koeberg-Ankerlig transmission line (2014).
- Social Assessment Specialists for EIA for transmission line options associated with Blanco Substation, George (2014).
- Social Assessment Specialist for EIAs undertaken for over 40 wind and solar energy projects in South Africa. The majority of SIAs includes an assessment of transmission line routes. Projects include:
    - Wind – Juwi, Northern Cape (2013), Mainstream, Northern Cape (2014), Gouda, Western Cape (2013); SAGIT Energy Venture, Western Cape (2012). Mainstream, Free State (2012), Amakhala, Eastern Cape (2010),
    - Solar – Mainstream, Northern Cape (2014), Abengoa, Northern Cape (2014), Kabi Energy, North West Province (2013), Subsolar, Free State (2013)
- Project Manager and Social Specialist for Strategic Environmental Assessment (SEA) for Phase 2 of the National Roads Strategy for Mozambique (2007).
- Project Manager for Strategic Environmental Assessment (SEA) of the potential production of biofuels based on Jatropha in the Kavango and Caprivi regions of Namibia (2010).
- Project Manager for Strategic Environmental Assessment (SEA) for development of City of Windhoek (2011).
- Public Consultation Facilitator and Social Specialist for Wellington Industrial Area Strategic Environmental Assessment (SEA), (2014).

2 SPECIALIST DECLARATION

I, Hugo van Zyl, as the lead appointed independent specialist hereby declare that I:

- act/ed as the independent specialist in this application;
- regard the information contained in this report as it relates to my specialist input/study to be true and correct;
- do not have and will not have any financial interest in the undertaking of the activity, other than remuneration for work performed;
- have and will not have any vested interest in the proposed activity proceeding;
- have disclosed any material information that have or may have the potential to influence the objectivity of any report or decisions base thereon; and
- am aware that a false declaration is an offence in terms of regulation 71 of GN No. R. 543.

Signature of the specialist:

Name of company: Independent Economic Researchers

Date: 03/07/2015

3 ABBREVIATIONS AND ACRONYMS

BA	Basic Assessment
BID	Background Information Document
DEA	Department of Environmental Affairs
Dti	Department of Trade and Industry
CSIR	Council for Scientific and Industrial Research
EGI	Electricity Grid Infrastructure
EIA	Environmental Impact Assessment
EMF	Electro-magnetic Field
EMP	Environmental Management Plan
EMPR	Environmental Management Plan Report
GDP	Gross Domestic Product
I&APs	Interested and Affected Parties
IPP	Independent Power Producers
NERSA	National Energy Regulatory of South Africa
PPP	Public Participation Process
RAP	Resettlement Action Plan
REIPPPP	Renewable Energy Independent Power Producers Procurement Programme
SEA	Strategic Environmental Assessment
SEZ	Special Economic Zone
SIP	Strategic Integrated Project
SIA	Social Impact Assessment
VIA	Visual Impact Assessment
WWF	Worldwide Fund for Nature

4 INTRODUCTION AND SCOPE

The National Department of Environmental Affairs (DEA) has embarked on a process of identifying ways to act swiftly, streamline and shorten the environmental authorisation process for major infrastructure build programmes in South Africa. In particular, the DEA is looking to facilitate the efficient roll out of Strategic Integrated Projects (SIPs) lead by the Presidential Infrastructure Coordinating Committee and detailed in the National Infrastructure Plan.

As part of this process, the Department of Environmental Affairs (DEA), commissioned the Council for Scientific and Industrial Research (CSIR) to undertake a Strategic Environmental Assessment (SEA) linked to SIP 10: Electricity Transmission and Distribution for all. The SEA is entitled “National Department of Environmental Affairs Electricity Grid Infrastructure Strategic Environmental Assessment”. The aim of the SEA is to identify suitable routing corridors that will enable the efficient and effective expansion of key strategic transmission infrastructure designed to satisfy national transmission requirements up to 2040.

Upon gazetting of the corridors, it is envisaged that the environmental authorisation process for transmission infrastructure will be streamlined in specific areas identified through the SEA process as being less sensitive to the negative impacts of electricity grid infrastructure development. This should incentivise Eskom and other potential transmission infrastructure developers to plan and develop in less sensitive areas.

The preliminary corridors (the starting point of the SEA) were identified by Eskom and are based on the results of a detailed Eskom Strategic Grid Plan Study. The Study considered a number of possible future generation and load scenarios and in so doing identified the need for five national transmission infrastructure corridors to facilitate the balancing of South Africa’s electricity supply and demand needs up to 2040. The 100 km wide corridors are as shown in the figure below:

- Central Corridor;
- Northern Corridor;
- International Corridor;
- Eastern Corridor, and;
- Western Corridor.

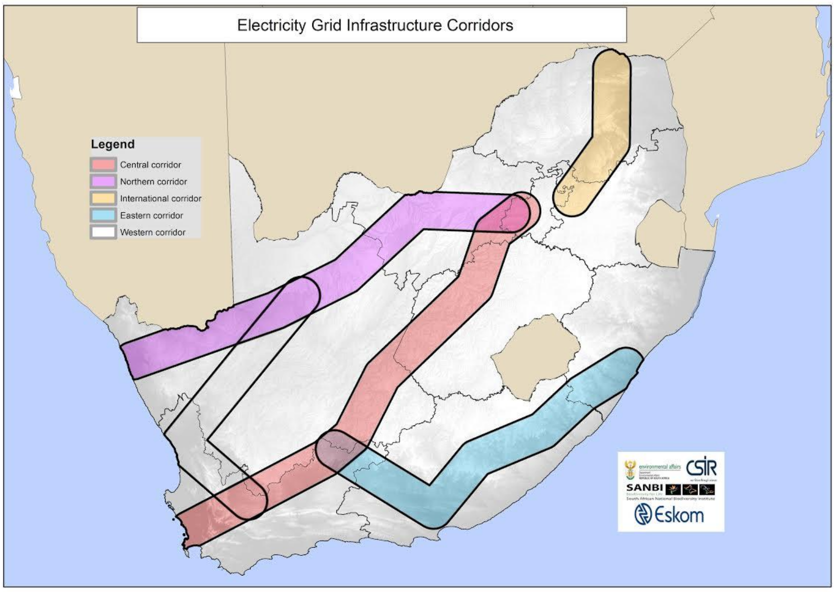


Figure 5-4-1: Eskom preliminary corridors

The main thrust of this socio-economic specialist input is to provide an understanding of the impacts that are likely to arise specifically as a result of the declaration of corridors. Assessing the impacts of transmission lines and other electricity grid infrastructure (EGI) elements as project types is thus necessary to the extent that this assists with better understanding the impacts of declaring special corridors for EGI.

The following key issues or questions provided guidance for the assessment:

- What advantages and disadvantages do the corridors and concomitantly streamlined authorisation of strategic electricity grid infrastructure development within the corridors present to national, provincial and local economies;
- What opportunities or challenges do the gazetting of strategic corridors, where Eskom plan to expand the EGI network, present to industry, both energy intensive and IPPs?
- What is the risk for a devaluation or escalation of land prices in the corridors and if so, how could this be managed. Consideration should be given to the negotiation and servitude acquisition process followed by Eskom when undertaking route selection;
- What impacts (if any) will the corridors and EGI development within the corridors have on communities, in particular the risk of resettlement, displacement, to health and well-being?
- What are the potential costs and benefits related to undertaking a 40 year strategic assessment to identify the position of South Africa future transmission backbone and fast tracking EGI development in these areas?
- Recommendations on the public participation process as part of a streamlined environmental assessment process that needs to be undertaken at the project level in each of the corridors. This information will be incorporated into a Development Protocol that will ultimately govern development in the corridor.

5 APPROACH

The study process started with a description of the basic socio-economic conditions, land uses and key towns within each of the five proposed corridors. The following socio-economic indicators were chosen for this purpose drawing primarily on the 2001 and 2011 Census data:

- Population numbers,
- Population growth (2001 to 2011),
- Population density,
- Unemployment levels,
- Electricity service provision levels,

The socio-economic description along with a scoping of key issues commonly associated with EGI projects was then used to identify the following key impacts and issues for assessment:

- Strategic development considerations
- Impacts on key economic sectors including:
  - Electricity generators (incl. IPPs)
  - Industry with a focus on energy intensive industries
  - Tourism and eco-tourism in particular
- Impacts on property values
- Resettlement and relocation impacts
- Impacts associated with the presence of EGI project workers and operations
- Health impacts focusing on those associated with electro-magnetic fields

For each impact type or category it was necessary to first understand the impacts associated with EGI in general (i.e. what kinds of impacts are generally to be found when assessing EGI infrastructure projects such as transmission line projects). This was then used to inform the key purpose of the study, namely the assessment of impacts that are specific to the declaration of corridors and ways to mitigate these impacts. Key data sources used for assessment included reviews of the published and grey literature including previous EIA reports and associated specialist studies for EGI projects along with stakeholder interviews. In this regard particularly useful inputs were provided by John Geeringh, Ronald Marais, Kevin Leask, Ernest Grunewald and Kritesh Bedessie (all from Eskom) and by Maoto Molefane from the Department of Trade and Industry.

Once impacts were assessed, it was also possible to make recommendations on public participation process-related issues distinguishing between (1) public participation as part of the SEA process and (2) as part of the Basic Assessments that will be necessary for future EGI projects in the corridors.

5.1 Assumptions and limitations

Key overall assumptions with relevance to the study included:

- All inputs provided by CSIR, Eskom and other stakeholders were assumed to be correct unless a clear reason was found to suspect otherwise.
- The findings of the assessment reflect the best professional assessment of the authors drawing on relevant and available information within the constraints of time and resources thought appropriate and made available for the assessment.

The following points are important to bear in mind with regard to key limitations of the study:

- Given the strategic nature of the study and the size of the proposed corridors, it was not possible to conduct detailed assessments of impacts. This made it difficult to reach particularly firm conclusions for some impacts.
- This applied study cannot be expected to address any gaps or shortcomings in the literature that was reviewed and used to inform some study findings. Shortcoming have, however, been considered to the extent possible in reaching conclusions.

6 DESCRIPTION OF CORRIDORS

This section provides a brief description of socio-economic conditions in each of the five corridors. Its purpose it to provide a level of familiarity with these conditions without extensive analysis. For each corridor, the following data and information is provided focusing on the local municipal scale and drawing primarily on the 2011 Census:

- Population numbers,
- Population growth (2001 to 2011),
- Population density,
- Unemployment levels,
- Electricity service provision levels,
- Key towns and broad land uses

Provincial averages for these data are also provided for comparative purposes. Note that further details on the spatial distribution of IPP renewable energy projects within each corridor and province are provided in Section 7.2. Similarly, further details on Special Economic Zones (SEZs) are provided in Section 7.3. Areas of particular tourism importance in each corridor are also discussed further in Section 7.4.

6.1 Central Corridor

The table below contains summary socio-economic data and a list of key towns/cities in the Central Corridor moving from south to north. With respect to land use, the corridor originates in the City of Cape Town moving through the mixed high-value agriculture and protected areas of Stellenbosch and Drakenstein and on to the Karoo characterised by small livestock farming and increasingly solar power generation centred around towns such as De Aar. Crossing into the western Free State and passing through Kimberley it goes through agricultural, game farming and diamond mining areas. It also goes through agricultural and mining areas such as Klerksdorp in the North-West Province before entering Gauteng.

Table 5-1: Socio-economic data and key towns – Central Corridor

Central Corridor - south to north						
Province / local Municipality	**Total population (2011)**	**Annual population growth rate (2001 to 2011)**	**Population density 2011 (people /km²)**	**Unemployment rate (2011)**	**Percnetage of households with electricity (2011)**	**Main towns/cities**
Western Cape	**5,822,734**	**2.5%**	**45**	**21.6%**	**93.4%**	
City of Cape Town	3,740,026	2.6%	1,530	23.9%	94.0%	Cape Town
Stellenbosch	155,733	2.7%	187	15.2%	92.9%	Franschhoek
Drakenstein	251,262	2.6%	163	17.6%	95.0%	Mbekweni
Swartland	113,762	4.6%	31	12.7%	97.8%	Mooreesburg
Saldanha Bay	99,193	3.5%	49	23.4%	97.0%	Saldanha
Bergrivier	61,897	2.9%	14	6.8%	94.9%	Porterville
Drakenstein	251,262	2.6%	163	17.6%	95.0%	Mbekweni
Breede Valley	166,825	1.3%	44	14.4%	88.3%	Worcester
Witzenberg	115,946	2.6%	11	7.6%	93.4%	Prince Alfred Hamlet
Langeberg	97,724	1.8%	22	11.3%	94.2%	
Prince Albert	13,136	2.2%	2	19.4%	86.4%	
Beaufort West	49,586	1.4%	2	25.5%	92.0%	Merweville
Northern Cape	**1,145,861**	**1.4%**	**3**	**27.4%**	**85.4%**	
Karoo Hoogland	12,588	1.8%	-	14.6%	64.9%	Sutherland
Ubuntu	18,601	1.3%	1	29.1%	84.8%	Ubuntu
Emthanjeni	42,356	1.7%	3	28.0%	92.6%	Britstown
Renosterberg	10,978	1.9%	2	26.8%	88.1%	Phillipstown
Thembelihle	15,701	0.8%	2	28.4%	75.2%	Hopetown
Siyancuma	37,076	-0.6%	2	28.2%	82.2%	
Sol Plaatjie	248,041	2.0%	79	31.9%	84.9%	Kimberly
Free State	**2,745,590**	**0.1%**	**21**	**32.6%**	**89.9%**	
Letsemeng	38,628	-1.0%	4	22.3%	92.8%	Jacobsdal
Tokologo	28,986	-1.1%	3	27.5%	84.2%	Boshof
Tswelopele	47,625	-1.2%	7	34.8%	91.9%	Bultfontein
Masilonyana	63,334	-0.2%	9	38.8%	93.2%	Masilonyana
Matjhabeng	406,461	0.0%	79	37.0%	91.1%	Welkom
Nala	81,220	-1.9%	20	35.9%	90.3%	Wesselsbron
Moqhaka	160,532	-0.5%	20	35.2%	93.3%	Vierfontein
Ngwathe	120,520	0.1%	17	35.2%	92.0%	Parys
Metsimaholo	149,108	2.5%	87	32.1%	86.4%	Vaalprk
North West	**3,509,953**	**1.6%**	**34**	**31.5%**	**84.0%**	
Maquassi Hills	77,794	1.2%	17	33.4%	82.8%	Makwassie
City of Matlosana	398,676	1.0%	112	32.7%	90.3%	Hartbeesfontein
Tlokwe City Council	162,762	2.4%	61	21.6%	90.5%	Potchefstroom
Ventersdorp	56,702	2.8%	15	27.0%	76.1%	Ventersdorp
Rustenburg	549,575	3.5%	161	26.4%	83.0%	
Madibeng	477,381	3.2%	124	30.4%	81.0%	Hartbeespoort
Gauteng	**12,272,263**	**2.7%**	**675**	**26.3%**	**87.4%**	
Merafong City	197,520	-0.6%	121	27.2%	82.8%	
Randfontein	149,286	1.5%	314	27.1%	84.5%	
Westonaria	111,767	0.2%	175	29.5%	64.3%	
Emfuleni	721,663	0.9%	747	34.7%	92.2%	
Midvaal	95,301	3.9%	55	18.8%	79.3%	
City of Johannesburg	4,434,827	3.2%	2,696	25.0%	90.8%	Johannesburg
Mogale City	362,422	2.0%	270	24.6%	85.9%	
City of Tshwane	2,921,488	3.1%	464	24.2%	88.6%	Pretoria
Ekurhuleni	3,178,470	2.5%	1,609	28.8%	82.2%	

6.2 Northern Corridor

The table below contains summary socio-economic data and a list of key towns/cities in the Northern Corridor moving from west to east. The corridor originates in the Northern Cape on the coast to the south of Port Nolloth, an area characterised by mining mostly for diamonds and some agriculture. It then moves through primarily agricultural areas interspersed with mining operations and increasingly solar power generation facilities particularly near Pofadder and Upington. It passes through the major iron ore mining areas around Sishen/Kathu before crossing into the agricultural areas of North-West province centred around Vryburg. Thereafter it reaches the wider Rustenburg area platinum belt and on to Gauteng.

Table 5--2: Socio-economic data and key towns – Northern Corridor

Northern Corridor - west to east						
Province / local Municipality	**Total population (2011)**	**Annual population growth rate (2001 to 2011)**	**Population density 2011 (people /km^2)**	**Unemployment rate (2011)**	**Percnetage of households with electricity (2011)**	**Main towns/cities**
Northern Cape	**1,145,861**	**1.4%**	**3.1**	**27.4%**	**85.4%**	
Richtersveld	11,982	1.7%	1.0	18.6%	96.0%	Port Nolloth
Nama Khoi	47,041	0.5%	3.0	22.9%	93.7%	Springbok
Khai-Ma	12,465	0.8%	1.0	22.1%	89.6%	Pofadder
Kai !Garib	65,869	1.2%	2.0	10.0%	87.4%	Kakamas
//Khara Hais	93,494	1.8%	4.0	22.1%	91.1%	Upington
!Kheis	16,637	0.1%	1.0	28.0%	64.0%	
Tsantsabane	35,093	2.6%	2.0	26.1%	83.5%	Postmasburg
Siyancuma	37,076	-0.6%	2.0	28.2%	82.2%	
Gamagara	41,617	5.8%	16.0	17.7%	87.9%	Dibeng
Ga-Segonyana	93,651	2.9%	21.0	33.7%	91.2%	kuruman
Joe Morolong	89,530	-0.9%	4.0	38.6%	81.8%	
Kgatelopele	18,687	2.4%	8.0	22.3%	91.7%	Danielskull
Dikgatlong	46,841	2.0%	6.0	39.7%	75.9%	
North West	**3,509,953**	**1.6%**	**33.5**	**31.5%**	**84.0%**	
Kagisano/Molopo	105,789	0.5%	4.0	30.2%	73.8%	
Greater Taung	177,642	-0.3%	32.0	49.8%	88.5%	Reivilo
Naledi	66,781	1.7%	10.0	26.1%	76.7%	Vryburg
Ratlou	107,339	0.1%	22.0	43.9%	83.7%	
Tswaing	124,218	0.8%	21.0	28.7%	73.7%	Ottosdal
Mafikeng	291,527	1.2%	79.0	35.7%	84.5%	Mmabatho
Ditsobotla	168,902	1.4%	26.0	28.3%	74.0%	Lichtenburg
City of Matlosana	398,676	1.0%	112.0	32.7%	90.3%	Hartbeesfontein
Ventersdorp	56,702	2.8%	15.0	27.0%	76.1%	Ventersdorp
Kgetlengrivier	51,049	3.4%	13.0	20.5%	78.0%	Koster
Rustenburg	549,575	3.5%	161.0	26.4%	83.0%	
Gauteng	**12,272,263**	**2.7%**	**675.1**	**26.3%**	**87.4%**	
Mogale City	362,422	2.0%	270.0	24.6%	85.9%	

6.3 International Corridor

The table below contains summary socio-economic data and a list of key towns/cities in the International Corridor moving from south to north. With respect to land use, the corridor originates in Gauteng going through areas of north east Mpumalanga dominated by maize production and other cultivation along with extensive coal mining centred around the Witbank area. Crossing into Limpopo, agriculture is the dominant land use with increasing mining taking place. Particularly towards northern Limpopo, game farming and protected areas such as the Nzehelele Nature Reserve are more prevalent.

Table 5-3: Socio-economic data and key towns – International Corridor

International Corridor - North to South						
Province / local Municipality	**Total population (2011)**	**Annual population growth rate (2001 to 2011)**	**Population density 2011 (people /km^2)**	**Unemployment rate (2011)**	**Percnetage of households with electricity (2011)**	**Main towns/cities**
Gauteng	**12,272,263**	**2.7%**	**675.1**	**26.3%**	**87.4%**	
City of Tshwane	2,921,488	3.1%	464.0	24.2%	88.6%	Pretoria
Lesedi	99,520	3.3%	67.0	25.9%	89.9%	
Mpumalanga	**4,039,939**	**1.8%**	**52.8**	**31.6%**	**86.4%**	
Victor Khanye	75,452	2.9%	48.0	28.2%	84.9%	Delmas
Emalahleni	395,466	3.6%	148.0	27.3%	73.4%	Witbank
Thembisile	310,458	1.9%	130.0	37.0%	92.3%	Tweenfontein
Steve Tshwete	229,831	4.8%	58.0	19.7%	90.8%	Middleburg
Emakhazeni	47,216	0.9%	10.0	25.9%	83.6%	Stoffberg
Thaba Chweu	98,387	1.9%	17.0	20.5%	84.3%	
Limpopo	**5,404,868**	**0.8%**	**43.0**	**38.9%**	**87.3%**	
Elias Motsoaledi	249,363	1.2%	67.0	42.9%	91.1%	Groblersdal
Ephraim Mogale	123,648	0.2%	61.0	41.4%	89.6%	Marble Hall
Makhuduthamaga	274,358	0.5%	131.0	62.7%	90.4%	Ga-Marishane
Greater Tubatse	335,676	2.2%	73.0	50.3%	75.7%	
Fetakgomo	93,795	0.1%	85.0	58.9%	91.5%	
Lepele-Nkumpi	230,350	0.1%	67.0	48.1%	91.9%	Zebediela
Mookgopong	35,640	0.3%	6.0	23.5%	85.3%	Roedtan
Mogalakwena	307,682	0.3%	50.0	40.2%	91.8%	Mokopane
Aganang	131,164	-1.1%	70.0	50.4%	94.6%	
Polokwane	628,999	2.1%	167.0	32.4%	83.0%	Polokwane
Greater Tzaneen	390,095	0.4%	120.0	36.7%	86.2%	
Greater Letaba	212,701	-0.3%	112.0	40.3%	90.8%	
Molemole	108,321	-0.1%	32.0	42.7%	95.7%	Soekmekaar
Makhado	516,031	0.4%	62.0	36.7%	89.4%	Louis Trichardt
Blouberg	162,629	-0.5%	18.0	39.2%	88.0%	
Musina	68,359	5.5%	9.0	18.7%	76.4%	Mussina

6.4 Eastern Corridor

The table below contains summary socio-economic data and a list of key towns/cities in the Eastern Corridor moving from west to east. With respect to land use, the corridor originates in the Beaufort West municipality moving into the Karoo region of the Eastern Cape characterised by small livestock faming. It passes through towns such Graff-Reinet and Jansenville on its way to Nelson Mandela Bay. The area north of this towards Cradock is of particular importance for wind energy projects along with other parts of the Eastern Cape where wind potential is significant. The corridor includes protected areas such as the Addo Elephant National Park and agricultural areas such as the Sunday's River Valley. Game farming and associated tourism is also relatively prominent in this wider area stretching roughly from north of Port Elizabeth to the Queenstown area. The corridor then moves through to the Transkei region of the Eastern Cape. The majority of the land in this area is communally owned and population densities are higher than other rural areas within the Eastern Cape Province. The land uses along the majority of the corridor in this area is communal farming, involving livestock and mostly dryland crops. The eastern section of the corridor is located in Kwa-Zulu Natal where land uses along the majority of the route are linked to commercial farming, specifically sugar cane and fruit farming. The south coast of Kwa-Zulu Natal is also an important tourist destination.

Table 5-4: Socio-economic data and key towns – Eastern Corridor

Eastern Corridor - west to east						
Province / local Municipality	**Total population (2011)**	**Annual population growth rate (2001 to 2011)**	**Population density 2011 (people /km^2)**	**Unemployment rate (2011)**	**Percnetage of households with electricity (2011)**	**Main towns/cities**
Western Cape	**5,822,734**	**2.5%**	**45.0**	**21.6%**	**93.4%**	
Beaufort West	49,586	1.4%	2.0	25.5%	92.0%	Murraysburg
Easten Cape	**6,562,053**	**0.0%**	**38.8**	**37.4%**	**75.0%**	
Camdeboo	50,993	1.1%	4.0	30.1%	94.1%	Graaf-Reinet
Blue Crane Route	36,002	0.2%	3.0	30.7%	86.9%	Sommerset Eeast
Ikwezi	10,537	0.2%	2.0	18.3%	88.5%	Jansenville
Baviaans	17,761	0.5%	2.0	29.4%	89.2%	Steytlerville
Sundays River Valley	54,504	2.2%	9.0	15.0%	79.8%	Kirkwood
Kouga	98,558	3.2%	37.0	21.5%	86.9%	Patensie
Nelson Mandela Bay	1,152,115	1.4%	588.0	36.6%	90.5%	Bethelsdorp
Makana	80,390	0.7%	18.0	32.5%	89.5%	Riebeek East
Nkonkobe	127,115	-0.2%	35.0	48.1%	88.4%	Fort Beaufort
Nxuba	24,264	-0.2%	9.0	42.0%	92.2%	Bedford
Inxuba Yethemba	65,560	0.8%	6.0	25.7%	95.6%	Cradock
Tsolwana	33,281	0.2%	5.0	38.2%	88.0%	Tarkastad
Inkwanca	21,971	0.8%	6.0	39.3%	91.7%	Sterkstroom
Lukanji	190,723	0.5%	50.0	36.8%	90.9%	Queenstown
Intsika Yethu	145,372	-0.6%	54.0	46.6%	71.0%	Confimvaba
Emalahleni	119,460	-0.2%	35.0	46.3%	78.5%	Lady Frere
Maletswai	43,800	1.6%	10.0	26.7%	84.2%	
Senqu	134,150	-0.1%	18.0	35.5%	81.1%	Barkly East
Sakhisizwe	63,582	-0.4%	27.0	38.8%	79.1%	Ellot
Engcobo	155,513	-0.4%	63.0	45.7%	50.9%	
Mbhashe	254,909	-0.4%	80.0	42.4%	49.7%	
King Sabata Dalindyebo	451,710	0.8%	149.0	38.3%	73.3%	Umtata
Nyandeni	290,390	0.6%	117.0	44.8%	71.0%	Libonde
Mhlontlo	188,226	-0.8%	67.0	48.9%	72.6%	
Elundini	138,141	0.1%	27.0	44.4%	46.3%	Maclear
Umzimvubu	191,620	-0.6%	74.0	45.9%	45.2%	Mount Ayliff
Ntabankulu	123,976	-0.6%	90.0	50.6%	23.3%	Tabankulu
Ngquza Hill	72,190	-1.5%	32.0	52.8%	91.4%	Flagstaff
Mbizana	281,905	1.4%	117.0	43.6%	60.0%	Bizana
KwaZulu-Natal	**10,267,300**	**0.7%**	**108.8**	**33.0%**	**77.9%**	
Greater Kokstad	65,981	1.6%	25.0	28.9%	80.7%	Kokstad
UMuziwabantu	96,556	0.5%	89.0	33.0%	80.3%	Harding
Ezingoleni	52,540	-0.4%	81.0	41.6%	79.9%	Kwamshiwa
Umzumbe	160,975	-1.9%	128.0	51.9%	49.0%	
Umzimkhulu	180,302	0.3%	74.0	46.6%	64.5%	Umzimkhulu
Ingwe	100,548	-0.7%	51.0	39.3%	49.9%	Donnybrook
Ubuhlebezwe	101,691	0.0%	63.0	34.0%	53.9%	Ixopo
Vulamehlo	77,403	-0.7%	81.0	52.6%	36.9%	
Umdoni	78,875	2.4%	314.0	33.3%	76.3%	Umzinto
Ethekwini	3,442,361	1.1%	1,502.0	30.2%	89.9%	Durban
Mkhambathini	63,142	0.7%	71.0	26.8%	65.2%	Camperdown
Richmond	65,793	0.4%	52.0	26.3%	81.5%	Richmond
The Msunduzi	618,536	1.1%	976.0	33.0%	91.9%	Piertermaritzburg
uMngeni	92,710	2.3%	59.0	23.9%	85.5%	Howick
Mpofana	38,103	0.3%	21.0	23.9%	71.9%	
uMshwathi	106,374	-0.2%	59.0	24.9%	72.7%	Mpoleni
Ethekwini	3,442,361	1.1%	1,502.0	30.2%	89.9%	Durban
Ndwedwe	140,820	-0.3%	129.0	48.7%	37.3%	
Maphumulo	96,724	-2.2%	108.0	49.0%	33.7%	
Umvoti	103,093	1.1%	41.0	30.4%	58.3%	Greytown

6.5 Western Corridor

The table below contains summary socio-economic data and a list of key towns/cities in the Western Corridor moving from west to east. The corridor originates in the Saldanha area which is increasing characterised by large scale industrial development associated with the Saldanha Industrial Development Zone. There is also significant interest in wind farm development in this area and along the West Coast. The corridor then moves through primarily agricultural areas interspersed with protected areas in the Ceres Valley, Sandveld and Cederberg before reaching Namaqualand known for its flower-base tourism. In the Northern Cape it moves through sparsely populated areas supporting agriculture focused on grazing with limited cultivation given water availability. Increasing this area is also characterised by the development of solar energy generation facilities taking advantage or high levels or solar radiation.

Table 5-5: Socio-economic data and key towns – Western Corridor

Western Corridor - west to east						
Province / local Municipality	**Total population (2011)**	**Annual population growth rate (2001 to 2011)**	**Population density 2011 (people /km^2)**	**Unemployment rate (2011)**	**Percnetage of households with electricity (2011)**	**Main towns/cities**
Western Cape	**5,822,734**	**2.5%**	**45.0**	**21.6%**	**93.4%**	
Saldanha Bay	99,193	3.5%	49.0	23.4%	97.0%	Saldanha
Bergrivier	61,897	2.9%	14.0	6.8%	94.9%	Velddrif
Cederberg	49,768	2.3%	6.0	10.5%	88.8%	Clawilliam
Matzikama	67,147	2.1%	5.0	14.0%	88.7%	Vredendal
Northern Cape	**1,145,861**	**1.4%**	**3.1**	**27.4%**	**85.4%**	
Hantam	21,578	0.6%	1.0	11.8%	76.9%	Nieuwoudtville
Khai-Ma	12,465	0.8%	1.0	22.1%	89.6%	Pofadder
Kai !Garib	65,869	1.2%	2.0	10.0%	87.4%	Kenhardt
!Kheis	16,637	0.1%	1.0	28.0%	64.0%	Groblershoop

7 ASSESSMENT OF IMPACTS

This section focuses on the assessment of the key impacts of the declaration of EGI corridors including:

- Strategic development considerations
- Impacts on key economic sectors including:[1]
    - Electricity generators (incl. Independent Power Producers)
    - Industry with a focus on energy intensive industries
    - Tourism and eco-tourism in particular
- Impacts on property values
- Resettlement and relocation impacts
- Impacts associated with the presence of EGI project workers and operations
- Health impacts focusing on those associated with electro-magnetic fields (EMFs)

Each assessment section starts by briefly considering the impacts associated with EGI infrastructure in general (i.e. what kinds of impacts are generally to be found when assessing EGI infrastructure projects such as transmission line projects). The focus then shifts to the key purpose of the study, namely the assessment of impacts that are specific to the declaration of corridors and ways to mitigate these impacts.

[1] Note that impacts on agriculture are dealt with in the agricultural specialist assessment.

7.1 Strategic development considerations

7.1.1 Impacts of EGI in general

With respect to the development or Electricity Grid Infrastructure (EGI), Eskom's Transmission Development Plan (TDP) for the period 2015 to 2024 notes that new transmission lines and associated infrastructure form part of the long-term strategy to develop a main transmission backbone from which regional power corridors can be supported. These power corridors will connect generation pools to one another and to the major load/demand centres in the country. EGI is thus essential for the transmission or transport of electricity from locations where it is generated to its end users. It therefore forms an integral part of the system that allows for the provision of electricity to consumers and its strategic socio-economic benefits are essentially inseparable from the overall strategic benefits of electricity provision. These are highly significant, diverse and relatively self-evident.

The links between energy and electricity provision and socio-economic development have been spelt out by a number of authors. DFID (2002), for example, provides the following synopsis:

"Energy provides services to meet many basic human needs, particularly heat, motive power (e.g. water pumps and transport) and light. Business, industry, commerce and public services such as modern healthcare, education and communication are highly dependent on access to energy services. Indeed, there is a direct relationship between the absence of adequate energy services and many poverty indicators such as infant mortality, illiteracy, life expectancy and total fertility rate. Inadequate access to energy also exacerbates rapid urbanization in developing countries, by driving people to seek better living conditions."

With specific reference to combating poverty, IIASA (2013) found that:

"Limited access to modern and affordable energy services is an important contributor to the poverty levels in developing countries, particularly in sub-Saharan Africa and some parts of Asia. Access to modern forms of energy is essential to overcome poverty, promote economic growth and employment opportunities, support the provision of social services, and, in general, promote sustainable human development. It is also an essential input for achieving most Millennium Development Goals (MDGs) – a useful reference of progress against poverty by 2015 and a benchmark for possible progress much beyond that. Poverty alleviation and the achievement of the MDGs will not be possible as long as there are billions of people who do not have access to electricity and or to cleaner and better quality as well as adequate supplies of cooking fuels or with limited access to affordable and more efficient end-use energy devices such as improved cookstoves (those using traditional fuels but burning in a cleaner fashion), proper heating, more efficient lights, water pumps, low-cost agro-processing equipment as well as energy-efficient housing and transportation options."

The concept of energy poverty has also emerged to refer to situations in which households do not have access to basic energy services for day to day living. The Energy Poverty Action Initiative classifies a person as being in 'energy poverty' if they do not have access to a minimum of:

- 120kWh electricity per capita per year for lighting, access to most basic services (drinking water, communication, improved health services, education improved services and others) plus some added value to local production, and,
- The equivalent of 35 kg LPG for cooking per capita per year from liquid and/or gas fuels or from improved supply of solid fuel sources and improved (efficient and clean) cook stoves.

The above generalised findings regarding the role of access to energy and electricity in socio-economic development are largely based on development experience and cases studies. For example, Dinkelman (2010) investigated the impacts of electrification in rural Kwa-Zulu Natal and found that it resulted in significant increases in the use of electricity for lighting, cooking, and reductions in woodfueled cooking. In addition, it was linked to a 9.5% increase in female employment over a five-year period much of it from releasing women from household work. In addition, George (2012) found that that one of the major causes of unemployment in Nigeria can be traced to inadequate and unstable power supply to the industrial sector. He advises policy makers to invest more in electricity provision to the industrial sector if the high unemployment rate is to be addressed. This supports the basic observation that adequate electricity supply is a pre-requisite for the establishment and continued growth of a modern economy.

7.1.2 Impacts specific to the declaration of corridors

Given its importance to socio-economic development, it makes sense to plan ahead for the installation of EGI and ensure that it can be delivered within a reasonable and predictable timeframe. Currently this is often not possible due to lengthy environmental authorisation requirements which can result in EIA processes taking three years or even more for major routes. Additional environmental permits and licenses which succeed environmental authorisation, such as Water Use Licenses, means that the overall authorisation timeline exceeds five years in many instances. Environmental authorisation therefore often takes unreasonably long and/or within a timeframe that is not predictable. Indeed, it is primarily these difficulties that gave rise to the EGI corridor concept and associated SEA. In essence, the SEA allows for some level of pre-assessment of corridor areas in order to identify areas that should be acceptable for the development of EGI. This information can then be used in order to streamline authorisation processes within corridor areas and ensure that these processes can be finalised within a more reasonable time frame of closer to three years. Furthermore, environmental pre-assessment of the corridors provides important information about key environmental sensitivities at the earliest stages of development planning thereby enabling Eskom to start the servitude negotiation process, with a high degree of assurance, well in advance of environmental authorisation. Upfront strategic investment of this nature creates greater alignment between the time frames for the development of electricity grid infrastructure and new generation.

The declaration of corridors and associated changes to process requirements would hold key advantages at a strategic level focused on (1) streamlining and (2) the provision of greater certainty or clarity regarding the future roll-out of EGI:

Streamlining

The streamlining that would be associated with declaration would have significant economic advantages. For example, the majority of projects or developments driving the economy that require electricity supply (e.g. new industrial plants) or are themselves generators of electricity (e.g. renewable energy facilities) are planned and executed within three to four years. This is not compatible with the seven to ten year (length dependent on size of development) environmental authorisation, environmental licensing and servitude negotiation process synonymous with EGI. By reducing the Eskom environmental authorisation process and by facilitating upfront strategic investment within the corridors (such as the pre-negotiation of servitudes), it will therefore be possible to substantially reduce the timeframes for EGI development in these areas. This would introduce significant efficiencies. The risk of important development projects being delayed or even cancelled due to EGI infrastructure being too slow to respond would be reduced. The ability of the system to bring new power into the grid efficiently and as soon as this power is available will be enhanced. Authorisation processes that are shorter and, importantly, also predictably shorter would allow for substantially more efficient budgeting and associated financing. This should reduce the overall costs of electricity provision. They should also assist with the more accurate projection of likely revenue flows from electricity sales also resulting in benefits.

Enhanced certainty

It is important to bear in mind that the corridor areas are those areas where there is a high likelihood that transmission lines are going to be necessary in the future regardless of whether corridors are declared or not. This is due to their position relative to future electricity generation and demand areas. The declaration of the corridors therefore provides greater certainty and forewarning of an outcome that is most likely to happen anyway.
Land use and sector planning would benefit from knowing that certain areas are more likely locations for EGI. Greater certainty would be provided from an environmental perspective thereby enabling Eskom to start making strategic upfront investment within the corridors particularly in low sensitivity areas. Enhanced certainty would be provided to electricity generators and large users in particular regarding how Eskom and government intends unlocking the corridor areas and areas in proximity to them. Corridor declaration and gazetting would demonstrate a commitment to prioritising grid expansion and facilitate/accommodate investment. Gazetting the corridors would also provide comfort to Eskom regarding government's commitments to unlocking these areas under SIP 10. This in turn should allow Eskom to present a stronger business case to the National Energy Regulatory of South Africa (NERSA) when applying for funding for grid expansion in these areas.

Greater certainty should also foster enhanced electricity market development. For example, if an electricity generator/Eskom has power available and needs transmission infrastructure to conclude a deal for delivery of electricity by a specific date then they need to be sure that they can indeed deliver by this date. Currently such deals are hampered as Eskom is essentially not often in a position to make firm commitments. Aside from being detrimental to the achievement of development goals, this puts Eskom at a disadvantage in terms of financing. For instance, in such a situation, Eskom cannot explore options such as raising finance for EGI from customers thereby essentially pre-financing projects and lessening its own need to raise capital.

Note that the strategic benefits of streamlining and greater certainty would differ between economic sectors. The following section sections focus on impacts on electricity generators (incl. IPPs), industry and mining and tourism.

7.1.3 Management and mitigation

The benefits of streamlining and greater certainty can be maximised if all relevant stakeholders have access to accurate, understandable and timely information regarding the corridors and intended EGI developments within them. Once the corridors are declared, Eskom should engage with stakeholders with a view to drawing up an appropriate information dissemination plan in this regard. These include electricity generators, industry and mining and tourism stakeholders as discussed in the sections to follow.

7.2 Impacts on electricity generators

7.2.1 Impacts of EGI in general

EGI is required to provide grid access to electricity generators so that the energy they generate can reach users. For this reason, planning around the likely future location of these generators is a key input to Eskom's transmission network planning processes. This includes planning for generation plants of all types and sizes. It also encompasses independent power producers (IPPs) which have rapidly become a key source of demand for grid access particularly for renewable energy projects. As noted in the latest Eskom Transmission Development Plan, the establishment of large-scale renewable energy generation is becoming a primary driver of network development particularly in the Western, Eastern and Northern Cape provinces (Eskom, 2014).

The table below shows the number of IPP renewable energy projects and their capacity in MWs for the four bid windows completed thus far as part of the Renewable Energy Independent Power Producers Procurement Process (REIPPPP). The Northern Cape is the greatest beneficiary of the programme thus far with 40 projects awarded preferred bidder status. This represents 54% of the total capacity up to the fourth window followed by the Eastern Cape with 29% and the Western Cape with 9% of total capacity.

Table 5-6: IPP renewable energy project numbers and capacities per province

Province	Nr of preferrded bidders					MW of capacity commited to					
	Bidding window 1	Bidding window 2	Bidding window 3	Bidding window 4	Total	Bidding window 1	Bidding window 2	Bidding window 3	Bidding window 4	Total	% of total
Northern Cape	15	7	10	8	40	685	330	1,015	695	2,725	54.1%
Eastern Cape	5	6	2	3	16	470	402	197	396	1,465	29.1%
Western Cape	4	4	1		9	133	244	75	-	452	9.0%
Free State	1	2	1	1	5	64	64	75	5	208	4.1%
Limpopo	2	-	1		3	58	-	60	-	118	2.3%
Mpumalanga	-	-	-	1	1	-	-	-	25	25	0.5%
Gauteng	-	-	1		1	-	-	18	-	18	0.4%
Kwazulu Natal	-	-	1		1	-	-	16	-	16	0.3%
North West	1	-	-		1	7	-	-	-	7	0.1%
All Provinces	**28**	**19**	**17**	**13**	**77**	**1,417**	**1,040**	**1,456**	**1,121**	**5,034**	**100.0%**

Sources: Own analysis based on DEA (2015) and DoE (2015)

The map in the figure below shows the preliminary EGI Corridors overlain on the Renewable Energy Development Zones (REDZs). It is clear that the EGI Corridors have taken into account the areas where concentrations of renewable energy production is anticipated and will be incentivised.

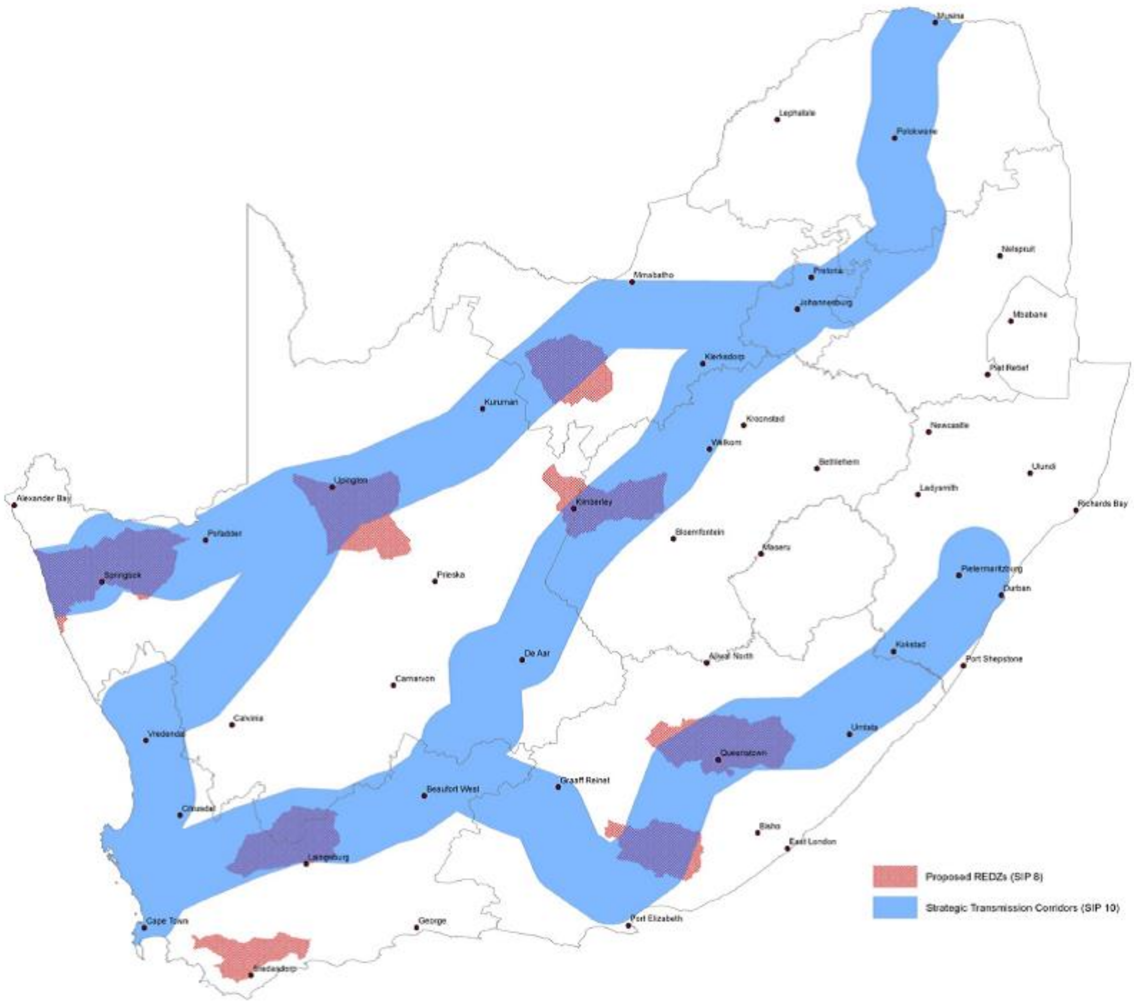


Figure 5-2: Corridors in relation to proposed Renewable Energy Development Zones (REDZs)

7.2.2 Impacts specific to the declaration of EGI corridors

The key benefits specifically from corridor declaration would come in the form of (1) authorisation process streamlining and, associated with this, (2) the provision of greater certainty or clarity regarding the future roll-out of EGI as discussed in Section 7.1.2. For power generators including IPPs this would hold advantages in terms of:

- Facilitating improved planning which includes better information on the broad areas where future EGI is likely to be located. This information should play a key role in informing future investments and allowing them to be made with a greater degree of confidence.
- Enhanced dealings with Eskom who will be able to respond to grid access requests in a more timely and predictable manner.
- Streamlining of environmental authorization processes for IPPs themselves who may also opt to build their own transmission infrastructure to connect to established Eskom infrastructure.

These advantages would result in time and associated cost savings for generators which can then be passed on to users thereby benefiting the economy. They should also hold advantages for the overall development of the IPP market through the creation of greater certainty and predictability regarding grid access. Note that the rapid development of renewable energy generation over the last few years lead to mis-matches between where developers wanted to establish generation projects and grid access opportunities. While there are still challenges in this regard, the imminent establishment of Renewable Energy Development Zones (REDZs) should result in improved predictability. The location of these Zones have been a key informant of the drawing up of the EGI corridors (see map above). The corridors areas should thus facilitate improved grid access for them.

7.2.3 Management and mitigation

The key need of IPPs will be access to timely and accurate information about intended development within the corridors and how the declaration of corridors will affect them. Eskom should engage with the relevant representative bodies with a view to drawing up an appropriate and clearly understandable information package and dissemination plan in this regard. These bodies should include, for example:

- The South African National Energy Association (SANEA)
- The South African Independent Power Producers Association (SAIPPA)
- The South African Wind Energy Association (SAWEA)
- The South African Photovoltaic Industry Association (SAPVIA)
- The Southern Africa Solar Thermal and Electricity Association (SATELA)
- The Southern African Alternative Energy Association (SAAEA).

7.3 Impacts on industry and mining

7.3.1 Impacts of EGI in general

The installation of EGI is a basic requirement in being able to supply industry and mining with the power needed to run its operations. This is true of practically all industries and all the more so for large energy-intensive users. Current national industrial policy, for example, places significant emphasis on the beneficiation of minerals. In most instances, this requires significant electricity often in relatively remote mining areas. EGI is thus essentially a pre-condition to the development of industry and mining.

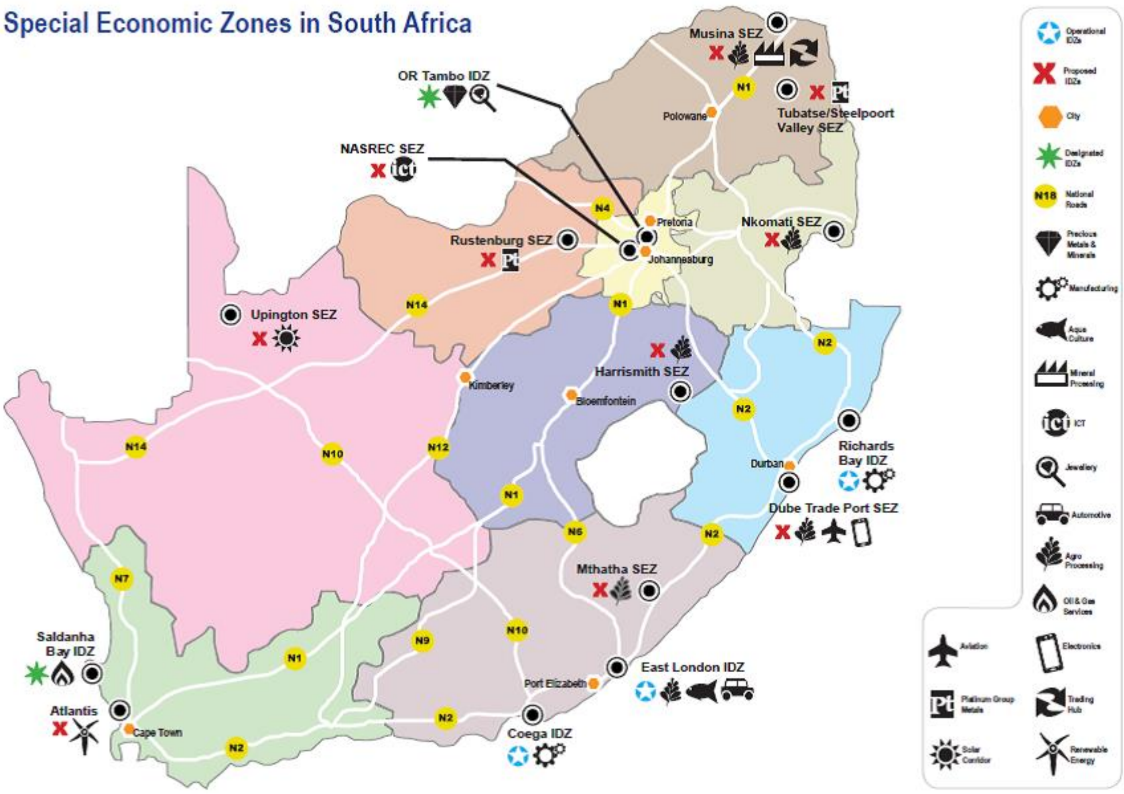
The establishment and promotion of Special Economic Zones (SEZs) are at the centre of national industrial policy. These Zones include the existing Industrial Development Zones (IDZs) at Coega, East London, Richard's Bay and Saldanha along with the following 10 proposed SEZs:

Table 5-7: Proposed Special Economic Zones (SEZs) for South Africa

	Province	Location	SEZ Type
1.	Kwazulu-Natal	Dube Trade Port	Agro-processing, Green Energy, trade hub
2.	Mpumalanga	Nkomazi	Agro-processing, mineral processing and trade hub
3.	Free State	Harrismith	Agro-processing, logistics hub
4.	Eastern Cape	Wild Coast	Agro-processing, tourism, leather
5.	North West	Mafikeng/Rustenburg	Agro-processing, mixed manufacturing and Platinum Hub
6.	Limpopo	Musina	Agro-processing, mineral processing and trade hub
7..	Limpopo	Burgersfort/Tubatse	Platinum and other PGMs beneficiation
8.	Gauteng	Nasrec	ICT Hub (Smart City)
9.	Northern Cape	Upington Solar Corridor	Solar Components, Electronics
10.	Western Cape	Atlantis	Renewable Energy

**Source: Dti (2014*

The aforementioned SEZs are mapped in the figure below. It is clear that they are spread throughout the country and would be well-served and facilitated by the planned EGI corridors which generally run through or nearby them.



**Source: Dti Regional and Spatial Economic Development*

Figure 5-7-1: Map of existing Industrial Development Zones (IDZs) and planned Special Economic Zones (SEZs)

7.3.2 Impacts specific to the declaration of EGI corridors

The key benefits specifically from corridor declaration would come in the form of (1) authorisation process streamlining and, associated with this, (2) the provision of greater certainty or clarity regarding the future roll-out of EGI as discussed in Section 7.1.2. For industry and mining this would hold advantages in terms of:

- Facilitating improved planning which includes better information on the broad areas where future EGI is likely to be located. This information should play a key role in informing future investments and allowing them to be made with a greater degree of confidence. Note that corridor declaration should also facilitate planning though the Spatial Planning and Land Use Management Act (SPLUMA) which requires provinces, districts and local municipalities to make provision for the development of infrastructure including that which may be linked to EGI.
- Enhanced dealings with Eskom who will be able to respond to electricity supply requests in a more timely and predictable manner.

These advantages should result in time and associated cost savings for industrial and mining users to the overall benefit of the economy. As noted above, the location of the corridors has been informed by industrial policy such as the location of the SEZs along with key mining areas. This should ensure that their facilitating role in encouraging the expansion of industry and mining is maximised.

7.3.3 Management and mitigation

The key need of industry and mining will be access to timely and accurate information about intended development within the corridors and how the declaration of corridors will affect them. Eskom should engage with the relevant representative bodies with a view to drawing up an appropriate and clearly understandable information package and dissemination plan in this regard. These bodies should include, for example:

- The Energy Intensive User Group (EIUG) of Southern Africa
- The Chamber of Mine (CoM)
- Business Unity South Africa
- The Manufacturing Circle

7.4 Impacts on tourism

7.4.1 Impacts of EGI in general

Electricity provision, and therefore all the elements required to deliver electricity including EGI, plays a pivotal role in overall socio-economic development as discussed in Section 7.1.1. This includes the development of the tourism sector where a reliable supply of on grid electricity is arguable a prerequisite for the establishment of most lodges and other tourism facilities and services. The provision of EGI therefore has a significant overall positive impact on the sector. This needs to be borne in mind but is not elaborated on further here as the focus of the SEA process is the limitation of risks from needed EGI particularly at a local scale.

EGI has the potential to affect tourism negatively primarily through the visual impacts that are often associated with sub-stations and transmission lines in particular. Although the peer reviewed literature on this topic is limited, tourism impact assessments have been commissioned as part of environmental impact assessments. A selection of recent studies of this nature in South Africa were reviewed. Their findings can be summarised as follows:

- Seaton Thomson and Associates (2012) assessed the eco-tourism impact of the proposed Merensky – Foskor 275KV transmission line in Mpumalanga. They found a high degree of resistance and sensitivity to transmission lines in an area with numerous game farms and eco-tourism establishments. Their key finding was that the route of the lines directly through the middle of protected areas would have a severe impact on eco-tourism. As a consequence they strongly recommended that the transmission line be moved to run along the R526 and R36 roads where they would have far lower impacts on eco-tourism and the sense of place of the overall destination.
- Milburn (2013) assessed the eco-tourism impact of the proposed Perseus - Gamma 765KV transmission line in the Northern Cape and Free State. The study considered three alternatives which were found to have very different impacts on tourism. The clearly preferred alternative followed an existing transmission line and transmission servitude resulting in negligible additional visual impact and associated risks. The other two alternatives had varying impacts with one being problematic given its risk for the nearby Mokala National Park which is key to the tourism offering

of the area. The other was also found to have ecotourism risk but of a lower significance as it would not affected the National Park as much.
- The eco-tourism impact of the proposed Kappa - Omega 765kV transmission line between Koeberg and Victoria West area in the Western Cape were assessed by Murimbika (2013). Three corridor alternatives were assessed all of which were found to have some level of tourism risks given the presences of numerous tourism assets and scenic view areas. However, similar to Milburn (2013), the preferred route was the alignment staying closest to the existing transmission line and road networks.

Haefele (2015) also assessed tourism impacts in California where a 500KV transmission line has been proposed that would roughly bisect the Anza-Borrego Desert State Park. The focus of the study was on approximating the economic costs of the transmission line in terms of lost tourism and recreational value. This was estimated to be in a range from $21.6 million to $216 million. This study also quoted a study by Brian et al. (2009) for a proposed power line in Scotland which found that as many as 15% of tourists would try to avoid visiting areas where the power lines were visible.

In summary, transmission lines have been found to entail risks for tourism where visual quality and natural landscapes with minimal signs of man-made structures are a key attraction. This tends to be the case in relatively unspoilt areas and particularly those containing land uses such as protected areas and game farms.[2] Such areas can be found in all of the five EGI corridors. There are, however, certain areas where tourism is relatively more prominent and potentially sensitive. Such areas are broadly identified in the table below for each corridor.

Table 5-8: Areas of particular tourism sensitivity per corridor

Corridor	Areas of relatively higher tourism value and sensitivity
Central	Winelands area, Ceres Valley, Sutherland and surrounds, Karroo National Park and surrounds. Game farms in the wider region around Kimberley, Vredefort Dome area.
Northern	Riemvasmaak Community Conervancy, Augrabies Falls and surrounds, Areas along the Orange River, Game Reserves and game farms in the North-West Province.
International	Region to west of Dullstroom, Game Reserves and game farms primarily north of Polokwane, Mapungubwe National Park and surrounds.
Eastern	Cambeboo National Park and Graaff Reinet area, Addo Elephant National Park and nearby Amakhala Game Reserve. Game farms to the north of Port Elizabeth up to the Queenstown area, Kwa-Zulu Natal South Coast.
Western	West Coast north of Saldanha, Namaqualand flower areas, Cedarberg and surrounds, Knersvlakte area.

7.4.2 Impacts specific to the declaration of EGI corridors

The declaration of corridors would provide some level of increased certainty to the tourism sector regarding the broad areas (i.e. 100 km corridors) where future major transmission lines and other EGI are likely to be constructed. It would also importantly provide guidance regarding particularly sensitive areas within the

[2] In this sense, transmission lines entail similar tourism risks to those that are associated with other structures that can have high visual impacts such as wind turbines (see GCU, 2008).

corridors which are likely to be avoided by future EGI projects making them potentially more suitable for tourism on balance. This should facilitate better informed planning by those in the sector when compared to the status quo (bearing in mind that transmission lines would have probably been established approximately in the corridor areas anyway just without the benefit of the forewarning provided by corridor declaration). Tourism establishments inside the corridors wishing to expand should be in a better position to understand where risks may be introduced by transmission lines. Similarly, those wishing to invest in new tourism ventures would be able to consider their options with a fuller set of information.

Enhanced information for planning should be positive for the tourism sector as a whole. However, at a local scale, the reaction of those in the tourism industry to this information may be an avoidance of expansion or new investment in corridor areas. It stands to reason that risk averse investors in particularly may try to avoid corridor areas where possible. The likely level of this risk is difficult to anticipate. Generous corridors widths of 100 km should limit risks. Nevertheless, there are likely to be instances where the risk of investor avoidance of areas could be higher. This would include parts of the corridors where sensitivity mapping leaves a substantially smaller area through which transmission lines could possibly go (i.e. 'pinch-points' and similar areas). Particularly in the eyes of eco-tourism investors, this would mean that the likelihood of transmission lines going through properties in these narrow areas would increase potentially significantly. Investors are then likely to be particularly careful when considering such areas.

Sensitivity mapping within the EGI corridors introduced layers for the following types of land uses or areas:

- Protected areas (incl buffers and expansion areas), game farms and private nature reserves.
- Visually sensitive areas including scenic routes
- Areas of high heritage and ecological value.

The avoidance of these areas will assist with limiting tourism risks at a broad level. Assessments of corridor areas as part of environmental authorisation processes for individual EGI projects should, however, conduct more detailed assessments including ground truthing. Such assessment would need to:

- Identify, briefly describe and map key tourism assets and establishments (e.g. lodges, guest houses)
- Assess their likely sensitivity to impacts taking into consideration their tourism offering and key target markets. For example, high-end ecotourism or hunting lodges are likely to be particularly sensitive given their clientele.
- Assess potential socio-economic impacts on them informed by visual impacts along with how these could be mitigated.

7.4.3 Management and mitigation

A comprehensive list of mitigation measures that can essentially be applied to all transmission line project is provided by Milburn (2013). As one would expect, the majority of these measures focus on limiting visual and ecological impacts of echoing the findings of visual and ecological specialist studies as follows:

"- Avoid crossing over or through ridges, rivers, pans or any natural features that have visual value. This also includes centres of floral endemism and areas where vegetation is not resilient and takes extended periods to recover;
- The preferred type of tower is the compact cross-rope or the cross-rope suspension tower. These two tower types are the most visually permeable and create an extremely low degree of visual obstruction;

- Avoid changing the alignment's direction too often in order to minimise the use of the self supporting Strain tower. This tower type is the most visually intrusive as the steel lattice structure is more dense than the other two tower types, hence creating more visual obstruction;
- Where practically possible, provide a minimum of 1 km buffer area between the transmission line and sensitive visual receptors; and
- Rehabilitate disturbed areas around pylons as soon as practically possible after construction. This should be done to restrict extended periods of exposed soil.
- Align the route along the foot slopes of hills, mountains and ridges. This is to maximise the backdrop screening effect of the topography that will reduce presenting the Transmission line in silhouette.
- Plan the route so that the route crosses existing main routes as close to 90° as possible as this will reduce the time that the line is in the viewshed of the passing motorist / viewer.
- Align the route through areas of existing visual clutter and disturbance such as alongside railway lines, existing Transmission lines, roads and other visible infrastructure, rather than through pristine or undisturbed areas where possible. However, the cumulative effect of adding to the visual clutter prior to the final placement should be evaluated.
- Avoid areas where the current land uses, such as game farm, lodges, etc. often rely on the absence of human visual intrusion.
- The galvanising of the pylon should be allowed to weather to a matt grey finish rather than be painted silver, as is often the case. This allows the structures to blend in with the existing environmental colours more readily than the silver that is highly reflective especially early morning and late afternoon. Should it be necessary to paint, it is recommended that a neutral matt finish be used."

Recommendations are also made by Milburn (2013) regarding limiting impacts on eco-tourism products as follows:

"- Establish an ecotourism/conservation forum for the project by engaging with all tourism associations (local and provincial) to ensure that ongoing communication is provided to all role-players and to ensure that all ecotourism products are aware of the construction timeframes. This will enable ecotourism destinations to plan accordingly in terms of occupancies and potential down times.
- Conduct construction activities within the off-peak tourism seasons and outside of the hunting season. - Provide dedicated contact point for the purpose of providing an opportunity for product owners to obtain information on the project and to provide information on impacts or problems on an ongoing basis. A response structure should also be setup to support this contact point. This will enable localized impacts to be mitigated more effectively and efficiently.
- All impacts on fauna or flora within high conservation/ecotourism value land should be rehabilitated immediately to a completely natural state.
- Compile booklets which interpret the project and where the power is going and what value the project is adding to the local and provincial economy. Very often, when eco-tourists see the value in a development project, they are willing to accept the associated impact on the environment."

A key need of tourism industry stakeholders will be access to timely and accurate information about intended development within the corridors and how the declaration of corridors will affect them. With respect to corridor declaration, a fine balance will need to be struck between the provision of information that is accurate and useful to tourism industry participants and providing information that misinforms and has the potential to raise unnecessary alarm. Eskom should therefore engage with the relevant representative bodies with a view to drawing up an appropriate and clearly understandable information package and dissemination plan in this regard. These bodies should include, for example:

- South African Tourism (SAT) along with its provincial and local affiliates
- The Southern African Tourism Services Association (SATSA)
- The Federated Hospitality Association of Southern Africa (FEDHASA)

- The Tourism Business Council of South Africa (TBCSA)
- The South African Leisure Tourism and Hospitality Association (SALTHA)

7.5 Impacts on property values

7.5.1 Impacts of EGI in general

Electricity provision, and therefore all the elements required to deliver electricity including EGI, plays a pivotal role in overall socio-economic development as discussed in Section 7.1.1. EGI thus plays a role in supporting property values by contributing to socio-economic development and overall well-being which are key drivers of these values. This need to be borne in mind but is not elaborated on further here as the focused of the SEA process is the limitation of risks from needed EGI particularly at a local scale.

EGI has the potential to impact negatively on property values primarily through the visual impacts that are often associated with sub-stations and transmission lines in particular. Health concerns and disruption of activities such as farming or recreation can also play a role. With this in mind, the relatively extensive international literature on this topic was reviewed.

Headwaters Economics conducted a review of previous studies on the property value impacts of high voltage transmission lines in 2012. Their headline conclusion was that *"the results have been as mixed as the study approaches and their diverse locations"* (Headwaters, 2012). As general rule, it was found that actual statistical post impact studies found less or lower evidence of negative effects when compared to findings from interviews and questionnaires of property owners. This indicates that respondents tend to exaggerate the impact on their properties. Allied to this finding, with respect to the timing of impacts, stigmatization and negative value impacts tended to be significantly higher before or during construction compared to post construction. Variability in actual result was significant and case specific. For example, according to a review by Kroll and Priestly (1992), no impact on the value of agricultural lands was found in western states of the United States. There is, however, conflicting evidence from Minnesota were negative impact as high as 20% were found (Kroll and Priestly, 1992). Thompson (1982) also carried out studies in rural Alberta finding that agricultural land sales experienced a decrease in areas with numerous transmission lines.

Headwater (2012) also notes that another review by Jackson and Pitts (2010) covering studies between 1964 and 2009 found value decreases which generally ranged between 2% and 9%. In addition, Sims and Dent (2005) conducted a national survey on the perceptions of Chartered Surveyors and members of the National Association of Estate Agents regarding the impact of high voltage transmission lines on the residential property values in the United Kingdom. Survey outcomes were then compared with the transaction data from a case study in Scotland. The study of data concluded that property values within 100 m of transmission lines were 11.5% lower than the average. The perceptual study indicated that valuers and agents observed an average value reduction of 5-10% due to the presence of nearby transmission lines (Sims and Dent, 2005).

Chalmers (2012) also conducted a review of impacts based on Chalmers and Voorvaart (2009), Jackson and Pitts (2010) and others. The summary findings of the review are as follows:

"- Over time, there is a consistent pattern, with about half of the studies finding negative property value effects and half finding none.
- When effects on value have been found, they tend to be small; almost always less than 10% and usually in the range of 3% to 6%.
- Where effects on value are found, they decline rapidly as distance from the lines increases and usually disappear at about 200 to 300 feet.

- Two of the studies investigated behaviour of the effect over time and found that, if there were effects, they tended to dissipate over time as well."

Most of the research on the property value impacts of transmission lines has focused on residential properties in suburban and urban areas. Chalmers (2012) conducted research in Montana using 56 case study transaction occurring between 2000 and 2010 for rural and urban properties within 500 feet of 500 kV transmission lines. The summary trends found in the study were as follows:

"Use. The more heavily oriented the property is toward residential use, the more vulnerable it is to transmission line impact. Properties oriented more toward purely recreational use are much less vulnerable to HVTL impact, and properties with pure agricultural use show no price effects of transmission lines whatsoever.
• Size. The larger the property, the less vulnerable it is to transmission line impact. Larger properties have a greater likelihood that the location of the lines will not interfere with the use of the property; or, if they do interfere, that there are siting alternatives for dwelling or recreational improvements, which can mitigate the impacts.
• Substitutes. The availability of otherwise comparable substitutes is a third factor affecting the vulnerability of a property to transmission line effects. If there are alternative properties very similar to the subject except for the transmission line, there can be significant price and absorption effects. On the other hand, if a property is relatively unique and the transmission lines are but one of several differentiating factors, the property is less vulnerable to price and absorption effects".

The findings of other studies conducted after the Headwaters (2012) and Chalmers (2012) reviews were also considered and can be summarised as follows:

- Han and Elliot (2013) conducted a study in the Eight Miles Plains residential area in Brisbane, Australia. Their findings revealed that the average selling price of houses increased steadily as the distance between them and transmission lines increased up to a distance of 200m. Sale prices were 20% lower within 50m of transmission lines, 15% lower within 50-100m and 7% within 100-200m.
- Bottemiller and Wolverton (2013) used a regression model to assess the property price effect of high voltage transmission lines in Portland and Seattle between 2005 and 2007. For the average house in Portland a negative effect of 1.7% was found while houses in Seattle showed a negative effect of 2.4%. Low impacts for average houses were in contrast to the analysis focused on higher-priced houses only which revealed a much more significant effect of 11.2% reductions for close proximity to transmission lines.
- Abidoye and Oyedeyi (2014) investigated the impact of high voltage transmission lines in residential areas of Lagos State, Nigeria. The Ejigbo and Isolo areas were randomly selected through stratified random sampling and became the focus area of the study. Its outcomes revealed that properties within 600m of transmission lines were associated with 6.8% lower rentals on average when compared with properties with no lines nearby.
- Callanan (2014) investigated property value and duration of sale impacts after the removal of numerous transmission lines, and their associated stigma, in the Newlands suburb of Wellington, New Zealand. She found that properties that were 10-15m from transmission line towers had experienced a 27% reduction in sale price while properties 50m away declined by 5% before the removal of the lines. In addition, the time to sell a property before the removal of transmission lines was 66% longer than the average. Once removed, Newlands became the fastest selling area in Wellington indicating significant benefits associated with the removal of the stigma associated with them.

In summary, property value risks associated with transmission lines have been found to be highly case specific and variable. In general they tend to be higher in residential areas and in rural areas where visual quality and natural landscapes with minimal signs of man-made structures are a key attraction.[3] Such areas tends to be more remote and tend to contain higher concentrations of land uses such as protected areas and game farms. They can be found in all of the five EGI corridors and are consequently not singled out here.

7.5.2 Impacts specific to the declaration of EGI corridors

The declaration of corridors in areas which are the mostly likely location for transmission lines in any event would essentially assist the property market to function more efficiently by providing information to market participants that is pertinent to their property purchasing decisions. Without the declaration of corridors it is likely that the majority of buyers would not have the benefit of the enhanced or fuller information that declaration would offer. They may have been vaguely aware of the potential for transmission lines in a given area possibly because of the presence of a major sub-station nearby. In the majority of cases, however, it is likely that they would have no or limited insight into the likely roll-out of transmission lines and would therefore make buying decisions with incomplete information in this respect. The provision of information to market participants can therefore be seen as a positive impact in terms of improved property market functioning.

While a better functioning property market is a positive, declaration is also likely to result in risks to existing property owners in the corridors. In particular, buyers looking for properties with high aesthetic values may seek to avoid the corridor areas if possible. The most obvious buyer categories among this group would be those involved in eco-tourism or those who place a premium on the leisure or lifestyle offering associated with properties. Those seeking properties for purely agricultural purposes may place less emphasis on aesthetic values. However, they are unlikely to totally ignore aesthetic considerations entirely even if this is not their focus as they will be aware that future buyers may be looking for aesthetic values. In addition, they may want to avoid the risks of potential disruptions of agricultural activities even if these may be relatively minor particularly on larger properties.

Having established that there may be risks, it is extremely difficult to come to an overall conclusion regarding the actual level of risk. The width of the corridors should, however, ensure that risks are kept low. At 100 km wide they provide significant scope to accommodate alternative transmission line routes which would mean that it would be difficult to see significant stigma being associated with corridor properties in general. Nevertheless, there are likely to be instances where risks could be higher. This would include parts of the corridors where sensitivity mapping leaves a substantially smaller area through which transmission lines could possibly go (i.e. ‘pinch-points’ and similar areas). Particularly in the eyes of buyers, this would mean that the likelihood of transmission lines going through properties in these narrow areas would increase potentially significantly. Buyers are then likely to be particularly careful when considering such areas. The potential for speculative buying to drive up demand for these areas cannot be entirely ruled out (i.e. people buying with the sole purpose of extracting a higher price from Eskom given their weaker bargaining position). However, such a strategy would entail significant risks with potentially limited rewards which most speculators should be aware of. In particular they are unlikely to be encouraged by the limited likelihood of Eskom paying high prices for servitudes as discussed in the next section. Increased powers of land expropriation for strategically important projects as envisaged by the Land Expropriation Bill are also likely to discourage speculation.

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[3] In this sense, transmission lines entail similar property value risks to those that are associated with other structures that can have high visual impacts such as wind turbines (see Hoen et al., 2013; Gibbons, 2014; CEBR, 2014 and Lang & Opaluch, 2013 for recent research on this topic).

Sensitivity mapping within the EGI corridors introduced layers for the following types of land uses or areas:

- Protected areas (incl buffers and expansion areas), game farms and private nature reserves.
- Visually sensitive areas including those nearby residences
- Areas of high heritage and ecological value
- Areas of particularly high agricultural value

The avoidance of these areas will assist with limiting risks to property values at a broad level. In addition, as per Section 7.4.3, it has been recommended that assessments forming part of environmental authorisation processes for individual EGI projects within corridors should conduct more detailed assessments to avoid key tourism areas. This should limit impacts on those property values that are linked to tourism.

7.5.3 Management and mitigation

As in the case of tourism impacts, mitigating property value impacts should focus on the limitation of visual and ecological impacts along with other potentially relevant impacts such as those of a social or heritage nature which may play a role in affecting property values. The relevant specialist inputs provide more details in this regard which is not repeated here.

The servitude negotiation process and, in particular, the amounts paid to property owners also plays a key role in mitigation. If these are fair and truly reflective of all value losses and risks associated with accommodating EGI then one would expect less opposition to EGI projects from land owners including those owning land adjacent to or nearby EGI site. Here, the contrast with the situation for renewable energy is instructive. Properties with potential for the establishment of future renewable energy projects tend to increase in value (aside from areas with particularly high aesthetic quality or with significant ecotourism that would derive higher value from excluding renewable energy projects). These increases can be linked to anticipation of the potentially generous payments offered by Independent Power Producers (IPPs).[4] Transmission line servitude payments, on the other hand, are seldom viewed as generous and seem significantly more likely to be viewed as inadequate by land owners.[5] Anticipation of low payments can then contribute to property value risks. Better servitude payments for EGI are therefore a potential mitigation if the goal is to reduce value losses specifically for property owners of EGI sites. They do not, however, currently offer a remedy for those owning land adjacent to or nearby EGI site. Under South African law, those acquiring servitudes such as Eskom, SANRAL, Transnet and other are not required to compensate neighbouring property owners for potential values losses. This essentially places a limit on achieving full compensation for property value decreases for a number of different infrastructure project types including EGI, roads, railways, wind farms, etc.

With regard to the corridor declaration process, a key need of property owners and property market participants will be access to timely and accurate information about potential development within the corridors and how the declaration of corridors will affect them. A fine balance will need to be struck between the provision of information that is accurate and useful to property market participants and providing information that misinforms and has the potential to raise unnecessary alarm. Eskom should therefore engage with the relevant representative bodies with a view to drawing up an appropriate and clearly understandable information package and dissemination plan in this regard. Engagement can start with the South African Property Owners Association (SAPOA) who may suggest other bodies worth contacting.

[4] The potential for increases in property values within the proposed Renewable Energy Development Zones (REDZs) points to this anticipation of potential offers from IPPs in these areas as discussed in DEA (2015).
[5] Note that this situation where renewable energy producers are generally welcomed by land owner while transmission line developers are not also seem to prevail in the United States for similar reasons (see Fahey, 2010).

7.6 Resettlement and relocation/displacement impacts

7.6.1 Impacts of EGI in general

Introduction

The establishment of transmission lines has the potential to result in involuntary resettlement or relocation. If the resettlement is not properly planned or managed is can impact on people's lives and result in long-term hardships. Resettlement in rural areas and small villages is usually as a result of the loss houses and farmland. The loss of access to farmland and other resources, such as rivers, springs and forests, can also impact on communities that rely on these resources for their livelihoods. One of the key challenges facing resettlement in rural areas is linked to the restoration of livelihoods based on land and access to resources.

EGI Resettlement Impacts

Based on experience, resettlement impacts are typically associated with large infrastructure projects, such as dams, mines, roads, railway lines and canals. Depending on the size of these projects they can impact on large areas of land, and in so doing, impact on communities and their natural assets. In the case of mines and large dams entire villages and settlements can be affected and may need to be resettled. In some instances thousands of households are affected. In the case of the Three Gorges Dam in China, 1.3 million people had to be resettled. This requires the identification of suitable areas for the construction and establishment of new villages and the associated infrastructure and facilities, such as schools, clinics etc.

Although transmission lines qualify as large infrastructure projects they differ from the projects listed above in that the physical footprint and associated land take is significantly smaller and usually limited to the foundations associated with the transmission line pylons. The impacts are therefore likely to be confined to a limited number of affected houses and structures. The need to relocate entire villages is therefore highly unlikely. However, access and service roads associated with the transmission lines may also impact on local communities and result in involuntary resettlement (physical and economic). This aspect must therefore also be taken into account when identifying suitable sub-corridors.

Given the width of the EGI corridors (100km) it is likely that a suitable sub-corridor (1-5 km wide) can be identified that avoids and or minimises the impact of involuntary resettlement. This would be in keeping with accepted international best practice that requires involuntary resettlement be avoided where possible. If this is not possible the number of people affected should be minimised. It is therefore reasonable to assume that the potential involuntary resettlement impacts associated with the establishment of transmission lines within the identified 100 km wide EGI corridors will be minimal. The potential impacts are likely to be limited to directly affected households as opposed to villages and or larger communities. The need to relocate entire villages or communities is therefore highly unlikely. It is also worth noting that the Corridor Refinement process (Phase II of the EGI SEA process) involved the identification of dense settlement areas. The corridors were adapted to avoid these areas where possible. This further reduces the risk of medium to large scale involuntary resettlement.

Resettlement Action Plans

In the event of involuntary resettlement occurring, there are two types of displacement that need to be considered when developing a Resettlement Action Plan (RAP). These are physical and economic displacement. Both of these types of displacement will need to be considered when identifying and assessing the location of potential sub-corridors and the placement of transmission line pylons within these sub-corridors within the 100km corridors identified by the SEA.

Physical displacement
Physical displacement occurs when people have to move away from the area to a new area because due to the direct impact of the proposed project, such as transmission line, on their houses, farmlands and crops. Where people have to move they need to be compensated for the loss of their assets, including houses, farm land, natural assets, etc.

Economic displacement
Economic displacement occurs when the proposed project, such as a transmission line, interrupts or cuts off access to productive assets and affects people's livelihoods without them having to move or be resettled. For example, the loss of a portion of farmland or access to the farmland, forests, rivers etc. may impact on its productivity without requiring the owners to be physically resettled.

The Resettlement Action Plan (RAP) is a document that specifies the procedures that need to be followed and the actions taken to resettle and compensate the affected people and communities. The scope and detail of the RAP will depend on the location, type and scale of the project. Ass indicated above, the potential impacts are likely to be limited to directly affected households as opposed to villages and or larger communities. The need to relocate entire villages or communities is therefore highly unlikely. The scope of the RAP is therefore likely to be limited and confined to a few affected households.

Accepted international best practice requires that involuntary resettlement be avoided where possible. If this is not possible the number of people affected should be minimised.

Where involuntary resettlement cannot be avoided, a minimum requirement the RAP must seek to ensure that the livelihoods of the people affected by the project are restored to levels that existed before the project was developed. In this regard international best practice requires that every effort should be made to ensure that resettlement should result in a measurable improvement in the economic conditions and the social well-being of the affected people and communities.

As a document the RAP must identify:

- The steps that will be taken to consult with the affected communities/households. This includes the potential need to establish a Resettlement Action Committee depending on the number of households affected;
- The legal requirements for land acquisition and compensation in South Africa;
- The number of people and households that will need to be resettled as a result of the proposed transmission line/s. This will be based on information collected by the social specialist during the Basic Assessment;
- The impacts associated with the proposed transmission line/s and the people that will be affected. This will be based on information collected by the social specialist during the Basic Assessment;
- The way in which disagreements and problems will be discussed and solved, especially in the case of compensation rates for structures, crops and land etc.;
- The best place to relocate people and households to. This will be done in consultation with the affected households and Eskom;
- The type of houses and other affected facilities that need to be built in the new relocation area;
- How and when the houses and other affected facilities will be built and how the people from the affected households and communities can benefit from and be involved in the development of the new houses and other affected facilities;
- How the affected households will be helped to move (what sort of assistance will be provided etc.);

- The assets that will be affected due to the transmission line. This includes houses and other structures, land (size and location), crops (type), schools, roads and other assets etc. In order to identify all of these assets a household census and asset register must be undertaken;
- The method used to calculate the value of structures, land, natural resources, and crops and what amount of compensation will be paid for the loss of structures, land, natural resources and crops;
- The people who are entitled to compensation for structures, land and crops and how the compensation will be paid, for example, once off or in instalments over an agreed period of time;
- The steps required to re-establish people's livelihoods, specifically in cases where productive agricultural assets are impacted.

In addition the Resettlement Action Plan must also provide:

- The identification of a cut-off date for compensation. After this date no compensation will be paid for the construction of new buildings, planting of new crops or clearing of new fields. The timing of this dates must be discussed with and agreed to by the affected households and community;
- A description of organisational responsibilities. This includes indicating who will be responsible for the development of the new houses etc., who will be responsible for establishing compensation rates, who will be responsible to paying compensation, who will be responsible to assisting people to move etc.;
- A budget for the resettlement programme. This includes the costs associated with compensation, the costs associated with establishing a new houses and facilities. These costs include site clearing, establishment of new fields, engineering etc. the costs associated with assisting people to move to the new settlement and the costs associated with the implementation of a Monitoring and Evaluation Programme. The costs associated with community development programmes should also be assessed;
- An implementation schedule for the resettlement and compensation process;
- A description of how the implementation of the RAP will be monitored and assessed and who will be responsible for making sure that the commitments contained in the RAP are carried out.

7.6.2 Impacts specific to the declaration of EGI corridors

Five EGI corridors have been identified, namely:

- Central Corridor;
- Northern Corridor;
- International Corridor;
- Eastern Corridor, and;
- Western Corridor.

As indicated above, given the width of the EGI corridors (100km) it is likely that a suitable sub-corridor (5 km wide) can be identified that avoids and or minimises the impacts associated with involuntary resettlement. The potential impacts are likely to be limited to directly affected households as opposed to villages and or larger communities. The need to relocate entire villages or communities is therefore highly unlikely. This applies to each of the five corridors. This will in turn influence the scale and level of detail required in preparing the RAP.

Each of the five corridors are discussed below:

Central Corridor

The majority of the Central Corridor passes through sparsely populated rural farm land largely located in the Western Cape, Northern Cape and Free State Provinces. The land uses along the majority of the route are linked to commercial farming, specifically livestock and dry land crops. Irrigation and more intensive farming are be confined to irrigation schemes located in the vicinity of the major rivers, such as the Orange and Vaal Rivers. The potential for involuntary resettlement related impacts (physical and economic) along this section of the Central Corridor are low.

The potential sections of the Central Corridor where the potential for involuntary resettlement related impacts (physical and economic) are higher are the south western section of the Central Corridor located within the Western Cape Province and the north eastern section as it enters the Gauteng Province.

Intensive farming (vineyards and orchards etc.) occurs in the south western section of the Central Corridor located within the Western Cape Province. This area starts near De Doorns/Ceres in the Western Cape and extends all the way to outskirts of the Cape Metropolitan Area. Population densities in this area are higher and land uses more intensive. The potential for potential for involuntary resettlement related impacts (physical and economic) is therefore higher along this section of the Central Corridor. Care will need to be taken in siting transmission pylons in order to avoid/minimise the potential for involuntary resettlement along this section of the corridor.

The north eastern section of the Central Corridor as it enters the Gauteng Province will encounter more dense urban areas associated with the Johannesburg Metropolitan Area. This will increase the potential for involuntary resettlement related impacts (physical and economic) along this section of the Central Corridor. Care will need to be taken in siting transmission pylons in order to avoid/minimise the potential for involuntary resettlement along this section of the corridor.

Northern Corridor

The majority of the Northern Corridor is located within the Northern Cape Province and passes through sparsely populated rural farm land. The land uses along the majority of the route are linked to commercial farming, specifically livestock. Irrigation and more intensive farming are be confined to irrigation schemes located in the vicinity of the major rivers, specifically the Orange River. The potential for involuntary resettlement related impacts (physical and economic) along this section of the Northern Corridor is low.

The section of the Northern Corridor located within the North West Province also passes through sparsely populated rural farm land. The land uses along the majority of the route are also linked to commercial farming, specifically livestock, and dry land crops. There are also areas of communal farmland located in the North West Province that may be affected. While care would need to be taken to ensure that the transmission lines do not impact on the livelihoods of commercial and communal farmers the potential for involuntary resettlement related impacts (physical and economic) along this section of the Northern Corridor is low.

The north eastern section of the Northern Corridor as it enters the Gauteng Province will encounter more dense urban areas associated with the Johannesburg Metropolitan Area. This will increase the potential for involuntary resettlement related impacts (physical and economic) along this section of the Northern Corridor. Care will need to be taken in siting transmission pylons in order to avoid/minimise the potential for involuntary resettlement along this section of the corridor.

International Corridor

The majority of the International Corridor in South Africa is located within the Limpopo Province and passes through sparsely populated rural farm land. The land uses along the majority of the route are linked to commercial farming, specifically livestock, and dry land crops. Irrigation and more intensive farming are be confined to irrigation schemes located in the vicinity of the rivers. With proper siting the potential for involuntary resettlement related impacts (physical and economic) along this section of the International Corridor is low.

The south western section of the International Corridor passes through a small section of the Mpumalanga Province before entering the Gauteng Province, where it will encounter more dense urban areas associated with the Johannesburg Metropolitan Area. This will increase the potential for involuntary resettlement related impacts (physical and economic) along this section of the International Corridor. Care will need to be taken in siting transmission pylons in order to avoid/minimise the potential for involuntary resettlement along this section of the corridor.

Eastern Corridor

The majority of the Eastern Corridor is located within the Eastern Cape Province. The western section of the corridor is located to the west of Port Elizabeth and passes through sparsely populated rural farm land. The land uses along the majority of the route are linked to commercial farming, specifically livestock. Irrigation and more intensive farming are be confined to irrigation schemes located in the vicinity of the major rivers, such as the Gamtoos and Fish Rivers. The potential for involuntary resettlement related impacts (physical and economic) along this section of the Eastern Corridor is low. However, care will need to be taken when crossing areas where intensive irrigation takes place.

The section of the Eastern Corridor located to the east of Port Elizabeth is located largely within the Transkei region of the Eastern Cape. The majority of the land in this area is communally owned land and population densities are higher than other rural areas within the Eastern Cape Province. The land uses along the majority of the route are communal farming, involving livestock and dry land crops. Care will need to be taken to ensure that the transmission lines do not impact on the livelihoods of communal farmers along this section of the Eastern Corridor. However, with well-placed transmission lines the potential for involuntary resettlement related impacts (physical and economic) along this section of the Eastern Corridor will be low. Also, as indicated above, the impacts are likely will be confined to a limited number of households. It is unlikely that entire villages will need to be relocated.

The eastern section of the Eastern Corridor is located within the Kwa-Zulu Natal Province. The population density along this section is higher and the land uses along the majority of the route are linked to commercial farming, specifically sugar cane and fruit farming. The south coast of Kwa-Zulu Natal is also an important tourist destination. The potential risk of resettlement along this section of the Eastern Corridor is higher than the section to the west. Care will therefore need to be taken to ensure that the transmission lines do not impact on the livelihoods of commercial and communal farmers along this section of the Eastern Corridor. However, as indicated above, the impacts are likely will be confined to a limited number of households. It is unlikely that entire villages will need to be relocated.

The corridor will also encounter more dense urban areas associated with the Durban Metropolitan Area. This will increase the potential for involuntary resettlement related impacts (physical and economic) along this section of the Eastern Corridor. Care will need to be taken to avoid impacting on built up areas.

Western Corridor

The Western Corridor passes through sparsely populated rural farm land l located in the Western Cape and Northern Cape Provinces. The land uses along the section of the corridor located in the Northern Cape are linked to commercial farming, specifically livestock. The potential for involuntary resettlement related impacts (physical and economic) along this section of the Western Corridor are low.

The land uses along the section of the corridor located in the Western Cape include irrigation and intensive farming, specifically in the Ceres Valley and along the banks of the Olifants River. The potential for involuntary resettlement related impacts (physical and economic) along this section of the Western Corridor are higher than the section that passes through the Northern Cape. Care will need to be taken to ensure that the transmission lines do not impact on the livelihoods of commercial farmers along this section of the Western Corridor. However, with well-placed transmission lines the potential for involuntary resettlement related impacts (physical and economic) along this section of the Western Corridor will be low.

7.6.3 Management and mitigation

Accepted international best practice requires that involuntary resettlement be avoided where possible. If this is not possible the number of people affected should be minimised. As indicated above, given the width of the EGI corridors (100km) it is likely that a suitable sub-corridor (5 km wide) can be identified that avoids and or minimises the impacts associated with involuntary resettlement. The potential impacts are likely to be limited to directly affected households as opposed to villages and or larger communities. The need to relocate entire villages or communities is therefore highly unlikely. This applies to each of the five corridors.

The key mitigation measure therefore involves siting of transmission pylons so as avoid the need for resettlement. Where involuntary resettlement cannot be avoided, the relocation of affected households and or compensation for economic displacement should be guided by international best practice. Key best practice documents include:

- World Bank Operational Policy (4.12) on Involuntary Resettlement (Revised in 2011);
- IFC Performance Standards (PS) on Environmental and Social Sustainability (Revised in 2012), specifically PS 5: Land Acquisition and Involuntary Resettlement, which notes:
- IFC's Handbook for Preparing a RAP (2002);
- African Development Bank's (AfDB) Policy on Involuntary Resettlement (2003).

These best practice documents were used as guidance for Eskom's Procedure for the Management of Involuntary Resettlement and Relocation of Legal Occupiers on Affected Eskom Land. Essentially, they advocate the following key principles:

- Avoid or at least minimise involuntary resettlement wherever feasible by exploring alternative project designs and layouts;
- Mitigate adverse social and economic impacts from land requisition or restrictions on affected persons' use of land by (i) providing compensation for loss of assets at replacement cost; and (ii) ensuring that resettlement activities are implemented with appropriate disclosure of information, consultation and the informed participation of those affected;
- Improve or at least restore the livelihoods and standards of living of displaced persons; and
- Improve living conditions among displaced persons through provision of adequate housing with security of tenure at resettlement sites.

7.7 Impacts associated with project workers/workforce

7.7.1 Impacts of EGI in general

The potential impacts associated with the presence of project workers apply to both the construction and operational phase of the transmission lines. The impacts associated with the operational phase are linked to activities of repair and maintenance crews.

Construction workers
The impacts associated with the construction phase are linked to the presence of construction workers on the site and the potential risks that they pose to family structures and social networks. While the presence of construction workers does not in itself constitute a social impact, the manner in which construction workers conduct themselves can impact on local communities. The most significant negative impacts are associated with the disruption of existing family structures and social networks. The risks are linked to potentially risky behaviour, mainly by male construction workers, including:

- An increase in alcohol and drug use;
- An increase in crime levels;
- The loss of girlfriends and/or wives to construction workers;
- An increase in teenage and unwanted pregnancies;
- An increase in prostitution;
- An increase in sexually transmitted diseases (STDs), including HIV.

The presence on and movement of construction workers on and off the site can also pose a potential safety threat to local famer's and farm workers in the vicinity of the site. In addition, farm infrastructure, such as fences and gates, may be damaged and stock losses may also result from gates being left open and/or fences being damaged or stock theft linked either directly or indirectly to the presence of construction workers on the site. The presence of construction workers on the site also increases the exposure of farming operations and livestock to the outside world, which, in turn, increases the potential risk of stock theft and crime. The activities associated with the construction workers and the construction phase also increase the risk of veld fires, which in turn, pose a risk to farmers and their livelihoods.

The potential risk posed by the presence of construction workers will be linked to the size of the work force, the duration that they are on site and where they are accommodated. Given nature of the work associated with the establishment of linear transmission lines the construction activities will not be confined to a single area, as would be the case with the establishment of a say a new mine. In addition, the size of the work force is likely to be relatively small compared to large civil construction projects. The potential social impacts associated with the presence of construction workers is therefore likely to be limited and can be managed through the implementation of effective management and mitigation measures as listed below.

Repair and maintenance workers
As in the case of construction workers, the presence on and movement of repair and maintenance workers during the operational phase can pose a potential safety threat to local famer's and farm workers in the vicinity of the site. Experience has also shown that farm infrastructure, such as fences and gates, can be damaged and stock losses may also result from gates being left open and/or fences being damaged or stock theft linked either directly or indirectly to the presence of repair and maintenance workers on the site. The presence of repair and maintenance workers on the site also increases the risk of veld fires and exposure of farming operations and livestock to the outside world, which, in turn, increases the potential risk of stock theft and crime.

The potential risk posed by the presence of repair and maintenance workers will be linked to the size of the work force, the duration that they are on site and where they are accommodated. Given nature of the repair and maintenance work for linear transmission lines the activities will not be confined to a single area. In addition, the size of the work force will be relatively small. The potential social impacts associated with the presence of repair and maintenance workers is therefore likely to be limited and can be managed through the implementation of effective management and mitigation measures as listed below. However, a large number of landowners have raised concerns regarding the impacts associated with the activities of repair and maintenance workers. This is an issue that must be addressed by Eskom. It is hoped that Eskom's Procedure on Access to Farms (Distribution, Transmission and Generation) will assist in this matter and result in better outcomes on the ground.

Influx of job seekers

Construction projects also have the potential to attract people to the area in the hope that they will secure a job, even if it is a temporary job. These job seekers can in turn become "economically stranded" in the area or decide to stay on irrespective of finding a job or not. As in the case of construction workers employed on the project, the actual presence of job seekers in the area does not in itself constitute a social impact. However, the manner in which they conduct themselves can impact on the local community.

These issues are similar to the concerns associated with the presence of construction workers as listed above. In some instances the potential impact on the community may be greater given that job seekers, unlike construction workers, are unlikely to have accommodation and may decide to stay on in the area. In addition, they will not have a reliable source of income. The risk of crime associated with the influx of job seekers it therefore likely to be greater. Experience from large projects has also shown that the families of job seekers may also accompany individual job seekers or follow them at a later date. In many cases the families of the job seekers that become "economically stranded" and the construction workers that decided to stay in the area, subsequently move to the area.

This has the potential to place additional pressure on the existing services in the area, specifically low income housing. In addition to the pressure on local services the influx of construction workers and job seekers can also result in competition for scarce employment opportunities. Further secondary impacts include increase in crime levels, especially property crime, as a result of the increased number of unemployed people. These impacts can result in increased tensions and conflicts between local residents and job seekers from outside the area.

Given the remote location of the majority of the areas associated with each of the EGI corridors the likelihood of significant influxes of job seekers associated with the establishment of transmission lines in each of the five corridors is likely to be low. Also, given the linear nature of transmission lines the construction activities will not be confined to a single area. In addition, unlike other major development projects, such as a mine, the employment opportunities associated with the operational phase of a transmission line are limited to repairs and maintenance. The attraction potential for job seekers during both the construction and operational phase is therefore low. The potential social impacts associated with the influx of job seekers are therefore not regarded as a key social issue.

7.7.2 Impacts specific to the declaration of EGI corridors

Five EGI corridors have been identified, namely:

- Central Corridor;
- Northern Corridor;
- International Corridor;

- Eastern Corridor, and;
- Western Corridor.

As indicated above, given nature of the work associated with the establishment of linear transmission lines the construction activities will not be confined to a single area. In addition, the size of the work force is likely to be relatively small compared to large civil of construction projects. The potential social impacts associated with the presence of construction workers is therefore likely to be limited and can be managed through the implementation of effective management and mitigation measures as listed below. This applies to each of the five corridors. This also applies to workers involved with the repair and maintenance of the transmission lines.

The potential social impacts associated with the influx of job seekers are not regarded as a key social issue, and as such are not discussed further.

Each of the five corridors are discussed below

Central Corridor

The majority of the Central Corridor passes through sparsely populated rural farm land largely located in the Western Cape, Northern Cape and Free State Provinces. The land uses along the majority of the route are linked to commercial farming, specifically livestock and dry land crops. Irrigation and more intensive farming are be confined to irrigation schemes located in the vicinity of the major rivers, such as the Orange and Vaal Rivers. The potential impacts associated with construction workers and maintenance crews along this section of the Central Corridor are likely to be low.

The potential sections of the Central Corridor where the potential for impacts are higher are the south western section of the Central Corridor located within the Western Cape Province and the north eastern section as it enters the Gauteng Province.

Intensive farming (vineyards and orchards etc.) occurs in the south western section of the Central Corridor located within the Western Cape Province. This area starts near De Doorns/Ceres in the Western Cape and extends all the way to outskirts of the Cape Metropolitan Area. Population densities in this area are higher. The potential risks posed by construction workers and maintenance crews along this section of the Central Corridor are therefore likely be higher. Additional care will need to be taken in managing construction workers and maintenance crews along this section of the corridor.

The north eastern section of the Central Corridor as it enters the Gauteng Province will encounter more dense urban areas associated with the Johannesburg Metropolitan Area. This has the potential to increase the risks associated with the activities of construction and maintenance crews. Additional care will need to be taken in managing construction workers and maintenance crews along this section of the corridor.

Northern Corridor

The majority of the Northern Corridor is located within the Northern Cape Province and passes through sparsely populated rural farm land. The land uses along the majority of the route are linked to commercial farming, specifically livestock. Irrigation and more intensive farming are be confined to irrigation schemes located in the vicinity of the major rivers, specifically the Orange River. The potential impacts associated with construction workers and maintenance crews along this section of the Northern Corridor are likely to be low.

The section of the Northern Corridor located within the North West Province also passes through sparsely populated rural farm land. The land uses along the majority of the route are also linked to commercial farming, specifically livestock, and dry land crops. There are also areas of communal farmland located in the North West Province that may be affected. The presence of communal farmers may increase the potential risks posed by construction and maintenance workers. Additional care will need to be taken in managing construction workers and maintenance crews along this section of the corridor.

The north eastern section of the Northern Corridor as it enters the Gauteng Province will encounter more dense urban areas associated with the Johannesburg Metropolitan Area. This has the potential to increase the risks associated with the activities of construction and maintenance crews. Additional care will need to be taken in managing construction workers and maintenance crews along this section of the corridor.

International Corridor

The majority of the International Corridor in South Africa is located within the Limpopo Province and passes through sparsely populated rural farm land. The land uses along the majority of the route are linked to commercial farming, specifically livestock, and dry land crops. Irrigation and more intensive farming are be confined to irrigation schemes located in the vicinity of the rivers. The potential impacts associated with construction workers and maintenance crews along this section of the International Corridor are likely to be low.

The south western section of the International Corridor passes through a small section of the Mpumalanga Province before entering the Gauteng Province, where it will encounter more dense urban areas associated with the Johannesburg Metropolitan Area. This has the potential to increase the risks associated with the activities of construction and maintenance crews. Additional care will need to be taken in managing construction workers and maintenance crews along this section of the corridor.

Eastern Corridor

The majority of the Eastern Corridor is located within the Eastern Cape Province. The western section of the corridor is located to the west of Port Elizabeth and passes through sparsely populated rural farm land. The land uses along the majority of the route are linked to commercial farming, specifically livestock. Irrigation and more intensive farming are be confined to irrigation schemes located in the vicinity of the major rivers, such as the Gamtoos and Fish Rivers. Additional care will need to be taken in managing construction workers and maintenance crews working in the vicinity of irrigation schemes and more densely populated areas along this section of the corridor.

The section of the Eastern Corridor located to the east of Port Elizabeth is located largely within the Transkei region of the Eastern Cape. The majority of the land in this area is communally owned land and population densities are higher than other rural areas within the Eastern Cape Province. The land uses along the majority of the route are communal farming, involving livestock and dry land crops. The presence of communal farmers may increase the potential risks posed by construction and maintenance workers. Additional care will need to be taken in managing construction workers and maintenance crews along this section of the corridor.

The eastern section of the Eastern Corridor is located within the Kwa-Zulu Natal Province. The population density along this section is higher and the land uses along the majority of the route are linked to commercial farming, specifically sugar cane and fruit farming. The south coast of Kwa-Zulu Natal is also an important tourist destination. The corridor will also encounter more dense urban areas associated with the Durban Metropolitan Area. This has the potential to increase the risks associated with the activities of construction and maintenance crews. Additional care will need to be taken in managing construction workers and maintenance crews along this section of the corridor.

Western Corridor

The Western Corridor passes through sparsely populated rural farm land l located in the Western Cape and Northern Cape Provinces. The land uses along the section of the corridor located in the Northern Cape are linked to commercial farming, specifically livestock. The potential impacts associated with construction workers and maintenance crews along this section of the Western Corridor are likely to be low.

The land uses along the section of the corridor located in the Western Cape include irrigation and intensive farming, specifically in the Ceres Valley and along the banks of the Olifants River. Additional care will need to be taken in managing construction workers and maintenance crews along this section of the corridor.

7.7.3 Management and mitigation

The management and mitigation measures listed below are generic and apply to each of the five EGI corridors. The mitigation measures apply to construction and maintenance related activities:

- Eskom should make it a requirement for contractors to implement a 'locals first' policy for construction/maintenance jobs, specifically for semi and low-skilled job categories. Localisation objectives are spelt out in Eskom's Procurement and Supply Chain Management Procedure;
- Eskom should consider the need to establishing a Monitoring Forum (MF) in order to monitor the implementation of the recommended mitigation measures. The MF should be established before the construction/maintenance phase commences, and should include key stakeholders, including representatives from the relevant local municipalities, farmers, local farming unions, local community representatives etc. The MF should also be briefed on the potential risks to the local community and farm workers associated with construction/maintenance workers;
- Eskom and the appointed contractor(s) should, in consultation with representatives from the MF, develop a Code of Conduct for the construction/maintenance phase. The code should identify which types of behaviour and activities are not acceptable, such as trespassing, hunting, stock theft etc. Construction/maintenance workers in breach of the code should be dismissed. All dismissals must comply with the South African labour legislation;
- Eskom should be liable for compensating farmers in full for any stock losses and/or damage to farm infrastructure that can be linked to construction/maintenance workers. This should be contained in the Code of Conduct to be signed between Eskom and the affected landowners. The agreement should also cover loses and costs associated with veld fires caused by construction/maintenance or construction/maintenance related activities;
- The Environmental Management Plan (EMP) should outline procedures for managing and storing waste on site, specifically plastic waste that poses a threat to livestock if ingested;
- The EMP should also address risks posed by veld fires. In this regard no open fires for cooking or heating should be permitted, except in designated areas, the contractor(s) should ensure that construction/maintenance related activities that pose a potential fire risk, such as welding, are properly managed and are confined to areas where the risk of fires has been reduced. Measures to reduce the risk of fires include avoiding working in high wind conditions when the risk of fires is greater. In this regard special care should be taken during the high risk periods, such as dry, windy months, the contractor(s) must provide adequate fire fighting equipment on-site and fire-fighting training to selected construction/maintenance staff;
- Eskom and the appointed contractor(s) should implement an HIV/AIDS awareness programme for all construction/maintenance workers at the outset of the construction/maintenance phase.

Reference should be made to the requirements contained in Guidelines for Integrating HIV and Gender-related Issues into Environmental Assessment in Eastern and Southern Africa. Prepared for UNDP Regional Centre for Eastern and Southern Africa by the Southern African Institute for Environmental Assessment (2012);

- Eskom and or the appointed contractor should provide transport to and from the site on a daily basis for construction/maintenance workers. This will enable the contactor to effectively manage and monitor the movement of construction/maintenance workers on and off the site;
- Depending on the duration of the contract, Eskom and or the contractor(s) should make the necessary arrangements for construction/maintenance workers from outside the area to return home over weekends and/ or on a regular basis. This would reduce the risk posed to local family structures and social networks;
- Where feasible, no construction/maintenance workers, with the exception of security personnel, should be permitted to stay over-night on the site. This would reduce the risk to local farmers.

7.8 Health impacts focused on electro-magnetic fields

7.8.1 Impacts of EGI in general

Introduction

The section below is based primarily on information from research undertaken by the World Health Organisation (WHO) on Electric and magnetic fields (EMF) (http://www.who.int/peh-emf/about/WhatisEMF/en/index3.html)

Electric and magnetic fields (EMF) are always created, in varying levels, with the generation and use of electricity and at the frequency of the electrical power system. In South Africa, as in most European countries, electric power is supplied as an alternating current (AC) at a frequency of 50 Hertz (Hz). This means that the electric current flowing in the system changes direction 50 times per second (Electric and magnetic fields from overhead power lines, Pretorius, 2006).

Electric fields are produced by the presence of electric charges and therefore the Voltage (V) applied to a conductor. Generally the voltage on a system is stable and remains the same. Electric fields decrease with an increase in distance from the source (conductor). Electric field levels are measured in Volts per metre (V/m). Because of the range of the levels encountered in power system environments, field levels are reported in kilovolt per metre (kV/m). (One thousand V/m = 1 kV/m) (Electric and magnetic fields from overhead power lines, Pretorius, 2006).

Magnetic fields are produced by the current flowing (movement of electric charge) on a conductor. Electric current is measured in Ampere (A). The current on a system may vary depending on the number of devices (load) supplied by the system. As the load changes, the magnetic field will change. Magnetic fields decrease with an increase in distance from the source (conductor). Magnetic field levels are measured in Tesla (T). Because of the range of the levels encountered in typical power system environments, field levels are reported in microtesla (μT). (One millionth of a Tesla = 1 μT).

Overhead power lines generate electric and magnetic fields. Electric fields, measured in kV/m:

- Are linked to the voltage of the power line and remains relatively stable with the line energized;
- Can be reduced (shielded) fairly easily;
- Decrease with an increase in distance from the line.

Magnetic fields, measured in μT:

- Are linked to the current flowing (load) on the line. Magnetic field levels in the vicinity of a power line typically show daily and seasonal variation patterns;
- Can be reduced. Reducing magnetic fields require special engineering techniques or line designs;
- Decrease with an increase in distance from the line.

In homes that are not located near power lines this background field may be up to about 0.2 μT. In homes located directly beneath power lines the fields are much stronger. Magnetic flux densities at ground level can range up to several μT. Electric field levels underneath power lines can be as high as 10 kV/m. However, the fields (both electric and magnetic) drop off with distance from the lines. At 50 m to 100 m distance the fields are normally at levels that are found in areas away from high voltage power lines. In addition, house walls substantially reduce the electric field levels from those found at similar locations outside the house (Pretorius, 2006).

Exposure to electromagnetic fields is not a new phenomenon. However, during the 20th century, environmental exposure to man-made electromagnetic fields has been steadily increasing as growing electricity demand, technology and changes in social behaviour have created more and more artificial sources. In this regard most human beings are exposed to a complex mix of weak electric and magnetic fields, both at home and at work, from the generation and transmission of electricity, domestic appliances and industrial equipment, to telecommunications and broadcasting. The strongest power frequency electric fields that are ordinarily encountered beneath high voltage transmission lines. However, based on WHO study also found that the exposure of people living in the vicinity of high voltage power lines differs very little from the average exposure in the population.

In response to growing public health concerns over possible health effects from exposure to an ever increasing number and diversity of electromagnetic field sources, the World Health Organization (WHO) launched a large, multidisciplinary research effort in 1996. The International EMF Project brings together current knowledge and available resources of key international and national agencies and scientific institutions.

The key findings of the WHO EMF study to date are summarised below.

Effects on general health

The WHO report notes that some members of the public have attributed a diffuse collection of symptoms to low levels of exposure to electromagnetic fields at home. Reported symptoms include headaches, anxiety, suicide and depression, nausea, fatigue and loss of libido. However, the WHO study found that to date, scientific evidence does not support a link between these symptoms and exposure to electromagnetic fields. The study notes that some of these health problems may be caused by noise or other factors in the environment, or by anxiety related to the presence of new technologies.

The findings of the WHO study also state that it is not disputed that electromagnetic fields above certain levels can trigger biological effects. However, experiments with healthy volunteers indicate that short-term exposure at the levels present in the environment or in the home do not cause any apparent detrimental effects. Exposures to higher levels that might be harmful are restricted by national and international guidelines. The current debate is centred on whether long-term low level exposure can evoke biological responses and influence people's well- being.

The study reported that approximately 25,000 articles have been published over the past 30 years on the biological effects and medical applications of non-ionizing radiation. Based on an in-depth review of the scientific literature, the WHO EMF study concluded that current evidence does not confirm the existence of any health consequences from exposure to low level electromagnetic fields. However, some gaps in knowledge about biological effects exist and need further research.

The WHO study found that:

- At low frequencies, external electric and magnetic fields induce small circulating currents within the body. In virtually all ordinary environments, the levels of induced currents inside the body are too small to produce obvious effects;
- There is no doubt that short-term exposure to very high levels of electromagnetic fields can be harmful to health. However, despite extensive research, to date there is no evidence to conclude that exposure to low level electromagnetic fields is harmful to human health.

Effects on pregnancy outcomes

The study notes that many different sources and exposures to electromagnetic fields in the living and working environment, including computer screens, electric blankets, radiofrequency welding machines, diathermy equipment and radar, have been evaluated by the WHO and other organizations. Based on the findings of this research the overall weight of evidence shows that exposure to fields at typical environmental levels does not increase the risk of any adverse outcome such as spontaneous abortions, malformations, low birth weight, and congenital diseases. There have been occasional reports of associations between health problems and presumed exposure to electromagnetic fields, such as reports of prematurity and low birth weight in children of workers in the electronics industry, but these have not been regarded by the scientific community as being necessarily caused by the field exposures.

Electromagnetic fields and cancer

The WHO study notes that despite many studies, the evidence for any effect remains highly controversial. However, it is clear that if electromagnetic fields do have an effect on cancer, then any increase in risk will be extremely small. The results to date contain many inconsistencies, but no large increases in risk have been found for any cancer in children or adults.

A number of epidemiological studies suggest small increases in risk of childhood leukemia with exposure to low frequency magnetic fields in the home. However, the WHO study indicates that scientists have not generally concluded that these results indicate a cause-effect relation between exposure to the fields and disease (as opposed to artifacts in the study or effects unrelated to field exposure). In part, this conclusion has been reached because animal and laboratory studies fail to demonstrate any reproducible effects that are consistent with the hypothesis that fields cause or promote cancer. Large-scale studies are currently underway in several countries and may help resolve these issues.

Electromagnetic hypersensitivity and associated depression

Some individuals report "hypersensitivity" to electric or magnetic fields. The WHO study indicates that there is little scientific evidence to support the idea of electromagnetic hypersensitivity. The report also indicates that research on this subject is difficult because many other subjective responses may be involved, apart from direct effects of fields themselves. The WHO study indicated that more studies are continuing on the subject.

Exposure to magnetic fields in everyday life

In recent years, national authorities in different countries have undertaken numerous studies to investigate electromagnetic field levels in the living environment. The WHO study found that none of these surveys has concluded that field levels could bring about adverse health effects. The Federal Office for Radiation Safety in Germany recently measured the daily exposure to magnetic fields of about 2 000 individuals across a range of occupations and public exposures. The measured exposure varied widely but gave an average daily exposure of 0.10 μT. This value is a thousand times lower that the standard limit of 100 μT for the public and five thousand times lower than the 500 μT exposure limit for workers. Furthermore, the exposure of people living in the centres of cities showed that there are no drastic differences in exposure between life in rural areas and life in the city. The study also found that the exposure of people living in the vicinity of high voltage power lines differs very little from the average exposure in the population.

In conclusion, the findings of the WHO study indicate that, based on the available evidence there are no health consequences associated with the exposure to low level electromagnetic fields. However, the study did find that some gaps in knowledge about biological effects exist and need further research. This finding is also confirmed in the IFCs, Environmental, Health, and Safety Guidelines for Electric Power Transmission and Distribution (2007), which notes:

"Although there is public and scientific concern over the potential health effects associated with exposure to EMF (not only high voltage power lines and substations, but also from everyday household uses of electricity), there is no empirical data demonstrating adverse health effects from exposure to typical EMF levels from power transmissions lines and equipment".

7.8.2 Impacts specific to the declaration of EGI corridors

Five EGI corridors have been identified, namely:

- Central Corridor;
- Northern Corridor;
- International Corridor;
- Eastern Corridor, and;
- Western Corridor.

As indicated above, the findings of the WHO study indicate that, based on the available evidence there are no health consequences associated with the exposure to low level electromagnetic fields. However, the study did find that some gaps in knowledge about biological effects exist and need further research. The study also found that the exposure of people living in the vicinity of high voltage power lines differs very little from the average exposure in the population. The potential health related risks associated with the establishment of high voltage transmission lines is therefore not regarded as a key social issue. Despite this efforts should be made to ensure that transmission lines are not located within close proximity to dwellings and settlements.

Given the width of the EGI corridors (100km) it is likely that a suitable sub-corridor (5 km wide) can be identified that enables adequate buffer zones to be established between the servitude and potentially affected dwellings and settlements. The buffer distances should be informed by internationally accepted guidelines for buffers.

While the potential health related risks associated with the establishment of high voltage transmission lines are not regarded as a key social issue, additional care will need to be taken when siting transmission lines in the more densely developed and urbanised sections of the each of the five corridors. These sections are described below.

Central Corridor

The potential sections of the Central Corridor where additional care will need to be taken when siting transmission lines are the south western section of the Central Corridor located within the Western Cape Province and the north eastern section as it enters the Gauteng Province.

Intensive farming (vineyards and orchards etc.) occurs in the south western section of the Central Corridor located within the Western Cape Province. This area starts near De Doorns/Ceres in the Western Cape and extends all the way to outskirts of the Cape Metropolitan Area. Population densities in this area are higher and land uses more intensive. Care will need to be taken in siting transmission pylons in order to maximise the distances between dwellings and the overhead transmission lines.

The north eastern section of the Central Corridor as it enters the Gauteng Province will encounter more dense urban areas associated with the Johannesburg Metropolitan Area. Care will need to be taken in siting transmission pylons in order to maximise the distances between dwellings and the overhead transmission lines.

Northern Corridor

The north eastern section of the Northern Corridor as it enters the Gauteng Province will encounter more dense urban areas associated with the Johannesburg Metropolitan Area. Care will need to be taken in siting transmission pylons in order to maximise the distances between dwellings and the overhead transmission lines.

International Corridor

The south western section of the International Corridor passes through a small section of the Mpumalanga Province before entering the Gauteng Province, where it will encounter more dense urban areas associated with the Johannesburg Metropolitan Area. Care will need to be taken in siting transmission pylons in order to maximise the distances between dwellings and the overhead transmission lines.

Eastern Corridor

The western section of the corridor is located to the west of Port Elizabeth and passes through sparsely populated rural farm land. Irrigation and more intensive farming are confined to irrigation schemes located in the vicinity of the major rivers, such as the Gamtoos and Fish Rivers. Care will need to be taken in siting transmission pylons in order to maximise the distances between dwellings and the overhead transmission lines.

The section of the Eastern Corridor located to the east of Port Elizabeth is located largely within the Transkei region of the Eastern Cape. The majority of the land in this area is communally owned land and population densities are higher than other rural areas within the Eastern Cape Province. The land uses along the majority of the route are communal farming, involving livestock and dry land crops. Care will need to be taken in siting transmission pylons in order to maximise the distances between dwellings and the overhead transmission lines.

The eastern section of the Eastern Corridor is located within the Kwa-Zulu Natal Province. The population density along this section is higher and the land uses along the majority of the route are linked to commercial farming, specifically sugar cane and fruit farming. The south coast of Kwa-Zulu Natal is also an important tourist destination. The corridor will also encounter more dense urban areas associated with the

Durban Metropolitan Area. Care will need to be taken in siting transmission pylons in order to maximise the distances between dwellings and the overhead transmission lines.

Western Corridor

The land uses along the section of the corridor located in the Western Cape include irrigation and intensive farming, specifically in the Ceres Valley and along the banks of the Olifants River. Care will need to be taken in siting transmission pylons in order to maximise the distances between dwellings and the overhead transmission lines.

7.8.3 Management and mitigation

Given the width of the EGI corridors (100km) it is likely that a suitable sub-corridor (5 km wide) can be identified that enables adequate buffer zones to be established between the servitude and potentially affected dwellings and settlements. The buffer distances should be informed by internationally accepted guidelines for buffers.
While the IFCs, Environmental, Health, and Safety Guidelines for Electric Power Transmission and Distribution (2007), indicates that while the evidence of adverse health risks is weak, it is still sufficient to warrant limited concern. In this regard the recommendations applicable to the management of EMF exposures include:

- Evaluating potential exposure to the public against the reference levels developed by the International Commission on Non-Ionizing Radiation Protection (ICNIRP). Average and peak exposure levels should remain below the ICNIRP recommendation for General Public Exposure[6];
- Considering siting new facilities so as to avoid or minimize exposure to the public. Installation of transmission lines or other high voltage equipment above or adjacent to residential properties or other locations intended for highly frequent human occupancy, (e.g. schools or offices), should be avoided;
- If EMF levels are confirmed or expected to be above the recommended exposure limits, application of engineering techniques should be considered to reduce the EMF produced by power lines, substations, or transformers. Examples of these techniques include:
    - Shielding with specific metal alloys;
    - Burying transmission lines;
    - Increasing height of transmission towers;
    - Modifications to size, spacing, and configuration of conductors.

In addition to addressing potential impacts on public health, the IFC Environmental, Health, and Safety Guidelines for Electric Power Transmission and Distribution (2007) also list recommendations to address the health and safety of electricity utility workers exposed to EMF. The IFC Guidelines note that electric utility workers typically have a higher exposure to EMF than the general public due to working in proximity to electric power lines. In order to prevent and or minimise occupational EMF exposure an EMF safety plan should be prepared and implemented. The plan should address:

[6] ICNIRP is a non-governmental organization formally recognized by the World Health Organization (WHO), which published the "Guidelines for Limiting Exposure to Time-varying Electric, Magnetic, and Electromagnetic Fields" following reviews of all the peer-reviewed scientific literature, including thermal and non-thermal effects. The standards are based on evaluations of biological effects that have been established to have health consequences. The main conclusion from the WHO reviews is that exposures below the limits recommended by the ICNIRP international guidelines do not appear to have any known consequence on health.

- Identification of potential exposure levels in the workplace, including surveys of exposure levels in new projects and the use of personal monitors during working activities; Training of workers in the identification of occupational EMF levels and hazards;
- Establishment and identification of safety zones to differentiate between work areas with expected elevated EMF levels compared to those acceptable for public exposure, limiting access to properly trained workers;
- Implementation of action plans to address potential or confirmed exposure levels that exceed reference occupational exposure levels developed by international organizations such as the International Commission on Non-Ionizing Radiation Protection (ICNIRP), and the Institute of Electrical and Electronics Engineers (IEEE). Personal exposure monitoring equipment should be set to warn of exposure levels that are below occupational exposure reference levels (e.g. 50 percent). Action plans to address occupational exposure may include limiting exposure time through work rotation, increasing the distance between the source and the worker, when feasible, or the use of shielding materials.

8 PUBLIC PARTICIPATION CONSIDERATIONS

Overall socio-economic impacts and, in particular, the ultimate acceptability of proposed projects being assessed in authorisation processes are linked to how public participation processes are managed. In the case of transmission lines, which often carry a negative connotation, this is especially pertinent. In addition, given the limited involvement of the public in identification of the EGI Corridors as part of the EGI SEA process it will be critical to ensure that adequate provision is made for the public to comment on the proposed corridors during the Gazetting Process. The Basic Assessment Process undertaken for the preferred sub-corridors must also ensure the appropriate level and timing of public participation.

8.1 Public participation in the SEA process

The vision for the SEA is that Strategic Electrical Grid Infrastructure (EGI) is expanded in an environmentally responsible and efficient manner that responds effectively to the country's economic and social development needs. In order to meet this vision the objectives of the SEA are to:

- Identify strategic corridors to support backbone of electricity transmission up to 2040;
- Refine the corridors based high level suitability from an environmental, economic and social perspective;
- Facilitate streamlined and responsible environmental authorisation for EGI inside of corridors;
- Promote integrated decision-making between authorising authorities;
- Gazette the corridors under the SIP programme (Infrastructure Development Act);
- Enable Eskom pre-negotiation of servitudes;
- Support upfront strategic investment of generation and load industries.
- A key consideration in terms of the SEA process is how to inform the public of the process and findings, specifically with regard to the identification and gazetting of the EGI Corridors. The importance of public participation to the environmental assessment process is highlighted in the Public Participation Guideline, Public Participation in the Environmental Impact Assessment Process (Guideline 7), developed as part of the Integrated Environmental Management Guideline, published in terms of NEMA in Government Gazette No. 35769, 10 October, 2012.

The Guideline notes that public participation is the most important process in the environmental impact assessment (Section 12, Conclusion), and one of the most important aspects of the environmental authorisation process (Section 2, The Importance of the Public Participation Process). It is considered so important that it is the only requirement for which exemption cannot be given. This is because people have a right to be informed about potential decisions that may affect them and to be afforded an opportunity to influence those decisions. Effective public participation also facilitates informed decision-making by the competent authority and may result in better decisions as the views of all parties are considered.

The benefits of public participation include the following:

- It provides an opportunity for I&APs, EAPs and the competent authority (CA) to obtain clear, accurate and understandable information about the environmental impacts of the proposed activity or implications of a decision;
- It provides I&APs with an opportunity to voice their support, concerns and questions regarding the project, application or decision;
- It provides I&APs with the opportunity of suggesting ways for reducing or mitigating any negative impacts of the project and for enhancing its positive impacts;
- It enables an applicant to incorporate the needs, preferences and values of affected parties into its application;
- It provides opportunities for clearing up misunderstandings about technical issues, resolving disputes and reconciling conflicting interests;
- It is an important aspect of securing transparency and accountability in decision-making; and
- It contributes toward maintaining a healthy, vibrant democracy.

The majority of people are not aware of and or familiar with the gazetting process. In addition, the majority of people do not have access to and or provided with information on what is being gazetted and how they can comment as part of the process. Given the importance of the EGI Corridors and the public participation process it is therefore critical that the public be made aware of the SEA and its objectives before the EGI Corridors are gazetted. This will enable them to comment more effectively as part of the Gazetting process. It will also support the benefits of public participation as set out in the Guideline for Public Participation in the Environmental Impact Assessment Process as listed above.

It is therefore recommended that the CSIR and Eskom develop and implement a public awareness programme aimed at informing the public and key stakeholders in advance of the gazetting process. The awareness programme should aim to inform the broader South African public and key stakeholders of the importance of expanding the countries EGI and establishing the five identified EGI corridors. It should outline the following:

- The process followed by Eskom and the CSIR in identifying and selecting the five EGI Corridors;
- The location, size (100 km wide) and extent of the 5 EGI Corridors and the areas of South Africa that will be affected;
- The objectives of the SEA, specifically with reference to the Infrastructure Development Act and the streamlining of the Environmental Assessment Process (Basic Assessments vs. Environmental Impact Assessments);
- The proposed Assessment Process that will be undertaken to identify suitable sub-corridors within each of the five EGI Corridors;
- The Government Gazetting process. This includes information of when the proposed EGI Corridors will be Gazetted, how the public can obtain copies of the Gazette and how the public can comment on the information contained in the Gazette.
- The public awareness programme should be implemented well in advance of the proposed date for Gazetting.

The approach to the public awareness programme aimed at informing the public should include:

- Preparation of Background Information Document (BID) that provides information on EGI Corridors (location etc.) and their strategic importance, the SEA process and key findings, the Gazetting Process and implications of gazetting the 5 EGI Corridors in terms of the environmental authorisation process, and the proposed Assessment Process that will be undertaken to identify suitable sub-corridors within each of the five EGI Corridors;
- Allowing for online access to the BID and for the submission of comments online.
- Placing advertisements in selected newspapers, including key local and national daily and weekly newspapers. The advertisements should include a map showing the location of the proposed EGI corridors, information on SEA and Gazetting Process and contact details for further information (website to download BID and related project information etc.). The newspaper advertisements should be run more than once to ensure that public and key stakeholders are afforded an opportunity to be made aware of the project and establishment of EGI Corridors;
- Use of commercial and community radio stations to inform the public of the SEA and the Gazetting Process, key contact people and contact numbers etc. Large numbers of rural populations rely on local radio as a key source of information. This information is also provided in local languages which makes if more accessible. A list of South African stations can be found on: https://en.wikipedia.org/wiki/List_of_radio_stations_in_South_Africa
- Contacting Relevant Provincial, District and Local Municipalities. Copies of the BID should be sent to Relevant Provincial, District and Local Municipalities and they should be requested to inform local residents of the SEA and establishment of the EGI Corridors;
- Identification of key stakeholders to be contacted and sent copies of the BID and other relevant project information. Due to the linear nature of the corridors it will not be possible to contact and or notify all of the affected landowners. The focus should therefore be on organisations and institutions that represent the interests of potentially affected landowners and affected stakeholders, such as:

  - Local Farmers Associations and Unions in each of the 5 EGI Corridors;
  - Relevant Provincial Departments, such as Agriculture, Nature Conservation, Economic Development and Planning etc., in the Provinces affected by the 5 EGI Corridors;
  - Relevant District and Local Municipalities located within the 5 EGI Corridors. The information should be sent to the Municipal Manager and key departments, including Integrated Development Planning, Local Economic Development, Spatial Planning, etc.;
  - Relevant Tourism, Eco-Tourism and Heritage Organisations in the areas affected by the 5 EGI Corridors;
  - Relevant Hunting Organisations in the areas affected by the 5 EGI Corridors;
  - Relevant Conservation Organisations (Government and Private) in the areas affected by the 5 EGI Corridors;
  - Relevant Non-Government Organisations, including WWF, WESSA, etc.
  - As indicated above, it is critical that the public awareness programme be implemented well in advance of the proposed date for Gazetting.

8.2 Public participation in the Basic Assessment process

As indicated above, two of the key objectives of the SEA are to:

- Facilitate streamlined and responsible environmental authorisation for EGI inside of corridors; and;
- Enable Eskom pre-negotiation of servitudes.

The reasons for this are linked to the challenges associated with the current environmental authorisation, which include:

- Long time frame for EIAs;
- Additional permitting requirements- different accountable departments;
- Cascading authorisation process;
- EIA locks Eskom into predefined route- No negotiation on servitudes prior to EIA;
- High incidence of appeal;
- Authorisations expire.

The current EIA process involves Scoping, followed by Assessment Phase and production of Environmental Impact Assessment Report (EIAR). The EIA process is undertaken for preliminary sub-corridor options identified by Eskom. These are based largely on technical and financial considerations. Based on the outcome of the EIA process a preferred sub-corridor is selected and authorised. Together with the environmental authorisation process and potential appeals, the EIA can take up to 3 years or longer.

Once the sub-corridor has been authorised Eskom then enter into servitude negotiations and acquisitions with the landowners whose property is located within the preferred sub-corridor, followed by detailed surveys and designs, registration of servitudes, permitting and licencing and finally, construction. This process can take another 3-4 years.

The Gazetting of EGI Corridors the requirement to undertake fully EIAs will be replaced by Basic Assessments (BA).

8.2.1 Phasing options for public participation and BA within the project cycle

In order to address the current challenges the CSIR have identified three revised processes, referred to as:

- Proposed New Process 1: SEA informs preferred sub-corridor selection;
- Proposed New Process 2: SEA and Basic Assessment informs preferred sub-corridor selection;
- Proposed New Process 3: SEA and PPP informs preferred sub-corridor selection.

Each of these processes is discussed below. Based on the comments a new, process has been proposed, referred to as:

- Recommended New Process 4: SEA, PPP and Specialist Studies inform preferred sub-corridor selection.

8.2.2 Proposed New Process 1: SEA informs preferred sub-corridor selection

In terms of the Revised Process 1: SEA informs the preferred corridor selection, the key steps in the process are:

- Step 1: Preliminary sub-corridor alignments (1 to 5 km wide) located within the 100 km corridor are identified by Eskom;
- Step 2: Based on the SEA sensitivity maps Eskom identifies preferred sub-corridor alignment (1 to 5 km wide);
- Step 3: An independent peer review is undertaken to assess/confirm the suitability of sub-corridor (Assumed there is a feedback loop here if peer review indicates that sub-corridor is not acceptable);

- Step 4: Commence Public Participation and Servitude Negotiation and Acquisition Process. The focus of both these processes would be on a single, preferred corridor identified by ESKOM and subject to a peer review;
- Step 5: Undertake specialist studies for the preferred sub-corridor once the Servitude Negotiation and Acquisition Process has been completed;
- Step 6: Undertake detailed Survey and Design for the preferred sub-corridor;
- Step 7: Prepare Draft BAR and EMP for preferred sub-corridor for comment;
- Step 8: Submit Final BAR and EMP;
- Step 9: Environmental Authorisation and appeals;
- Step 10: Servitude Registration;
- Step 11: Construction.

The permitting and licencing process would commence with Step 7, Prepare Draft BAR and EMP for preferred corridor.

Comment on Proposed New Process 1: SEA informs preferred sub-corridor selection

The main concerns with New Process 1 are:

- A single preferred sub-corridor is identified in Step 3. No alternative sub-corridors are identified;
- The public participation and Servitude Negotiation and Acquisition Process (Step 4) focus on a single, preferred corridor. It is unclear as to the scope of the public participation, i.e. does it focus on the landowners directly affected by the preferred sub-corridor, or does it include adjacent landowners and other key stakeholders;
- The specialist studies are only required to assess a single, preferred sub-corridor (Step 5). The specialist studies do no therefore inform the identification of the preferred sub-corridor;
- The specialist studies may find that sections of the preferred sub-corridor are not suitable and recommend that the route along these sections should be changed. This would require the servitude agreements with the farmers along the affected sections to be cancelled and the negotiation and acquisition process to be undertaken with a new set of landowners. This would result in additional delays in the process;
- The detailed Survey and Designs will be undertaken before the Draft BAR report is prepared and submitted for comment. This represents a major concern in that the public and authorities are essentially presented with fully designed fait accompli to comment on. This undermines the objectives of the environmental assessment and public participation process, and in the opinion of the authors, represents a **Fatal Flaw** in the process. The approach also significantly increases the risk of legal challenges, which, in turn, would result in additional delays in the process.

8.2.3 Proposed New Process 2: SEA and Basic Assessment informs preferred sub-corridor selection

In terms of the New Process 2: SEA and BA informs the preferred corridor selection, the key steps in the process are:

- Step 1: Preliminary sub-corridor alignments (~ 5 km wide) located within the 100 km corridor are identified by ESKOM;
- Step 2: Based on the SEA sensitivity maps Eskom identifies preferred corridor alignment (~ 5 km wide);
- Step 3: An independent peer review is undertaken to assess/confirm the suitability of sub-corridor (Assume there is a feedback loop here if peer review indicates that sub-corridor is not acceptable);

- Step 4: Commence Servitude Negotiation and Acquisition Process. The focus would be on a single, preferred corridor identified by Eskom and subject to a peer review;
- Step 5: Undertake Survey and Designs;
- Step 6: Start Basic Assessment process. Assume that this includes public participation and specialist studies for preferred sub-corridor;
- Step 7: Prepare Draft BAR and EMP for preferred corridor for comment;
- Step 8: Submit Final BAR and EMP;
- Step 9: Environmental Authorisation and appeals;
- Step 10: Servitude Registration;
- Step 11: Construction.

The permitting and licencing process would commence with Step 7, Prepare Draft BAR and EMP for preferred corridor.

Comment on Proposed New Process 2: SEA and Basic Assessment informs preferred sub-corridor selection

The main concerns with revised process 2 are similar to those associated with New Process 1, and include:

- The Basic Assessment process (Step 6), and one assumes, the public consultation process, only commence after the completion of the Servitude Negotiation and Acquisition (Step 4) and Survey and Design (Step 5) component have been completed. This represents a major concern in that the public and authorities are essentially presented with fully designed fait accompli to comment on. This undermines the objectives of the environmental assessment and public participation process, and in the opinion of the authors, represents a Fatal Flaw in the process. The approach also significantly increases the risk of legal challenges, which, in turn, would result in additional delays in the process
- Linked to the first concern, a single preferred sub-corridor is identified in Step 2. No alternative sub-corridors are identified;
- Linked to the first concern, the Servitude Negotiation and Acquisition Process (Step 4) and Detailed Survey and Design (Step 5) component of the process focus on a single, preferred sub-corridor and take place and are concluded before the Basic Assessment and public consultation takes place. As indicated above, as in the case of Proposed New Process 1, the public and authorities will essentially be presented with a fait accompli to comment on;
- The specialist studies will only assess a single, preferred sub-corridor (Step 6). The specialist studies do not therefore inform the identification of the preferred sub-corridor. Although the new EIA regulations allow for the identification of the a preferred alternative during Scoping this remains a potential concern;
- The specialist studies may find that sections of the preferred sub-corridor are not suitable and recommend that the route along these sections should be changed. This would require the servitude agreements with the farmers along the affected sections to be cancelled and negotiation and acquisition process to be undertaken with a new set of landowners. Detailed Survey and Designs would also need to be undertaken for the new sections identified by the specialists. This would result in additional delays in the process.

8.2.4 Proposed New Process 3: SEA and PPP informs preferred sub-corridor selection

In terms of the Proposed New Process 3: SEA and PPP informs the preferred corridor selection, the key steps in the process are:

- Step 1: Three preliminary sub-corridor alignments (1 to 5 km wide) located within the 100 km corridor are identified by Eskom;

- Step 2: SEA protocol and maps are used to identify preferred sub-corridor. The process diagram also indicates that the PPP process commences at this stage in the process. However, the PPP process would be limited to informing landowners within the selected 1-5 km wide corridor and the corridors immediate neighbours through the release of a BID. The BID gives background to the SEA, the listed alternatives and the environmental reasoning for selecting the preferred alternative. The document is circulated to landowners within the corridor and adjacent landowners and a 30 day commenting period would ensue;
- Step 3: The preferred sub-corridor is identified. From the diagram it is not clear if or how the PPP process informs the identification of the preferred sub-corridor. Based on the diagram it would appear that the identification of the preferred sub-corridor is largely informed by the SEA protocol and maps as in the case of New Process 1 and 2. However, unlike 1 and 2, there is no peer review mechanism;
- Step 4: Commence Specialist Studies;
- Step 5: Preliminary profile for line;
- Step 6: Commence Servitude Negotiation and Acquisition Process. The focus would be on a single, preferred corridor identified by Eskom and, one assumes, confirmed by the Specialist Studies;
- Step 7: Undertake Survey and Design component
- Step 8: Prepare and submit Draft Basic Assessment Report and EMPR for comment;
- Step 9: Submit Final BAR and EMP;
- Step 10: Environmental Authorisation and appeals;
- Step 11: Servitude Registration;
- Step 12: Construction.

The permitting and licencing process would commence with Step 8, Prepare Draft BAR and EMP for preferred corridor.

Comment on Proposed New Process 3: SEA and PPP informs preferred sub-corridor selection

The main concerns with revised process 3 are similar to those associated with New Process 1 and 2, and include:

- The specialist studies will only assess a single, preferred sub-corridor (Step 3). As in the case of New Process 1 and 2, the specialist studies may find that sections of the preferred sub-corridor are not suitable and recommend that the route along these sections should be changed. However, unlike New Process 1 and 2, this would take place before the commencement of the Servitude Negotiations and Acquisitions (Step 6). This represents an improvement over New Process 1 and 2;
- Linked to the first concern, the specialist are not involved in the assessment of alternative sub-corridors that are identified. Although the new EIA regulations allow for the identification of the a preferred alternative during Scoping this remains a potential concern;
- Linked to the first concern, the Servitude Negotiation and Acquisition Process (Step 3)[7] and Detailed Survey and Design (Step 4) component of the process focus on a single, preferred sub-corridor and take place and are concluded before the Basic Assessment and public consultation takes place. As indicated above, as in the case of Proposed New Process 1 and 2, the public and authorities will essentially be presented with a fait accompli to comment on;
- The Draft Basic Assessment Report is submitted after the Servitude Negotiation and Acquisition and Survey and Design component have been completed. This represents a major concern in that

[7] It should be noted that the Servitude Negotiation may also take place prior to the commencement of the BA process. In this regard, based on the findings of the EGI SEA, Eskom may decide to enter into negotiations with landowners well in advance of any BA process. This is however only likely to apply to certain strategic sections of the route. These sections would then be assessed as part of the BA process. The potential risk is that the BA may find that sections of the acquired route are unsuitable.

the public and authorities are essentially presented with fully designed fait accompli to comment on. This undermines the objectives of the environmental assessment and public participation process, and in the opinion of the authors, represents a Fatal Flaw in the process. The approach also significantly increases the risk of legal challenges, which, in turn, would result in additional delays in the process

8.2.5 General comments and recommendations

Having considered the three process options above, the following general comments and recommendations are offered:

- More than one potentially suitable sub-corridor should be identified for assessment;
- Public participation should include a broad range of stakeholders, including affected and adjacent landowners, local authorities and key interest groups etc.;
- The identification of preferred sub-corridor should be informed by findings of specialist studies, which should include site visits. While the high level information gathered as part of the SEA process is sufficient to identify potential sub-corridor alternatives, this information is not sufficiently detailed to assess which of the sub-corridors is the preferred option. This requires site visits by the relevant specialists;
- The Survey and Design component of the process should and cannot precede Environmental Authorisation. Undertaking detailed design prior to Environmental Authorisation would in effect mean that a final decision has been taken before the BA has commenced. This undermines the entire objective of the environmental assessment process, and in the opinion of the authors, represents a **Fatal Flaw** in the process;
- Recommended that the Survey and Design component should only commence once Environmental Authorisation and Appeals have been finalised. In the interim it would be possible for Eskom to undertake preliminary, desk top work relating to the Survey and Design components of the project. However, no on-site work should be undertaken prior to Environmental Authorisation.

8.2.6 Recommended New Process 4: SEA, PPP and Specialist Studies inform preferred sub-corridor selection

In terms of the Proposed New Process 4: SEA, PPP and Specialist Studies inform the preferred corridor selection, the key steps in the process are:

- Step 1: Three preliminary sub-corridor alignments (~ 5 km wide) located within the 100 km corridor are identified by Eskom. The SEA protocol and maps are used to identify preferred sub-corridors;
- Step 2: A high level independent peer review is undertaken to assess/confirm the suitability of the sub-corridors. A feedback loop is provided if peer review indicates that certain sub-corridors are not acceptable;
- Step 3: Three preferred sub-corridor alignments (~ 5 km wide) located within the 100 km corridor are confirmed;
- Step 4: PPP and BA process commence. Aim of the PPP process is to inform affected stakeholders and landowners of the three preferred sub-corridor alignments. The PPP would also, together with the findings of the Specialist Studies, inform the identification of the preferred sub-corridor;
- Step 5: Specialist studies undertaken to assess the three preferred sub-corridor alignments and identify preferred sub-corridor;
- Step 6: Servitude Negotiations and Acquisitions commence for preferred sub-corridor identified by specialist studies;
- Step 7: Prepare Draft BAR and EMP for preferred sub-corridor for comment;
- Step 8: Submit Final BAR and EMP;

- Step 9: Environmental Authorisation and appeals;
- Step 10: Survey and Design;
- Step 11: Servitude Registration;
- Step 12: Construction.

The permitting and licencing process would commence with Step 7, Prepare Draft BAR and EMP for preferred corridor.

Comment on potential benefits / advantages of Proposed New Process 4: SEA, PPP, and Specialist Studies inform preferred sub-corridor selection

The benefits / advantages associated with Revised Process 4 include:

- The PPP component commences early on in the process. This is in line with accepted best practice for environmental assessments and supports the statement contained in the DEAs Public Participation Guideline that public participation is the most important process in the environmental impact assessment and one of the most important aspects of the environmental authorisation process. As indicted above, given the limited involvement of the public in identification of the EGI Corridors as part of the EGI SEA process it will be critical to ensure that adequate provision is made for the public to comment on the proposed sub-corridors during the Basic Assessment Process. The PPP must therefore ensure that affected and adjacent landowners are informed of the proposed project. Information on the project should also be made available to relevant local stakeholders;
- The approach enables the specialist studies to assess more than one sub-corridor (Step 3). The findings of the specialist studies underpin the assessment process. It is therefore critical that they assess and identify the preferred sub-corridor. In order for this to happen they must be in a position to assess more than one sub-corridor option;
- The early commencement of the PPP and involvement of specialists in assessing alternative sub-corridors will also assist the Servitude Negotiation and Acquisition Process that takes place later on in the process (Step 7). By the time the Eskom officials contact the affected landowners they would have been informed that their farms are affected by the preferred sub-corridor;
- The approach ensures that the Survey and Design only takes place once the Environmental Authorisation has been obtained. This addresses the Fatal Flaws associated with Revised Process 1, 2 and 3;
- The approach allows the Servitude Negotiation and Acquisition Process (Step 7) to commence prior to preparation and submission of the Draft BAR and EMP for comment (Step 8). While there is the potential that the preferred sub-corridor identified in the BAR may not be authorised, the chance of this will be significantly reduced by involving the specialists in the assessment and identification of the preferred sub-corridor (Step 3);
- The need to complete the Servitude Negotiation and Acquisition Process (Step 7) is an issue that would need to be discussed with Eskom and dealt with on a case by case basis. Some landowners may be reluctant to allow a servitude to be establishment across their land and this may delay the Servitude Negotiation and Acquisition Process. This situation will however also be common to other three proposed new processes discussed above. However, once the Environmental Authorisation has been obtained this will provide Eskom with more leverage in terms of expropriation should this be the only option. It may therefore be more time effective submit the Draft BAR and EMP for comment (Step 8) before the Servitude Negotiation and Acquisition Process (Step 7) has been finalised.

It is also recommended that separate BA and authorisation processes should be carried out for specific sections of the sub-corridors within the 5 EGI Corridors. The advantages of this fragmented approach include:

- Allow for a more manageable and focussed BA process, as opposed to a BA for the entire route. This will make the BA processes easier to manage, including the PP component;
- Speed up the overall process by enabling sections of the sub-corridor to be assessed and approved. The risk of undertaking a BA for the entire route is that appeals and delays along certain sections could hold up and delay the entire authorisation process;
- Speed up the overall assessment process by undertaking separate BAs of different sections of the sub-corridor in parallel;
- Allow Survey and Design and Construction to commence along those sections of the route that have been approved.

9 CONCLUSIONS AND RECOMMENDATIONS

Given its critical importance to socio-economic development, it makes sense to plan ahead for the installation of EGI and ensure that it can be delivered within a reasonable and predictable timeframe. The declaration of the proposed EGI corridors and associated changes to environment authorisation process requirements would hold **key advantages at a strategic level** focused on (1) streamlining and (2) the provision of greater certainty or clarity regarding the future roll-out of EGI. These advantages would facilitate improved planning and enhanced dealings with Eskom for the **power generation, industrial and mining sectors** in particular resulting in cost savings and other efficiencies with economic benefits. The key need of these sectors will be access to timely and accurate information about intended development within the corridors and how the declaration of the corridors will affect them. Eskom should thus engage with the relevant representative bodies for these sectors with a view to drawing up an appropriate and clearly understandable information package and dissemination plan in this regard.

The declaration of corridors would provide some level of increased certainty to the **tourism sector** regarding the broad areas (i.e. 100 km corridors) where future major transmission lines and other EGI are likely to be constructed. It would also importantly provide guidance regarding particularly sensitive areas within the corridors which are likely to be avoided by future EGI projects making them potentially more suitable for tourism on balance. This should facilitate better informed planning by those in the sector. At a local scale, the reaction of those in the tourism industry may be to avoid expansion or new investment in corridor areas. Generous corridors widths of 100 km should limit risks. There may, however, be instances where the risk of investor avoidance of areas could be higher particularly in parts of the corridors where sensitivity mapping leaves a substantially smaller area through which transmission lines could possibly go (i.e. 'pinch-points' and similar areas). The avoidance of protected areas (incl buffers and expansion areas), game farms, private nature reserves, visually sensitive areas and areas of high heritage and ecological value as per the sensitivity mapping exercise should assist with limiting tourism risks. Assessments of corridor areas as part of environmental authorisation processes for individual EGI projects should, however, conduct more detailed assessments including ground truthing.

The declaration of corridors in areas which are the mostly likely location for transmission lines in any event would essentially assist the **property market** to function more efficiently by providing information to market participants that is pertinent to their property purchasing and sale decisions. While a better functioning property market is a positive, declaration is also likely to result in risks to existing property owners in the corridors. In particular, buyers looking for properties with high aesthetic values may seek to avoid the corridor areas if possible. The width of the corridors should, however, ensure that risk are kept low. At 100 km wide they provide significant scope to accommodate alternative transmission line routes which would mean that it would be difficult to see significant stigma being associated with corridor properties in general. Nevertheless, there are likely to be instances where risks could be higher including parts of the corridors where sensitivity mapping leaves a substantially smaller area through which transmission lines could possibly go (i.e. 'pinch-points' and similar areas). The potential for speculative buying to drive up demand for these parts cannot be entirely ruled out (i.e. people buying with the sole purpose of extracting a higher price from Eskom given their weaker bargaining position). However, such a strategy would entail significant risks with potentially limited rewards which most speculators should be aware of. Increased powers of land expropriation for strategically important projects as envisaged by the Land Expropriation Bill are also likely to discourage speculation.

The avoidance of protected areas, game farms, private nature reserves, visually sensitive areas, areas of high heritage and ecological value and areas of particularly high agricultural value as per the sensitivity mapping exercise should assist with limiting property values risks. In essence, better servitude payments for EGI are also a key potential mitigation if the goal is to reduce property value losses for directly affected land owners although they exclude neighbouring land owners. With regard to the corridor declaration process, the key need of property owners and property market participants will be access to timely and accurate information about potential development within the corridors and how the declaration of corridors will affect them. A fine balance will need to be struck between the provision of information that is accurate and useful to property market participants and providing information that misinforms and has the potential to raise unnecessary alarm.

Accepted international best practice requires that **relocation and involuntary resettlement** in particular be avoided where possible or minimised. Given the width of the EGI corridors it is likely that suitable sub-corridors can be identified that avoid and or minimise the impacts associated with involuntary resettlement. The potential impacts are thus likely to be limited to directly affected households as opposed to villages and or larger communities. The key mitigation measure therefore involves siting of transmission pylons so as avoid the need for resettlement. Where involuntary resettlement cannot be avoided, the relocation of affected households and or compensation for economic displacement should be guided by international best practice which was used as the departure point for the drawing up of Eskom's Procedure for the Management of Involuntary Resettlement and Relocation of Legal Occupiers on Affected Eskom Land.

The potential impacts associated with the **presence of project workers** apply to both the construction and operational phase of EGI roll-out. While the presence of workers and job seekers does not in itself constitute a social impact, the manner in which construction workers conduct themselves can impact on local communities. The potential risk posed by the presence of workers will be linked to the size of the work force, the duration that they are on site and where they are accommodated. Given the nature of the work associated with the establishment of linear transmission lines, the construction activities will not be confined to a single area, as would be the case with the establishment of, say, a new mine. In addition, the size of the work force is likely to be relatively small compared to large civil construction projects. The potential social impacts associated with the presence of construction workers is therefore likely to be limited and can be managed through the implementation of the management and mitigation measures listed in the report.

Electric and magnetic fields (EMFs) are created, in varying levels, with the generation and use of electricity. They are particularly strong beneath high voltage transmission lines sometimes resulting in health concerns among the public. However, based on a comprehensive World Health Organisation study and other sources, no health consequences associated with the exposure to EMFs from transmission lines have been found. The potential health related risks associated with the establishment of high voltage transmission lines is therefore not regarded as a key social issue. Nevertheless, efforts should be made to ensure that transmission lines are not located within close proximity to dwellings and settlements and that people are discouraged from living underneath them as is current Eskom practice.

Given the importance of the EGI corridors and the need for **public participation**, it is critical that the public be made aware of the SEA and its objectives before the corridors are gazetted. It is therefore recommended that the CSIR and Eskom develop and implement a public awareness programme aimed at informing the public and key stakeholders in advance of the gazetting process. The approach to this programme should include:

- Preparation of Background Information Document (BID) that provides information on the corridors and their strategic importance, the SEA process and key findings, the Gazetting Process and implications of gazetting the corridors in terms of the environmental authorisation process, and the proposed assessment process that will be undertaken to identify suitable sub-corridors within each of the five EGI corridors;
- Allowing for online access to the BID and placing advertisements in selected newspapers;
- Copies of the BID should be sent to Relevant Provincial, District and Local Municipalities and they should be requested to inform local residents of the SEA and establishment of the EGI corridors;
- Identification of key stakeholders to be contacted and sent copies of the BID and other relevant project information. Due to the linear nature of the corridors it will not be possible to contact and or notify all of the affected landowners. The focus should therefore be on the organisations and institutions listed in the report who represent the interests of potentially affected landowners and affected stakeholders.

For the Basic Assessments (BAs) that would be required for EGI projects within the corridors, three preliminary public participation process options were considered. A fourth preferred option was then developed which would entail the following key steps:

- Step 1: Three preliminary sub-corridor alignments (~ 5 km wide) located within the 100 km corridor are identified by Eskom. The SEA protocol and maps are used to identify preferred sub-corridors;
- Step 2: A high level independent peer review is undertaken to assess/confirm the suitability of the sub-corridors. A feedback loop is provided if peer review indicates that certain sub-corridors are not acceptable;
- Step 3: Three preferred sub-corridor alignments (~ 5 km wide) located within the 100 km corridor are confirmed;
- Step 4: PPP and BA process commence. Aim of the PPP process is to inform affected stakeholders and landowners of the three preferred sub-corridor alignments. The PPP would also, together with the findings of the Specialist Studies, inform the identification of the preferred sub-corridor;
- Step 5: Specialist studies undertaken to assess the three preferred sub-corridor alignments and identify preferred sub-corridor;
- Step 6: Servitude Negotiations and Acquisitions commence for preferred sub-corridor identified by specialist studies;
- Step 7: Prepare Draft BAR and EMP for preferred sub-corridor for comment;
- Step 8: Submit Final BAR and EMP;
- Step 9: Environmental Authorisation and appeals;
- Step 10: Survey and Design;
- Step 11: Servitude Registration;
- Step 12: Construction.

The permitting and licencing process would commence with Step 7. The advantages of this process would include early commencement of the public participation process, enabling specialist studies to assess more than one sub-corridor, assisting the servitude negotiation and acquisition process and, ensuring that the survey and design only takes place once the environmental authorisation has been obtained. It is also recommended that separate BA and authorisation processes should be carried out for specific sections of the sub-corridors within the five EGI corridors in order to increase manageability and save time.

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STRATEGIC ENVIRONMENTAL ASSESSMENT FOR ELECTRICITY GRID INFRASTRUCTURE IN SOUTH AFRICA

Appendix C.6

Visual Scoping Assessment Report

Quinton Lawson & Bernard Oberholzer
MLB Architects & BOLA Landscape Architects

CONTENTS

TABLES

FIGURES

1 SPECIALIST CV

Quinton Lawson (MLB Architects)

Partner, MLB Architects and Urban Designers
Professional Architect, B.Arch (Natal)
Professional Member of the SA Council for the Architectural Profession
(SACAP) Reg. No. 3686
Member of the Cape Institute for Architects (CIA)
Member of the Impact Assessment Review Committee, Heritage Western Cape

Experience:

Worked on large scale architectural and urban design projects since 1978.

Lectured at UCT on computer and visual assessment techniques.

Specialist expertise in visual modeling, viewshed mapping and photographic montages.

Worked in association with BOLA on numerous visual impact assessments, including wind energy farms, solar PV and CSP energy facilities in several provinces.

Prepared a visual specialist study for the CSIR on the National Wind and Solar PV Strategic Environmental Assessment with BOLA in 2014.

In association with:

Bernard Oberholzer (BOLA Landscape Architect)

Principal, Bernard Oberholzer Landscape Architect / Environmental Planner
Professional Landscape Architect, B.Arch (UCT), MLA (Pennsylvania)
Professional Member of the SA Council for the Landscape Architectural
Profession (SACLAP) Reg. No. 87018
Fellow of the Institute of Landscape Architects of SA (ILASA)
Advisor to the Stanford Heritage Committee

Experience:

Has worked on numerous large scale landscape projects and land use suitability studies since 1976.

Has lectured at UCT, mainly on terrain analysis, and produced a book on *Reading the Landscape*, which includes landscape classification and mapping.

Has specialist expertise in landscape assessments and visual impact assessments, including wind energy farms, solar PV and CSP energy facilities.

Prepared the *Guideline for Involving Visual and Aesthetic Specialists in EIA Processes*, with the CSIR for the Provincial Government of the W. Cape in 2005.

Prepared a landscape and scenic resource survey of the W. Cape as part of the PSDF for the Provincial Government, and a landscape heritage survey for the Overstrand Municipality, working in association with heritage specialists.

2 SPECIALIST DECLARATION

I, Quinton Lawson, as the appointed independent specialist hereby declare that I:

- act/ed as the independent specialist in this application;
- regard the information contained in this report as it relates to my specialist input/study to be true and correct;
- do not have and will not have any financial interest in the undertaking of the activity, other than remuneration for work performed;
- have and will not have any vested interest in the proposed activity proceeding;
- have disclosed any material information that have or may have the potential to influence the objectivity of any report or decisions base thereon; and
- am aware that a false declaration is an offence in terms of regulation 71 of GN No. R. 543.

Signature of the specialist:	
Name of company:	MLB Architects
Professional Registration (incl number):	SACAP 3686
Date:	05 June 2015
Revision 1	08 July 2015

3 ABBREVIATIONS AND ACRONYMS

CSIR	Council for Scientific and Industrial Research
DEA	Department of Environmental Affairs
DEM	Digital Elevation Model
NEMA	National Environmental Management Act
NFEPA	National Freshwater Ecosystem Priority Areas
NGI	National Geospatial Information
NHRA	National Heritage Resources Act
PGWC	Provincial Government of the Western cape
PV	Photovoltaic
SANBI	South African National Biodiversity Institute
SAPAD	South African Protected Areas Database
SEA	Strategic Environmental Assessment
SRTM	Shuttle Radar Topography Mission
VIA	Visual impact assessment

4 TERMS OF REFERENCES (TORS)

4.1 Background and Details of the Project

The National Department of Environmental Affairs (DEA) has embarked on a process of identifying ways to act swiftly, streamline and shorten the environmental authorisation process for major infrastructure build programmes in South Africa. In particular, the DEA is looking to facilitate the efficient roll out of Strategic Integrated Projects (SIPs) lead by the Presidential Infrastructure Coordinating Committee and detailed in the National Infrastructure Plan.

As part of this process, the Department of Environmental Affairs (DEA), mandated by Ministers and Members of the Executive Council (MinMec), commissioned the Council for Scientific and Industrial Research (CSIR) in January 2014 to undertake a Strategic Environmental Assessment (SEA) linked to SIP 10: Electricity Transmission and Distribution for all. The SEA is titled national Department of Environmental Affairs Electricity Grid Infrastructure Strategic Environmental Assessment. The aim of the SEA is to identify suitable routing corridors that will enable the efficient and effective expansion of key strategic transmission infrastructure designed to satisfy national transmission requirements up to the 2040 planning horizon. The CSIR is teaming up with Eskom and the South African National Biodiversity Institute (SANBI) to deliver on project outputs.

Upon gazetting of the corridors, it is envisaged that the environmental authorisation process for transmission infrastructure[1] will be streamlined in specific areas identified through the SEA process as being less sensitive to the negative impacts of electricity grid infrastructure development. This should incentivise Eskom and other potential transmission infrastructure developers to plan and develop in less sensitive areas.

The SEA process also provides a platform for coordination between the various authorities responsible for issuing authorisations, permits or consents and thereby will further contribute to a more streamlined environmental authorisation process.

The preliminary corridors (the starting point of the SEA) were identified by Eskom and are based on the results of a detailed Eskom Strategic Grid Plan Study. The Study considered a number of possible future generation and load scenarios and in so doing identified the need for five national transmission infrastructure corridors to facilitate the balancing of South Africa's electricity supply and demand needs up 2040.

The corridors are:

1. The Eastern Corridor
2. The Western Corridor
3. The Northern Corridor
4. The Central Corridor
5. The International Corridor

The SEA then undertook a corridor refinement process to determine optimal placement of the five (5) 100km wide corridors by considering key constraints (Phase I) and opportunities (Phase II) for electricity transmission level infrastructure development.

[1] Including associated infrastructure such as transmission substations and distribution lines.

Phase I involved a wall to wall nation-wide sensitivity delineation assessment to determine areas where electricity grid infrastructure is likely to have an impact on the environment (environmental constraints) and areas where the environment is likely to have an impact on electricity grid infrastructure (engineering constraints). The full extent of South Africa was then graded and mapped for environmental and engineering sensitivity, indicating areas to be avoided (Very High sensitivity), to areas which are sensitive for various reasons (High-Medium sensitivity), to areas which demonstrate no sensitivity (Low sensitivity). The outputs of Phase I are a 'wall to wall' environmental constraints map and 'wall to wall' engineering constraints map.

Phase II involved a review of national, provincial and local government development plans as well as detailed consultation with government and industry to determine areas of future bulk demand for electricity and or transmission level infrastructure. Key strategic demand areas were identified and mapped.

The Eskom Preliminary corridors are illustrated in Figure 1 below.

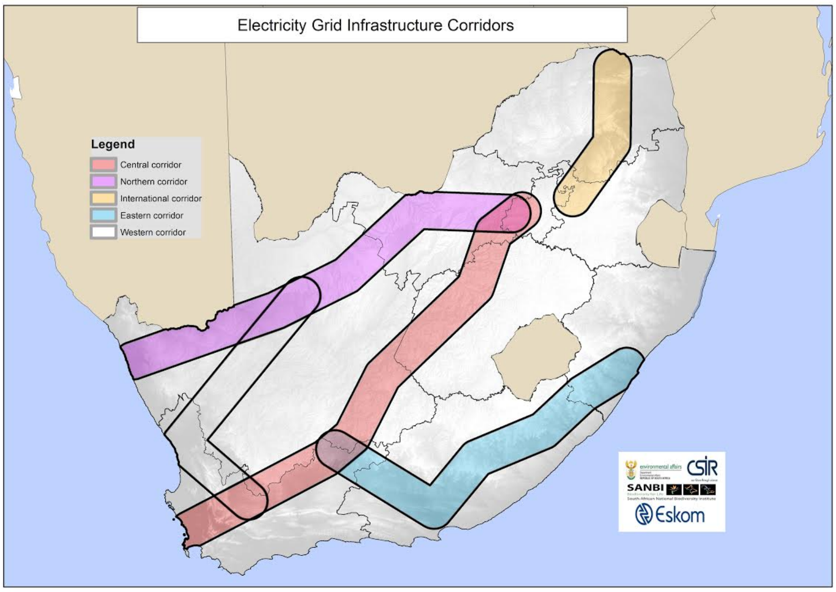


Figure 1: Eskom Preliminary Corridors

4.2 Scope of Work

The appointed supplier will be required to review and interrogate the draft environmental constraints map with respect to features linked to visual impact. The appointed supplier will be required to identify any gaps in information. Once the appointed supplier has considered the draft environmental constraints map, the appointed supplier will be required to develop a dedicated visual impact sensitivity map for each of the corridors with respect to electricity grid infrastructure.

The study methodology developed as part of this project will inform future SEA-level visual impact specialist assessment methodologies.

This RfP has been reviewed by the South African Heritage Resource Agency (SAHRA). The assessment must be undertaken in close collaboration with SAHRA as well as the relevant provincial heritage authorities to ensure that the outcomes of the study are accepted by these agencies and will be taken into consideration for future heritage authorisation and commenting in the pre-assessed areas. It is recommended that the supplier meet with appropriate representatives from these departments as part of conducting this assessment.

The visual impact assessment will include, but not be limited to, touristic and heritage resources and sensitivities for each corridor. Heritage resources and sensitivities will be extracted from the heritage assessment and will be made available by the heritage specialist by 8th May 2015. The landscape specialist will, therefore, also work in close collaboration with the heritage specialist/team of specialists.

In terms of Visual Impact Assessment best practice, the following guidelines should be considered:

- Internationally, the U.K. Institute of Environmental Management and Assessment's (IEMA) 'Guidelines for Landscape and Visual Impact Assessment'; (U.K Institute of Environmental
- Management and Assessment (IEMA. 2002);
- The 'Guideline for Involving Visual and Aesthetic Specialists in EIA Processes' generated by South Africa's Provincial Government of the Western Cape, Department of Environmental Affairs and Development Planning (Oberholzer, B. 2005); and
- The International Finance Corporation's (IFC) performance standards (PS) on environmental and social sustainability (IFC. 2012).

The aim of the assessment is to:

1. Use this information to determine and map the overall sensitivity value (Very High, High, Medium or Low) of different areas within each of the corridors, in the context of electricity grid infrastructure[2].
2. Describe what additional information and level of assessment is required in each sensitivity category before an authorisation with respect to visual impact should be considered. This should be done separately for each corridor and/or sections of the corridor; and
3. Assess the corridor in terms of the potential impacts of electricity grid infrastructure on visual quality of certain areas, taking cognizance of the relative sensitivity of these areas, and outline proposed management actions to enhance benefits and avoid/reduce/offset negative impacts.

It is important to note that the outputs from this study will form the basis of a planning document for electricity grid infrastructure development in the corridors. The aim of the planning document will be to inform and focus further visual impact project level assessment with respect to electricity grid infrastructure development in the corridors (i.e. serve as a scoping exercise).

The key deliverables and reporting requirements include:

- Study methodology;
- Data sources;
- Assumptions, limitations, confidence estimates;
- Identify, describe and map key visual sensitivities (features) within each of the corridors, making use of datasets made available through the draft environmental constraints map and additional information sourced by the specialist[3]. Any heritage features and resources must be submitted by the heritage specialist for use in the landscape assessment by 8th May 2015;

[2] Where possible, when assessing sensitivity rating consideration should be given to sense of place, visual quality, visual corridors, landscape character, surrounding landscape compatibility, scale, visual absorption capacity, viewshed and viewing distance and critical views (such as National Parks, tourists routes, viewpoints etc).
[3] The sensitivity assessment should be undertaken in the context of all electricity grid infrastructures including transmission lines, distribution lines and substations.

- Develop an approach for classing visual sensitivity according to a four- tiered sensitivity rating system i.e. Very High, High, Medium or Low[4].
- Develop GIS based four-tiered consolidated sensitivity map of all sensitivity features identified through the assessment showing the location and spatial extent for each sensitivity feature and associated buffering, if any, for each of the corridors. The sensitivity rating should be illustrated according to the following coloration scheme: Dark Red/Very High, Red/High, Orange/Medium, Green/Low[5].
- A guideline on the interpretation and implementation of the four tier maps as well as permit requirements (where applicable) for each corridor. This section should also make recommendations on requirements for additional specialist studies (if any) within the different tiers of sensitivity before an authorisation can be considered. Recommendations should be focused around the objective of streamlining without compromising environmental protection. This information will be incorporated into a Development Protocol that will ultimately govern development in the corridors; and
- General comments and discussion for each corridor on the nature of key potential impacts and proposed mitigation

[4] Sensitivities should be graded in relation to the ability to apply mitigation measures.
[5] Where available, standardised and recognised sensitivity mapping methodologies should be used to determine sensitivities for each feature for each of the corridors.

5 APPROACH AND METHODOLOGY

5.1 Study Methodology

5.1.1 Background to the Study

This visual Assessment is one of a series of specialist studies, which form part of a Strategic Environmental Assessment (SEA) to identify suitable routing corridors for the effective expansion of key strategic transmission infrastructure. The SEA, which has been commissioned by the Department of Environmental Affairs (DEA), is being conducted by the CSIR, working in association with Eskom and the South African National Biodiversity Institute (SANBI).

As part of Strategic Grid Plan Study, Eskom identified five national transmission infrastructure corridors to facilitate electricity supply and demand needs up to 2040. The SEA then undertook a corridor refinement process to determine optimal placement of the five 100km wide corridors by considering key constraints (Phase I) and opportunities (Phase II) for electricity transmission infrastructure development.

Phase I considered both environmental and engineering constraints as part of a nation-wide sensitivity delineation assessment. Phase II involved consultation with government and industry to determine areas of future bulk demand for electricity and transmission infrastructure.

Phase III involves scoping level specialist assessment of the final corridors to determine environmental sensitivity within the corridors. It is intended that this will inform further assessment requirements related to environmental authorisation for electricity grid infrastructure applications. These requirements will be contained in a 'Development Protocol' document[6].

This visual assessment report, together with accompanying maps, is one of the scoping-level specialist studies. It is based primarily on interpreting existing information, and uses recognised visual assessment criteria. The final corridors used in this study are indicated in Fig.1.

5.1.2 Aims of the Visual Assessment

The terms of reference for the visual assessment include the following:

- Identify areas or features of visual or scenic value and sensitive receptors within each of the proposed corridors;
- Use this information to determine overall sensitivity value within each corridor in the context of electricity grid infrastructure;
- Describe additional information and assessment required in each sensitivity category before authorization should be considered; and
- Assess the corridor in terms of potential visual impacts and outline proposed management actions to enhance benefits and avoid, reduce or offset negative impacts.

5.1.3 Definition of 'Visual'

A visual assessment broadly includes visual, scenic, aesthetic and amenity values, which contribute to an area's overall 'sense of place', and which encompass both natural and cultural landscape characteristics[7].

[6] Mabin, M. 11 Mar. 2015. National Electricity Grid Infrastructure Strategic Environmental Assessment: Background Information Document. Dept. Environmental Affairs, CSIR, SANBI and Eskom.
[7] Oberholzer, B. 2005. Guideline for involving visual and aesthetic specialists in EIA processes. CSIR Report No. ENV-S-C

5.1.4 The Basis of Visual Assessments

Sense of place is determined by the regional characteristics of the place including, but not restricted to, landscape features, geological structure, vegetation patterns, agricultural activities, settlement forms and vernacular architecture, as well as more intangible characteristics, such as traditions and language. Seen as a whole these qualities constitute the essential 'genius loci' or spirit of the place.

Often great value is attached to those landscapes where visual, scenic, cultural and heritage characteristics are intact, also described as the level of 'landscape integrity'. This concept is useful in providing a baseline for visual impact assessments.

Attaching a value to scenic resources is a further consideration in establishing 'visual sensitivity', and involves a degree of interpretation. Where landscape features are pronounced, clustered or overlap within a defined area, this can be described in terms of 'landscape complexity', a concept that is useful for determining scenic value and therefore sensitivity.

No standardised scenic resource mapping exists for the country as whole, nor the rating of scenic resources in terms of their value or sensitivity. Some work on this has been done for the Western Cape, (see 1.2 'Data Sources' below). This is seen as a major drawback in establishing a common baseline for visual impact assessments.

5.1.5 Scenic Value in the Context of Transmission Lines

The landscape qualities have important economic value in the form of tourism for most regions, particularly those in the Western, Southern and Eastern Cape, which are not endowed with mineral resources.

Transmission lines and related infrastructure, such as substations, tend to have an industrial connotation and could potentially compromise the value of scenic resources, particularly in pristine or protected environments, while they tend to be less of an issue in industrial or mining landscapes.

Transmission lines could in addition detract from the amenity value of recreation or resort areas, and certainly affect property values in many cases, all of which could affect the economy of a region. On the other hand, transmission lines in the right location are necessary for the regional economy.

5.1.6 Perceptions relating to Transmission Lines

Although large sections of the population see transmission lines as a major visual detraction or eye-sore, there are others, mainly among the working classes, who may regard them as a sign of progress and service delivery.

Habituation is another consideration, where transmission lines have been in place over a length of time and are hardly noticed any longer. This appears to have been the case with communication masts, which initially caused visual concern, but to which to which people have grown accustomed.

The implications of these considerations is that the 'context' of both the landscape (the receiving environment) and the community (the receptor) is important in the siting of transmission infrastructure.

2005 053. Provincial Government of the Western Cape, DEADP.

5.1.7 Visual Sensitivity Criteria

The various considerations above have informed the establishment of visual sensitivity criteria listed in Section 3.1. At the project scale, the view catchment area, or viewshed, as well as viewing distances and visual absorption capacity of the landscape, are additional criteria that are used in an attempt to quantify potential visual impacts.

Measures to mitigate the visual effect of transmission infrastructure have been considered in Section 5.2. scale

5.1.8 Study Methodology

The methodology for the current visual assessment involves the 3 broad stages outlined below.

- **Stage 1: Visual Resource Mapping (baseline study)**

The first stage involves a description and identification of visual and scenic resources for each of the corridors. The following aspects are considered:

- Differentiation of the corridor into landscape types (see Section 2 below);
- An inventory and mapping of visual / scenic features (see Appendices 1 and 2);
- Identification of cultural landscapes and historical sites (by heritage specialist).

- **Stage 2: Visual Sensitivity Mapping**

The second stage involves interpretation, using criteria that influence the value of visual / scenic resources, and therefore their 'significance'. Four levels of visual sensitivity are used, namely very high sensitivity, high sensitivity, medium sensitivity and low sensitivity. The following criteria are considered:

- Visually sensitive landforms, (e.g. ridgelines, cliffs, scarps, outcrops);
- Proclaimed or protected areas, (e.g. nature reserves);
- Visually sensitive receptors, (e.g. settlements, routes);
- Heritage importance (e.g. national, provincial or local significance).

- **Stage 3: Visual Resource Management**

The third stage involves strategies for the protection and management of visual / scenic resources, to increase benefits and minimise impacts. The following measures are considered:

Additional information or assessment requirements;
Permit requirements as part of authorization;
Mitigation measures to avoid, reduce or offset impacts;
Development Protocol document (by CSIR).

5.2 Data Sources

A list and description of data sources on which the assessment was based is given below and a detailed list for each feature is given in Section 3.1.

Table 1: Data Sources for Visual Scoping Assessment

Data title	Source and date of publication	Data Description
1:1 000 000 Geological Map of SA	Geological Survey, 1984. 4 sheets.	Geological information.
1:500 000 topographical maps of South Africa	Surveys and Mapping (several sheets with various dates).	Topographical and cadastral information.
South African Protected Areas	Dept. Environmental Affairs, 2014.	National Parks and Protected Areas.
Heritage and Scenic Resources: Inventory and Policy Framework for the Western Cape	S. Winter and B. Oberholzer, May 2013. For DEADP, Provincial Government of the Western Cape.	Survey and rating of heritage and scenic resources in Western Cape.

5.3 Assumptions and Limitations

A list and description of study limitations and assumptions in the report are given below.

Table 2: Assumptions & Limitations for Visual Scoping Assessment

Limitation	Included in the scope of this study	Excluded from the scope of this study	Assumption
Level of mapping detail	1: 500 000 topographical maps, and 1:1 000 000 geological survey maps.	1:250 000 and 1:50 000 topographical maps.	1:500 000 mapping considered adequate for a regional scale study. 1:50 000 scale maps would be required for micro corridor selection.
Information on cultural landscapes	Information obtained from W. Cape Heritage and Scenic Resource mapping, and from the Heritage Specialist.	Detailed analysis of local areas using historical airphotos or Google Earth imagery.	Some level of additional heritage assessment would be required on an individual project basis in terms of the NHRA.
Information on private reserves, game/ guest farms and resorts.	Information was included where these facilities were known.	Detailed survey of private reserves / game farms.	Detailed information would be needed on an individual project basis.
Viewsheds of National Parks and nature reserves		No viewsheds have been included for individual features.	Assumed that individual viewsheds would need to be prepared on an individual project basis.
Residual activities such as access roads, borrow pits etc. relating to transmission lines.	Some mitigations are included in Section 5.	Visual criteria or buffers for access roads, borrow pits etc. not included in the study.	Consideration of access roads etc. would need to be given at the project scale, in terms of NHRA.

5.4 Relevant Regulatory Instruments

A list and description of relevant regulatory instruments associated with visual and scenic resources at international, national and provincial scale for each focus area, is given below

Table 3: Relevant regulatory instruments for Visual Scoping Assessment

Instrument	Key objective
International Instrument	
Ramsar Convention (The Convention of Wetlands of International Importance (1971 and amendments)	Protection and conservation of wetlands, particularly those of importance to waterfowl and waterfowl habitat.
National Instrument	
National Environmental Management: Protected Areas Act, 2003	No development, construction or farming may be permitted in a nature reserve without the prior written approval of the management authority (Section 50 (5). Also in a 'protected environment' the Minister or MEC may restrict or regulate development that may be inappropriate for the area given the purpose for which the area was declared (Section 5).
Integrated Coastal Management Act (ICM Act) (Act 24 of 2008)	Protection of the coastal zone including land within 1 km of the High Water Mark (HWM) to 'protect the ecological integrity, natural character and the economic, social and aesthetic value of coastal public property'.
National Heritage Resources Act (Act 25 of 1999) NHRA)	Includes protection of national and provincial heritage sites, as well as areas of environmental or cultural value, and proclaimed scenic routes.
Provincial Instrument	
Protected Areas Act (PAA) (Act 57 of 2003, Section 17)	Local authority zoning schemes can be used to protect natural and cultural heritage resources through 'Conservation Areas', 'Heritage Overlay Zones' and 'Scenic Overlay Zones' including scenic routes.
KwaZulu Nature Conservation Act, 1992 (Act 29 of 1992)	According to the Natal Nature Conservation Ordinance No. 15 of 1974 and the KwaZulu Nature Conservation Act, 1992 (Act 29 of 1992), no person shall, among others: damage, destroy, or relocate any specially protected indigenous plant, except under the authority and in accordance with a permit from Ezemvelo KZN Wildlife (EKZNW).

6 CORRIDOR DESCRIPTION

Landscape characteristics for each of the corridors were based on desktop studies, a reconnaissance visit to the International Corridor and knowledge of the other corridor areas from previous studies for renewable energy facilities and other projects undertaken in the past by the authors.

As landforms play a major role in determining scenic resources at a regional scale, emphasis was placed on understanding the geomorphology of the landscape. A number of useful publications, listed below, were also consulted[8].

[8] N. Norman and G. Whitfield, 2006. Geological Journeys. Struik.
M. Viljoen and W. Reimold, 1999. An Introduction to South Africa's Mining Heritage. Mintek.

A location plan of the 5 corridors is shown in Fig. 6.2 below, and descriptions with key plans and transects of each corridor follow.

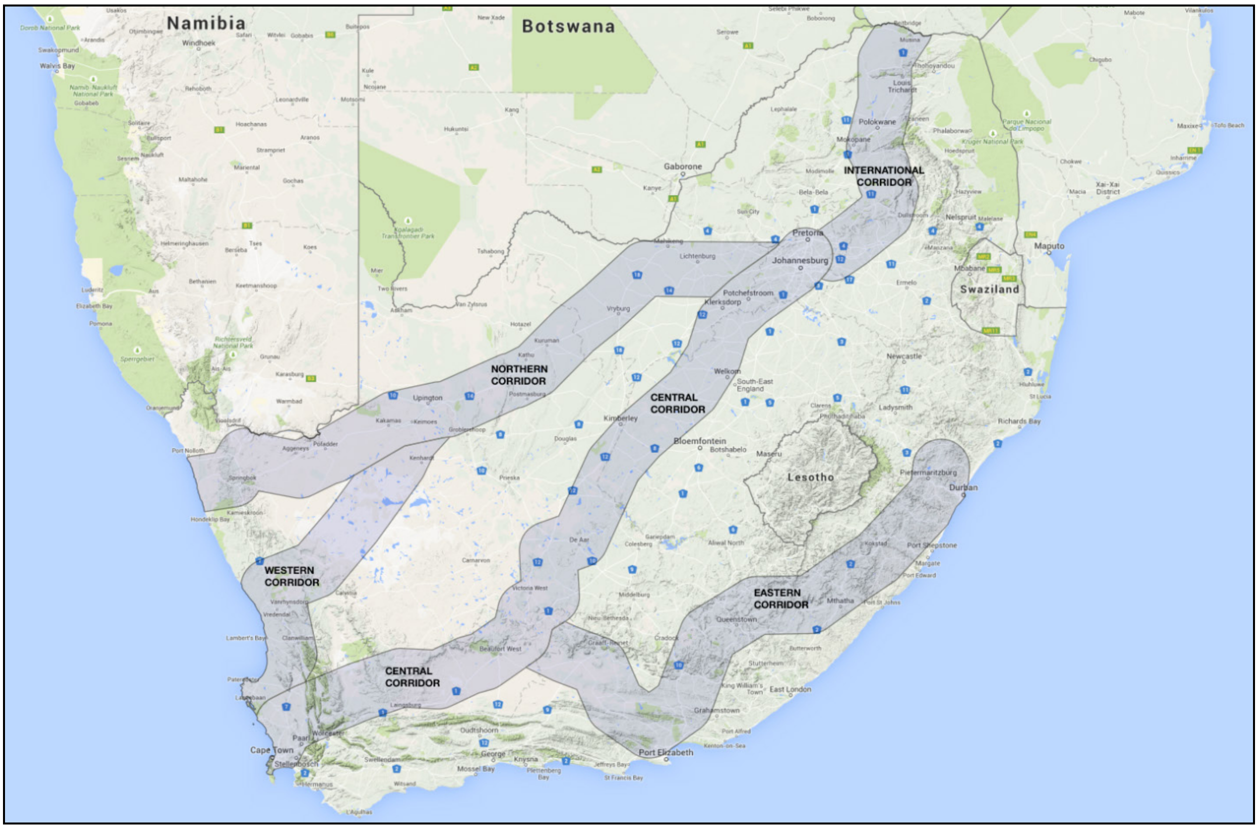
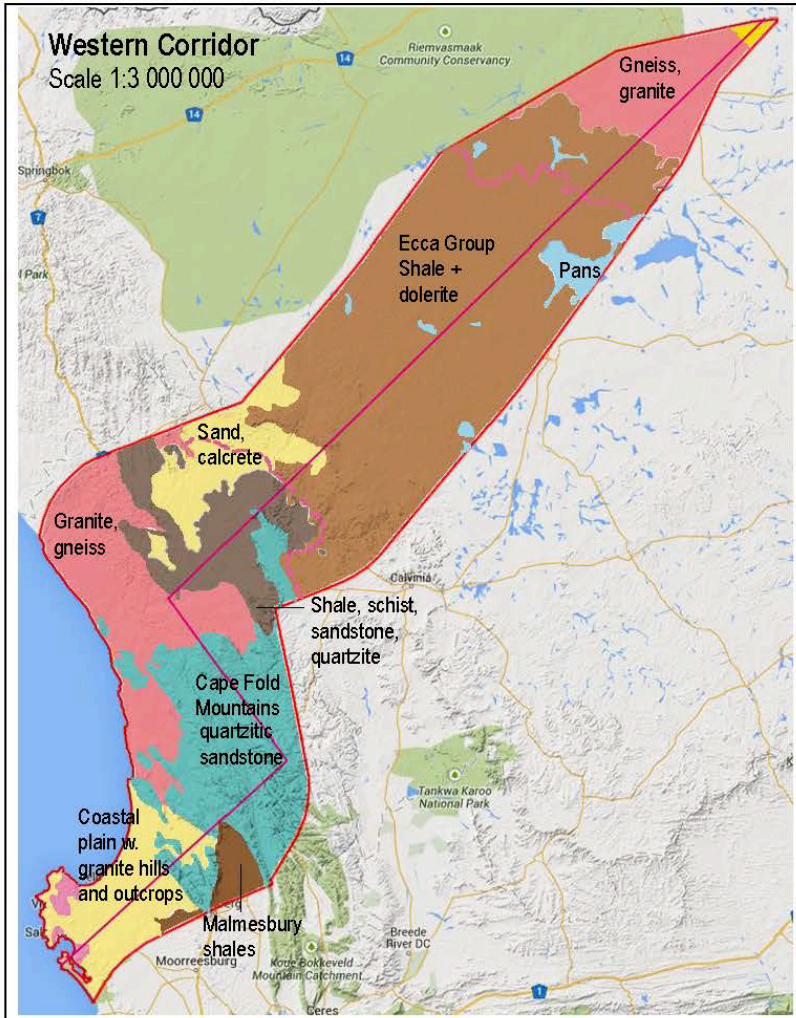


Figure 2: Final Corridors

CSIR our future through science | environmental affairs Department: Environmental Affairs REPUBLIC OF SOUTH AFRICA | Eskom | SANBI Biodiversity for Life South African National Biodiversity Institute



Western Corridor (see also transect on next page)

Regional context:

The Western Corridor encompasses the coastal plain of the West Coast, known as the Sandveld, followed by the rolling Swartland, and the inland Piketberg and Cederberg ranges, which form part of the Cape Fold Mountains. Further inland, the Corridor crosses the Hantam and the flat, arid region of the Northern Cape with its large pans between Brandvlei and Kenhardt.

Geomorphology:

The aeolian sands of the coastal plain have outcroppings of granite landforms, such as those at Saldanha. The resistant quartzitic sandstones of the Table Mountain Group give rise to the rugged high mountains of the Piketberg, Olifantsberg and Cederberg ranges, and the exposed scarp face of the Bokkeveldberg in the Nieuwoudtville area.

Further north the landscape is composed of various formations of granite and gneiss, while the flat plateau area above the escarpment consists of Ecca Group shales punctuated in places by dolerite outcrops.

Landscape features:

The prominent peaks and ridges of the Cederberg range constitute the main scenic features of the area, being important also for their wilderness character, water catchment and biodiversity, and therefore having high conservation value. The Piketberg, Olifantsberg and Bokkeveldberg ranges are prominent landscape features in the Corridor.

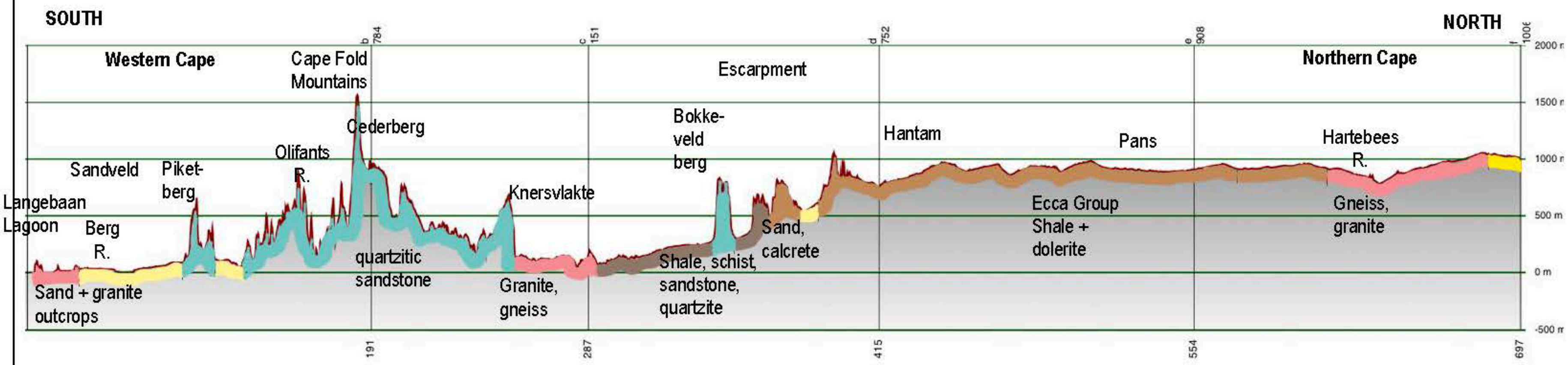
There are a number of scenic mountain passes in the Cederberg and other mountain ranges, as well as those leading up the escarpment. The citrus fruit farming of the Olifants River Valley and along the N7 Route have rural scenic value.

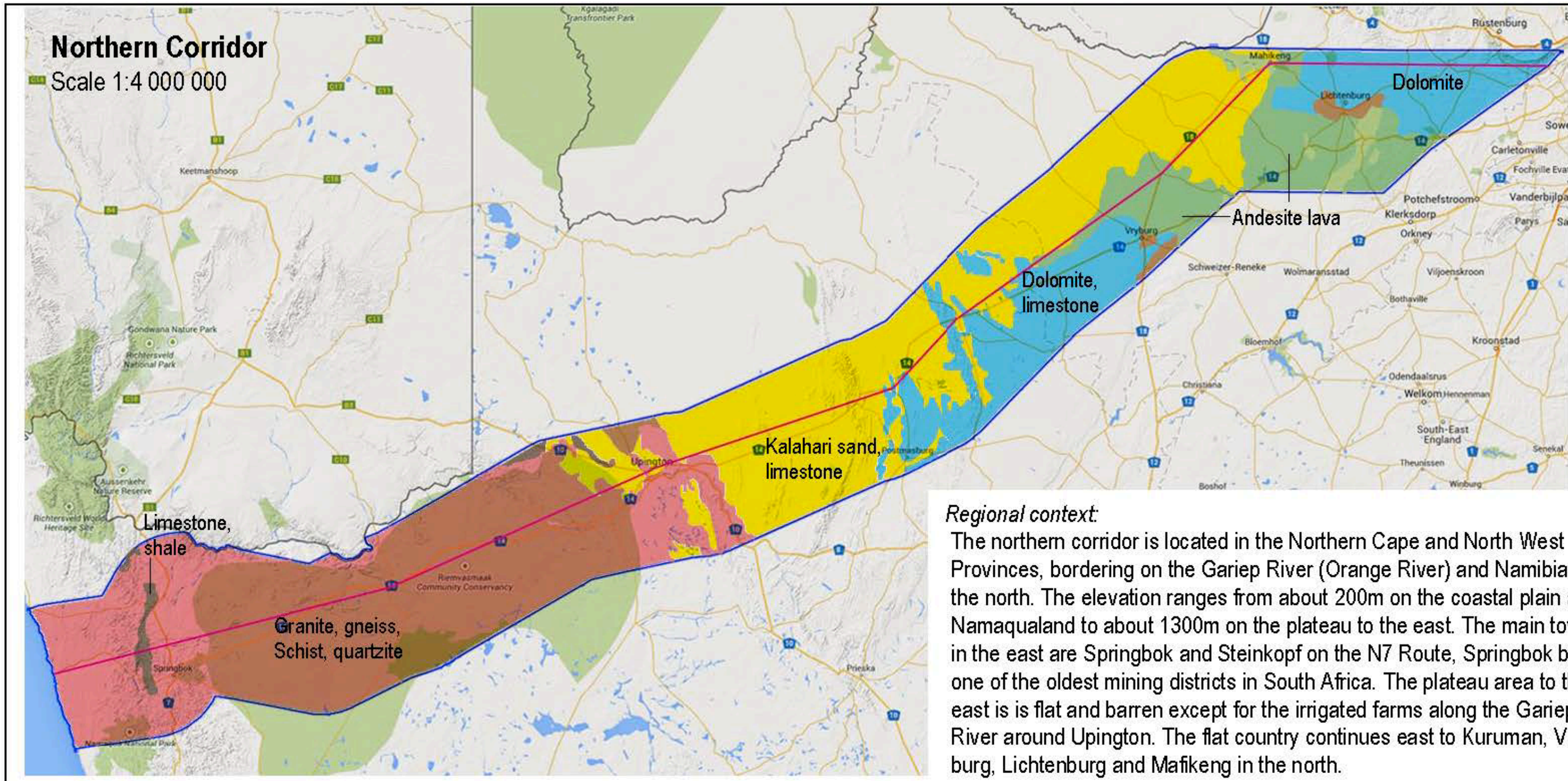
The flat barren plateau area inland is relieved only by the vast pans, such as Commissioner's Salt Pan, Groot Vloer Pan and Verneuk Pan.

A list of features is given in Appendix 1.

Transect through Western Corridor

Scale 1: 2 500 000





Regional context:

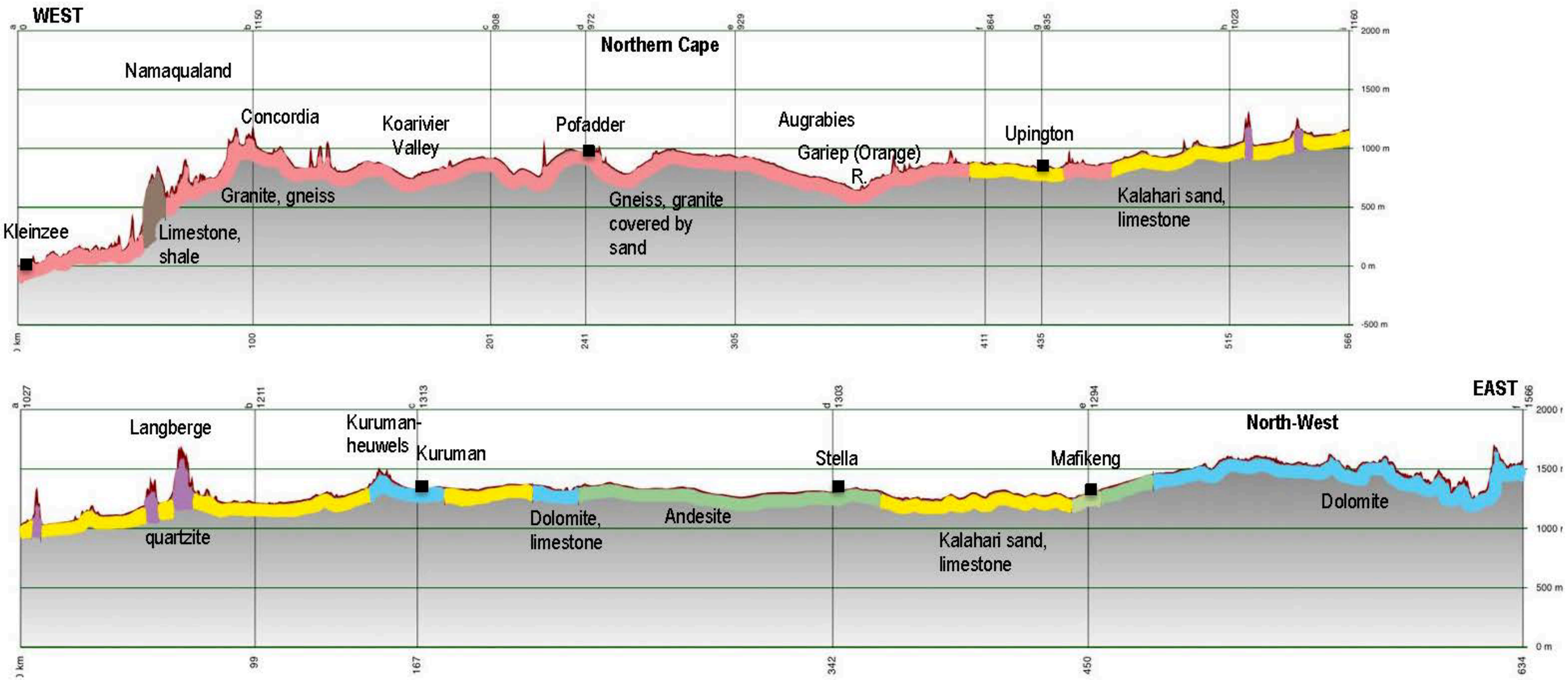
The northern corridor is located in the Northern Cape and North West Provinces, bordering on the Gariep River (Orange River) and Namibia to the north. The elevation ranges from about 200m on the coastal plain at Namaqualand to about 1300m on the plateau to the east. The main towns in the east are Springbok and Steinkopf on the N7 Route, Springbok being one of the oldest mining districts in South Africa. The plateau area to the east is is flat and barren except for the irrigated farms along the Gariep River around Upington. The flat country continues east to Kuruman, Vryburg, Lichtenburg and Mafikeng in the north.

Geomorphology:

The corridor is underlain by large domes of granite and gneiss, which have been eroded along the escarpment edge near Springbok to form an intensely rugged topography, the most pronounced and scenic topography provided by the more resistant quartzitic, gneiss and schist rocks. On the coastal plain and on the plateau the rocks are mostly hidden by more recent sands of aeolian and alluvial origin, interspersed with calcrete. Eastwards the rocks are covered by Kalahari Group sand. Towards Vryburg and Lichtenburg in the north the relatively flat landscape is composed of shale, sandstone, dolomite and shale, with large areas of andesite lava, the land rising gently to an elevation of 1500m.

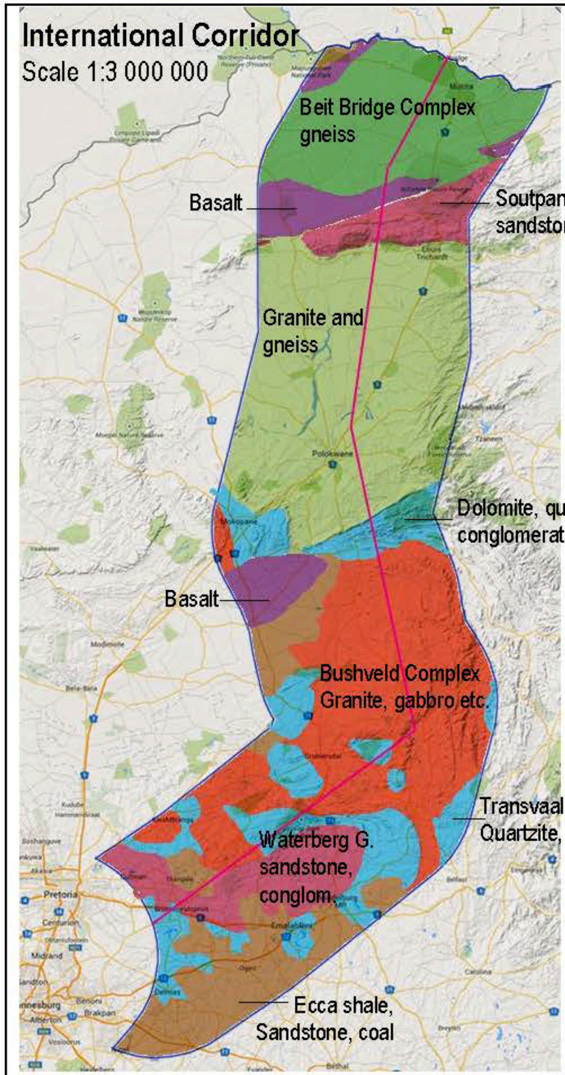
Transect through Northern Corridor

Scale 1: 2 500 000



Landscape features:

The coastal zone is of scenic and archaeological importance, an area intensively mined in the past for diamonds with many open cast trenches. The rugged mountainous escarpment further inland, consists of granite and gneiss domes, the deeply incised landscape, with visually sensitive ridgelines, includes a number of scenic passes and poorts, such as the Spektakel Pass. The flat plateau to the east is larger in scale and visually expansive, interspersed here and there by hilly outcrops of quartzite and schist, such as those near Aggeneys and Pella. The broad dry Koa valley to the west of Aggeneys is an ancient course of the Gariep River. Other landforms of significance further east are the quartzites of the Langberge near Olifantshoek and the granite outcrop of the Kurumanheuwels. The Gariep (Orange) River between Kakamas and Upington, with its irrigated fruit farms, is a major feature.



Regional context:

The Northern Corridor straddles Mpumalanga Province in the south and Limpopo Province northwards, taking in the broad Olifants River valley, Springbokvlakte, Strydpoortberge and Soutpansberg before descending through the Bushveld to the Limpopo River on the northern border. To the east lie the Steelpoort River Valley and Leolo mountain ranges.

Geomorphology:

The southern portion of the Corridor contains Ecca Group shales, sandstone and coal – an area of coal mines and large power stations, with Emalahleni (Witbank) and Middelburg being the main centres. North of this is a band of Waterberg Group sandstones and conglomerates.

The main geological feature is however the Bushveld Complex rocks, including granites, gabbro and quartzites – an area known for its valuable chrome and platinum mining.

The Strydpoort and Leolo mountain topography is related to the resistant dolomite and quartzite type rocks. To the north, around Polokwane, is a vast plain of old granite and gneiss type rocks.

The Soutpansberg Group consisting of sandstone, shale, conglomerate, basalt and quartzite give rise to this scenic mountain range. To the north of the Soutpansberg, an ancient flat plain of basement gneiss, quartzite and marble, and numerous other rocks belonging to the Beit Bridge Complex, dips towards the Limpopo River.

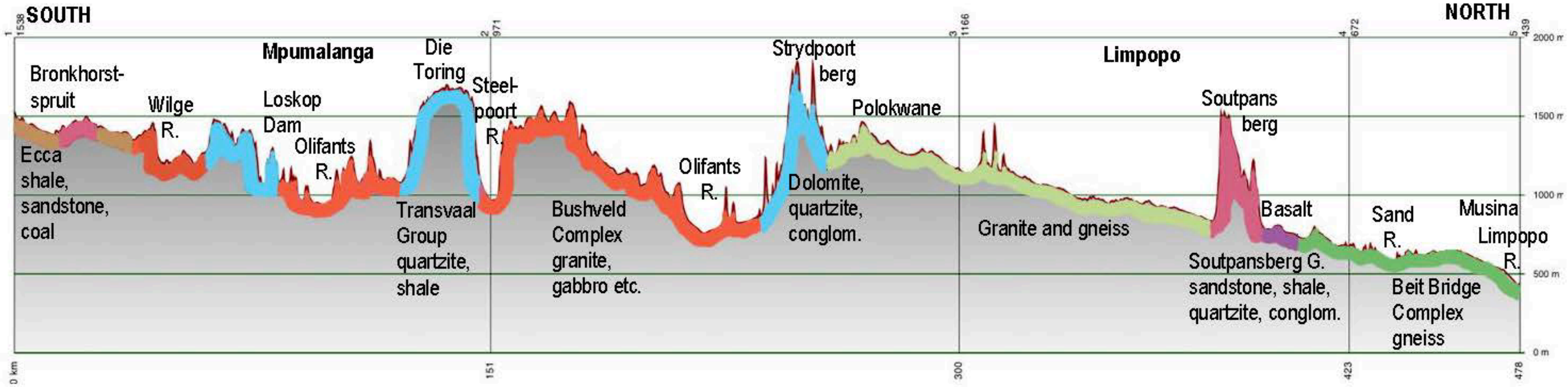
Landscape features:

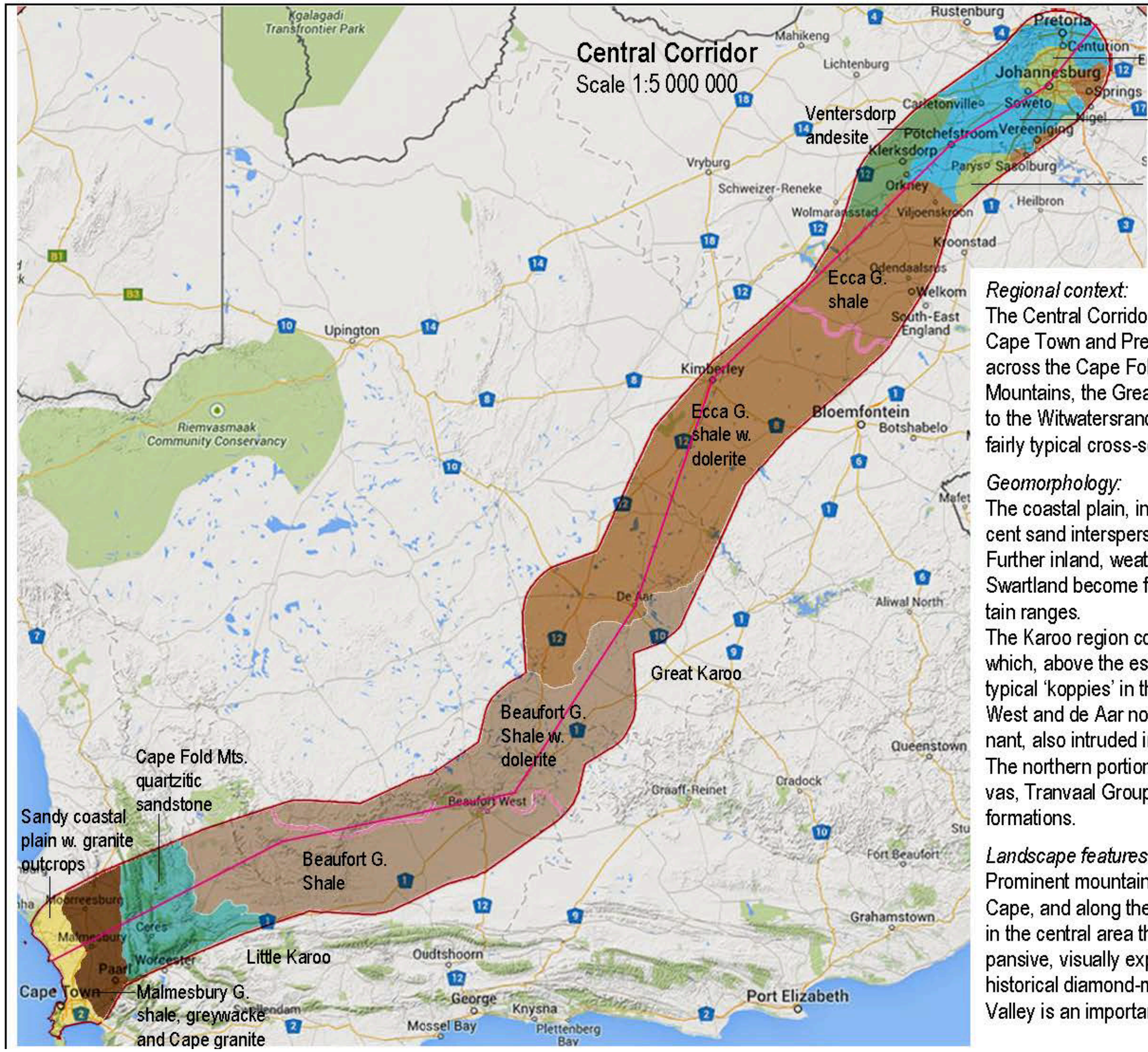
Notable landscape features of the Corridor in the south are the Olifants River Valley, particularly the gorge leading to the Loskop Dam, within a nature reserve. The mountainous area around the Steelpoort River and the Strydpoortberg are scenic landscapes to the east of the Corridor. Mokopane (Potgietersrus) to the west also lies within a scenic mountainous area.

The Soutpansberg in the north is a major scenic feature, valued for its striking cliffs, mountain passes and endemic vegetation, being also an important tourist area on the N1 National Road leading to the border with Zimbabwe.

Transect through International Corridor

Scale 1: 2 000 000





Regional context:

The Central Corridor straddles several provinces between Cape Town and Pretoria, stretching from the Atlantic coast, across the Cape Fold Mountains, Ceres-Karoo, Roggeveld Mountains, the Great Karoo 'vlakte', Free State plains and up to the Witwatersrand in the north. The Corridor represents a fairly typical cross-section of South Africa.

Geomorphology:

The coastal plain, including the Cape Flats are covered with recent sand interspersed with granite, such as the Darling Hills. Further inland, weathered Malmesbury Group shales of the Swartland become foothills of the quartzitic sandstone mountain ranges.

The Karoo region consists mainly of Beaufort Group shales, which, above the escarpment are intruded by dolerites to form typical 'koppies' in the otherwise flat landscape. From Victoria West and de Aar northwards the Ecca Group shales are dominant, also intruded in places by dolerite.

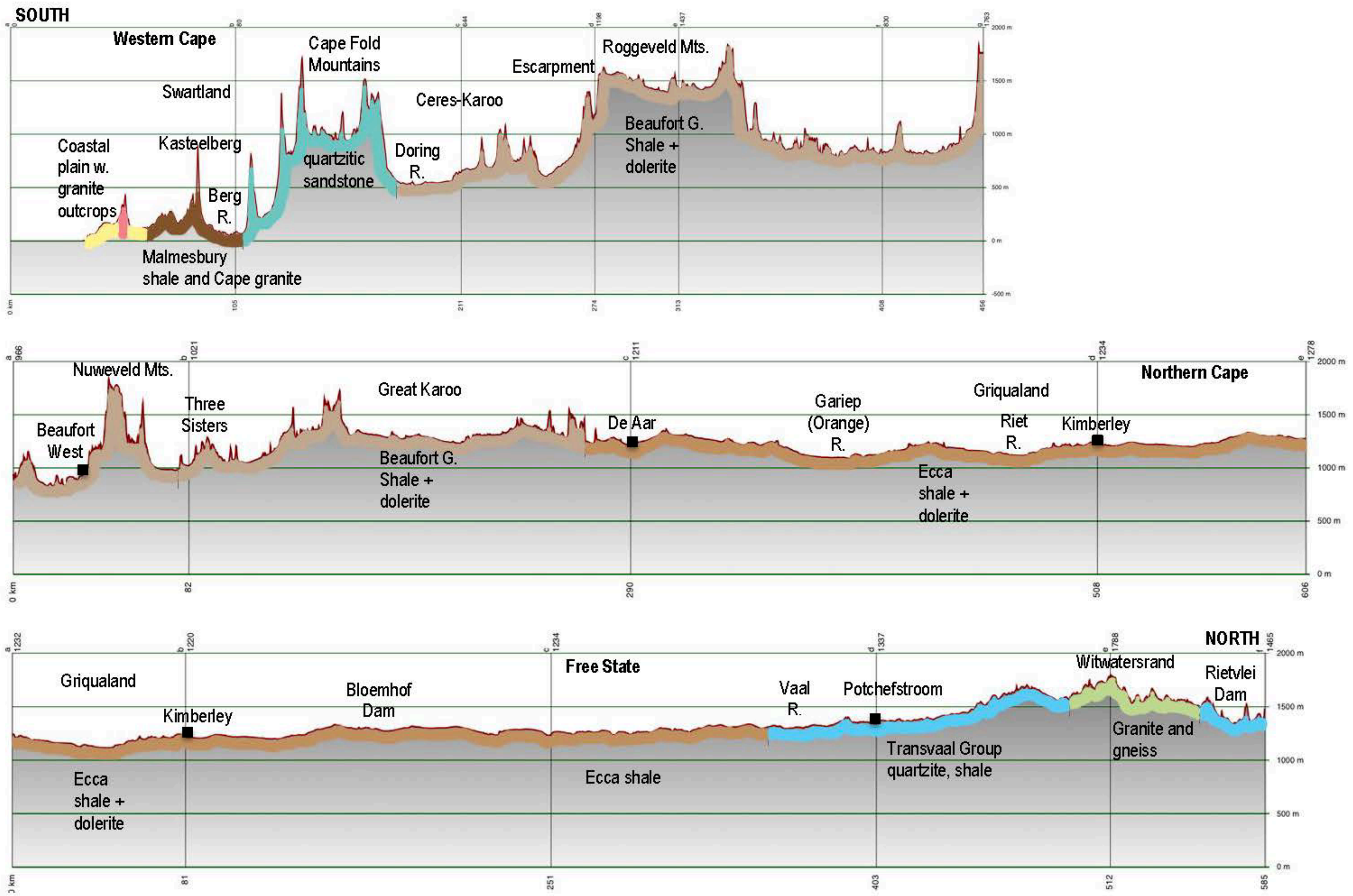
The northern portion becomes more complex with andesite lavas, Tranvaal Group quartzites and shale, and granite / gneiss formations.

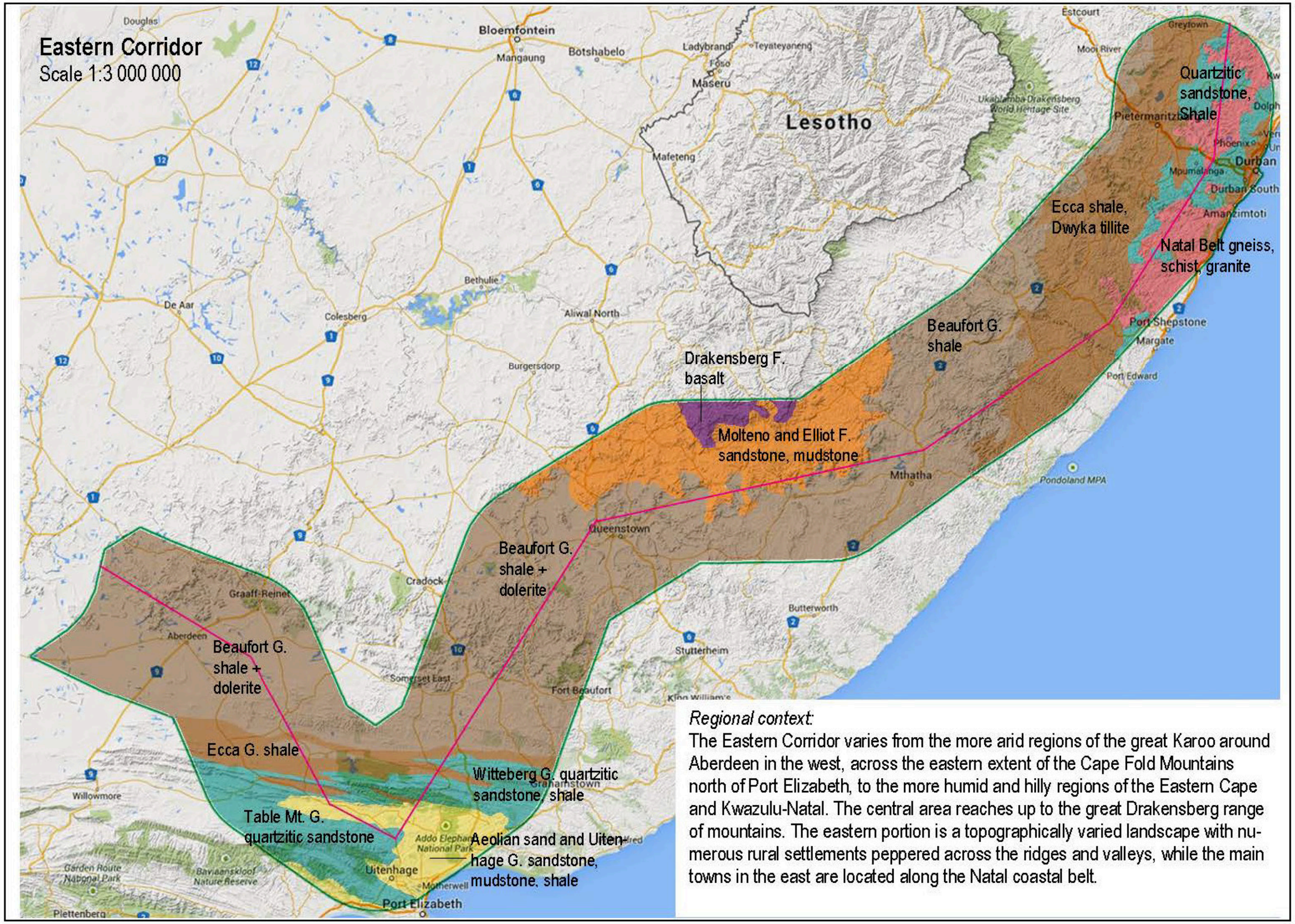
Landscape features:

Prominent mountainous features are concentrated in the SW Cape, and along the escarpment. Except for dolerite outcrops in the central area there are few topographic features in the expansive, visually exposed landscape. Kimberley is an important historical diamond-mining town, and in the north, the Vaal River Valley is an important landscape feature.

Transect through Central Corridor

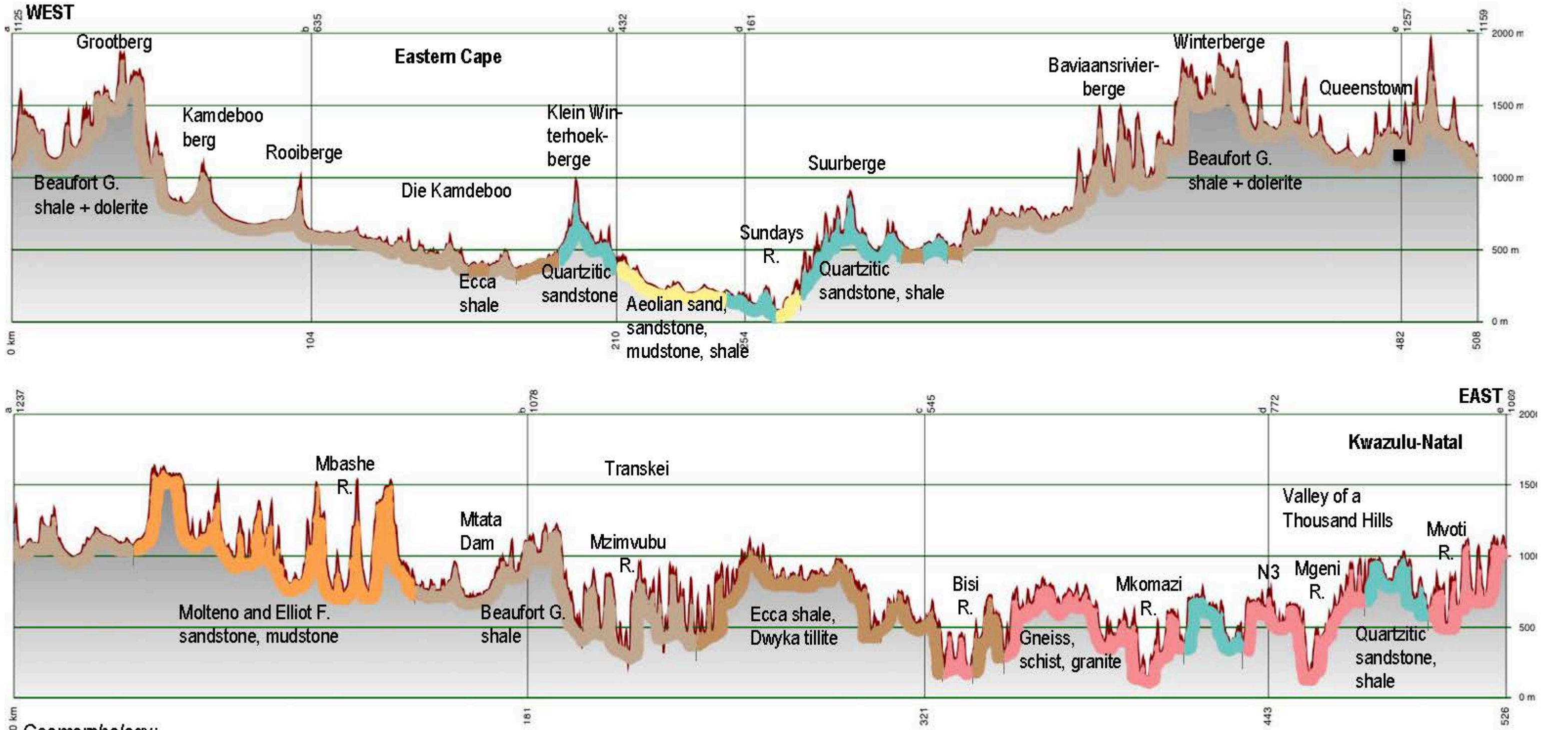
Scale 1: 2 500 000





Regional context:
The Eastern Corridor varies from the more arid regions of the great Karoo around Aberdeen in the west, across the eastern extent of the Cape Fold Mountains north of Port Elizabeth, to the more humid and hilly regions of the Eastern Cape and Kwazulu-Natal. The central area reaches up to the great Drakensberg range of mountains. The eastern portion is a topographically varied landscape with numerous rural settlements peppered across the ridges and valleys, while the main towns in the east are located along the Natal coastal belt.

Transect through Eastern Corridor Scale 1: 2 000 000



Geomorphology:

Alternating mudstones, siltstones and sandstones of the Beaufort Group are responsible for the varied topography. These are intruded by dolerite sills and dykes forming the distinctive peaks and ridges so typical of much of the area, together with the Molteno, Elliot, Clarence and Drakensberg Formations of the Karoo Sequence. Mountain ranges to the south, e.g. Groot Winterhoek, are formed by resistant quartzitic sandstones. Further east the hilly topography of Kwazulu-Natal is formed by Ecca shales, sandstones/ shales and gneiss/ granites.

Landscape features:

The area owes its scenery mainly to the doleritic landforms – plateaux, mesas and ridges with steep cliff faces, such as the Valley of Desolation near Graaff-Reinet or the Winterberge. Scenically prominent features to the south include the Groot Winterhoek, Klein Winterhoek and Suurberg ranges. The rolling landscape around Durban is characterised by the Valley of a Thousand Hills, and the numerous rivers, which have their source in the Drakensberg.

7 FEATURE SENSITIVITY MAPPING

7.1 Identification of feature sensitivity criteria

A list of the key visual / scenic features considered during the assessment of for electricity grid infrastructure (EGI) is given in Table 4 below. A detailed list of features for each corridor is given in Appendix 1.

Table 4: *Key Visual Criteria for Visual Scoping Assessment*

Sensitivity Feature Class	Data Source + Date of Publications	Data Description, Preparation and Processing	Relevant Corridors
Topographic features	1: 500 000 topographic map series; Google Maps with terrain (2015); and steep slopes data.	Topographic maps for prominent elevations, ridgelines, scarps, ravines and geological features, particularly where these occur in combination with steep slopes to create complex landscapes.	All
Steep slopes	SRTM DEM v4.1, 2009.	Two categories of slopes used: steeper than 1:5 and 1:5 - 1:10. Areas with a high geographic density of steep slopes. Steep slopes have been combined with topographic features for mapping purposes.	All
Major rivers and water bodies	1: 500 000 topographic map series, and National Freshwater Ecosystem Priority Areas (NFEPA)	Mainly perennial rivers are included, except where a seasonal river is a major feature. Water bodies include lagoons, lakes, wetlands, pans and dams where these constitute a potential scenic resource.	All
Ramsar sites	National Dept Environmental Affairs SAPAD 2014.	Mapped as indicated in the data base.	All
Coastal zone	1: 500 000 topographic map series, and NGI shapefiles.	A 1km strip of coastline is mapped. Sections of coastlines are diffentiated where these are distinct.	Western, Central, Eastern Corridors.
National Parks	National Dept Environmental Affairs SAPAD 2014.	Mapped according to current boundaries, plus buffers as indicated.	All
Protected Areas	National Dept Environmental Affairs SAPAD, 2014. SANBI Protected Areas Database, 2011.	Includes proclaimed / protected nature reserves, game reserves and wilderness areas, plus buffers as indicated.	All
Private reserves and game farms.	National Dept Environmental Affairs SAPAD, 2014. Google Maps 2015.	Where known these include guest farms, resorts and tourism destinations.	All
Cultural/ rural landscapes	Google Earth 2015.	Includes historically or socially important agricultural areas, such as the vineyards of the W. Cape.	All
Heritage sites	Heritage specialists	Includes archaeological sites, battle sites, cemeteries, etc. where these have heritage significance.	All
Historical towns and villages	AfriGIS Towns, 2013 Discovering Southern Africa, TV Bulpin, 2001.	Lists of towns and villages for each corridor. General information and dates for listed towns and villages, (where available).	All
National Roads	National Geospatial Information (NGI) and Open Street Maps (OSM).	As marked on maps, plus buffers as indicated.	All
Provincial Roads	NGI and OSM	Includes main arterial routes. As marked on maps, plus buffers as indicated.	All

Sensitivity Feature Class	Data Source + Date of Publications	Data Description, Preparation and Processing	Relevant Corridors
Scenic routes	1: 500 000 topographic map series; Google Maps with terrain (2015).	Includes mountain passes and poorts, and coastal routes with intact landscapes.	All
Passenger rail lines	NGI and OSM	Actively used passeger rail lines. (Historic abandoned rail line in the case of the Northern Corridor).	All except W. Corridor
South African Large Telescope (SALT)	1:500 000 topo map	Mapped with a 5km radius.	Central Corridor

Visual significance ratings in terms of visual / scenic sensitivity to electricity grid infrastructure are given for each feature type and their associated buffers in Table 5 below. (See also Appendix 1 for a detailed list).

Table 5: Visual Significance rating for Visual Scoping Assessment

Feature Type	Very high sensitivity	Sensitive	Mod. sensitive	Corridor
Topographic features incl. steep slopes	0 m	500 m	1 km	All
Major rivers	500 m	1 km	2 km	All
Water bodies, dams, wetlands, pans	500 m	1 km	2 km	All
Ramsar Sites	1 km	2 km	3 km	All
Coastal zone	1 km	2 km	3 km	Western, Central, Eastern
National Parks	2 km	3 km *	4 km *	All
Nature Reserves / biosphere core	1 km	2 km *	4 km *	All
Mountain Catchments / biosphere buffer	n/a	n/a	1 km	?
Private reserves and game farms	n/a	1 km *	2 km *	All
Cultural landscapes	0 m	500 m *	1 km *	All
Heritage sites	0 m	500 m *	1 km *	All
Historical towns / villages	500 m	1 km	2 km	All
Other towns / settlements	250 m	500 m	1 km	All
National roads	500 m	1 km *	2 km *	All
Provincial routes	250 m	500 m *	1 km *	All
Scenic routes	1 km	2 km *	3 km *	All
Passenger rail lines	250 m	500 m *	1 km *	All except Western Corridor
SA Large telescope (SALT)	5 km	-	-	Central Corridor

Note 1: * Viewsheds to be taken into account at the project scale. Buffers could be reduced if proposed transmission infrastructure is outside the viewshed or in a view shadow.

Note 2: Significance ratings and buffers are based on a 400kV transmission line 30 t0 60m high, and substations of about 1 ha. Buffers could be reduced where towers are less than 20m high, or where substations are less than 1 000m^2.

Note 3: buffers are in response to potential visibility of the proposed transmission infrastructure. Degrees of visibility in relation to distance are indicated below based on field observations. Visibility would be increased by the location of transmission infrastructure on ridges or skylines:

High visibility:	Clearly noticeable within the observer's viewframe 0 to 0.5 km.
Moderate visibility:	Noticeable feature within observer's viewframe 0.5 to 1 km.
Marginal visibility:	Partially noticeable within observer's viewframe 1 to 2 km.
Low visibility:	Hardly visible unless pointed out to observer 2 to 4 km+.

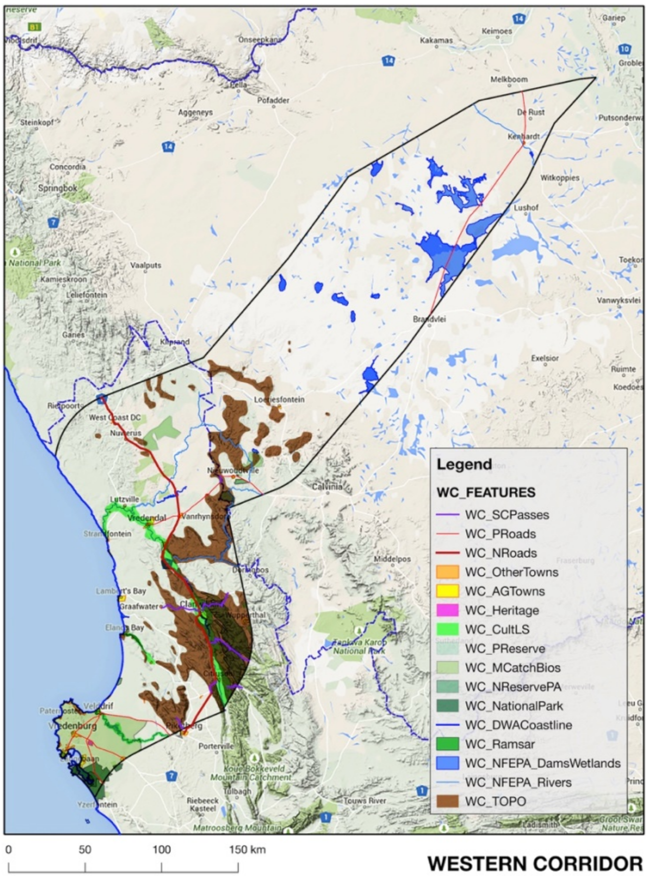
7.2 Feature maps

Legend

FEATURES

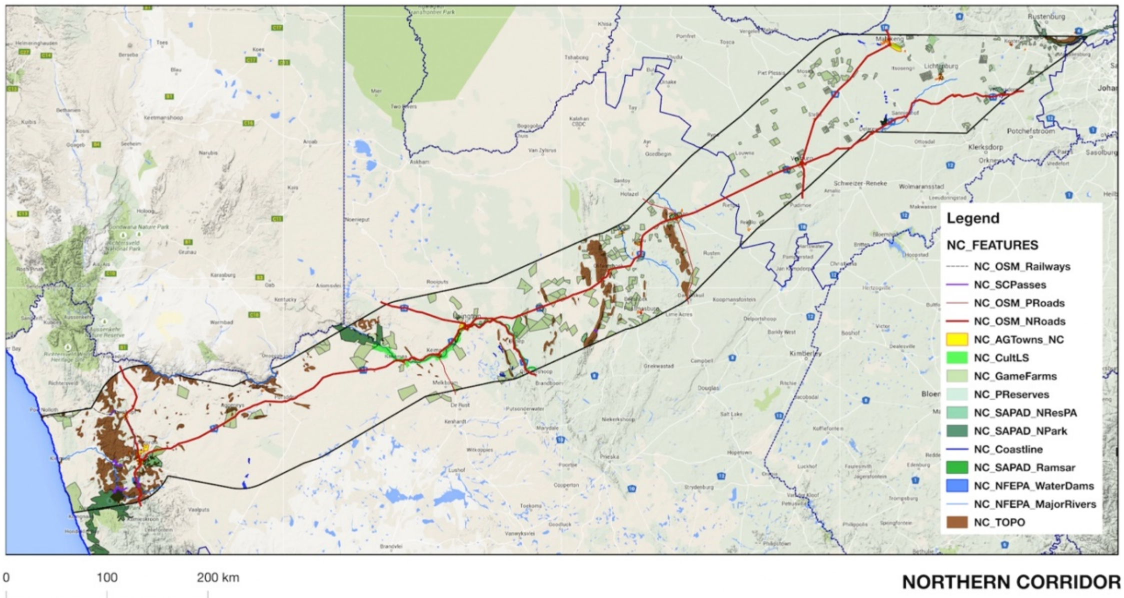
- SA Large Telescope
- OSM Railway Lines
- OSM Scenic Routes
- OSM Provincial Roads
- OSM National Roads
- AfriGIS Towns
- Cultural Landscapes
- Private Game Farms
- SAPAD Private Reserves
- SAPAD Mountain Catchments / Biosphere Reserves
- SAPAD Nature Reserves
- SAPAD National Parks
- DWA Coastline
- SAPAD Ramsar Sites
- NFEPA Dams / Wetlands
- NFEPA Rivers
- Topographic Features

7.2.1 Western Corridor



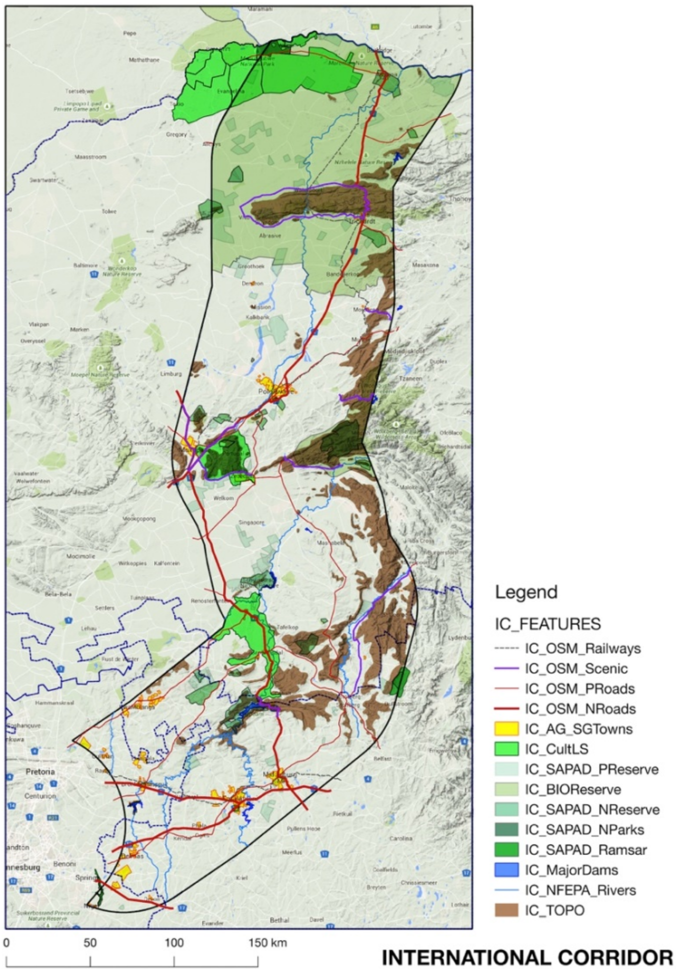
WESTERN CORRIDOR

7.2.2 Northern Corridor



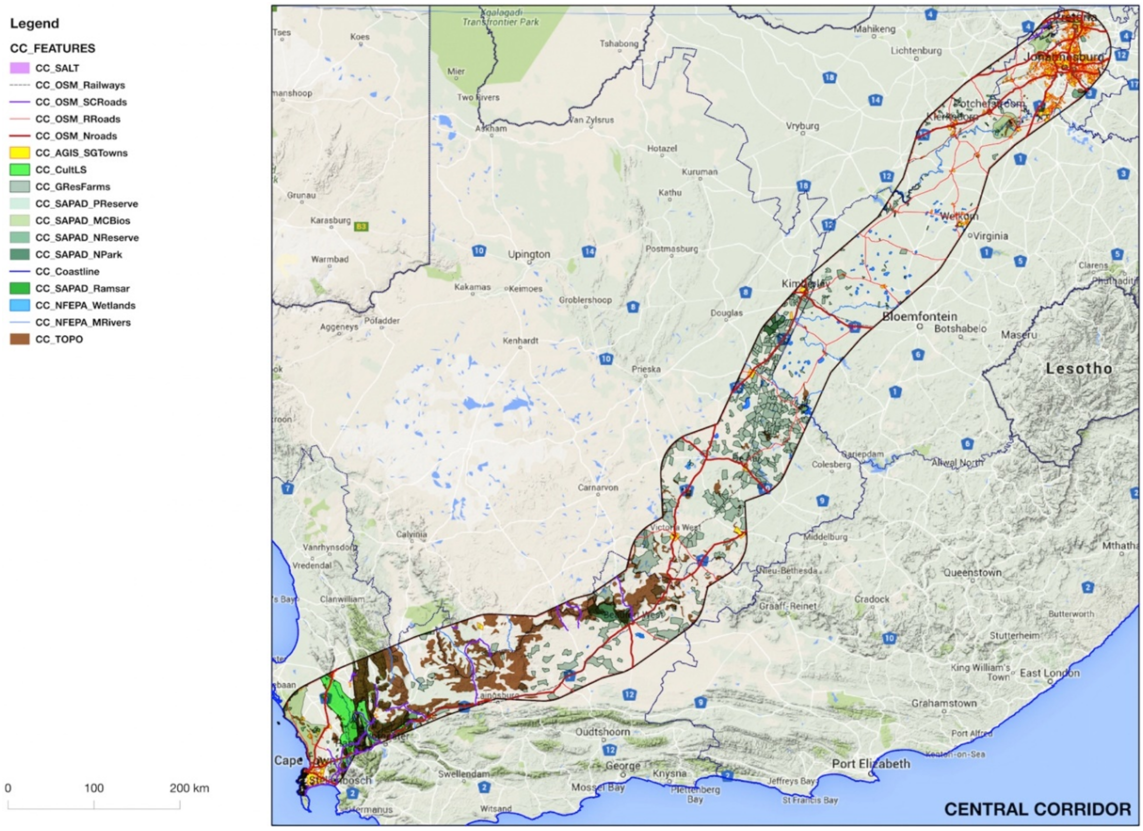
NORTHERN CORRIDOR

7.2.3 International Corridor

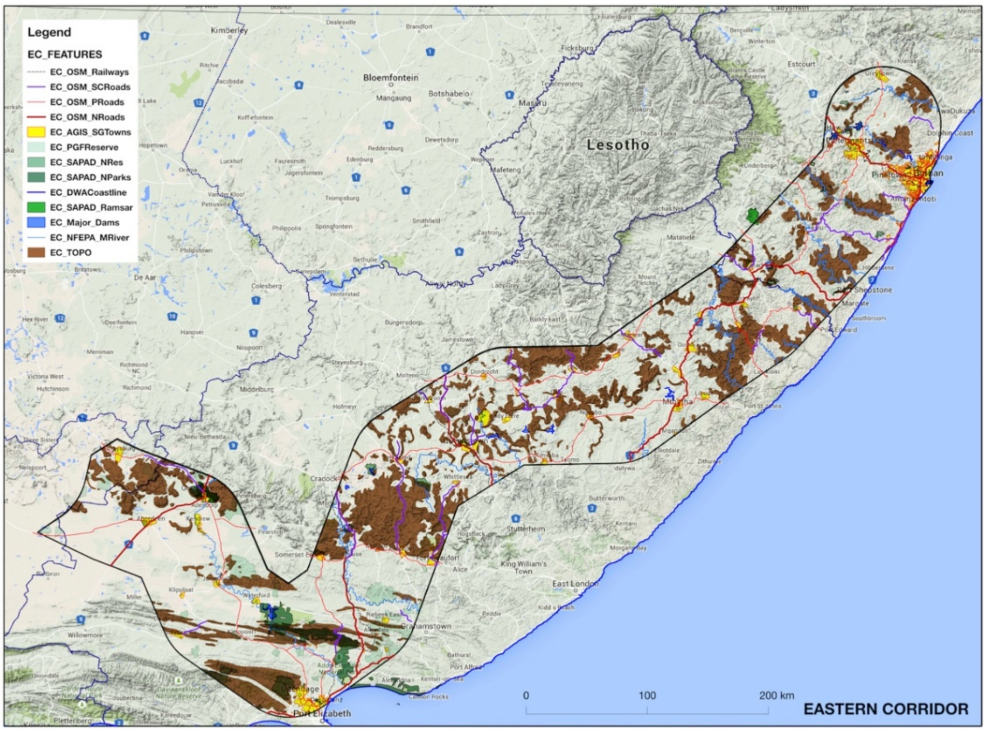


INTERNATIONAL CORRIDOR

7.2.4 Central Corridor



7.2.5 Eastern Corridor



8 FOUR- TIER SENSITIVITY MAPPING

The relative sensitivity mapping includes four sensitivity classes. Where sensitivities overlap no cumulative sensitivity has been allocated, the highest sensitivity value being the prevailing one. Visual sensitivity maps for each of the corridors are given below.

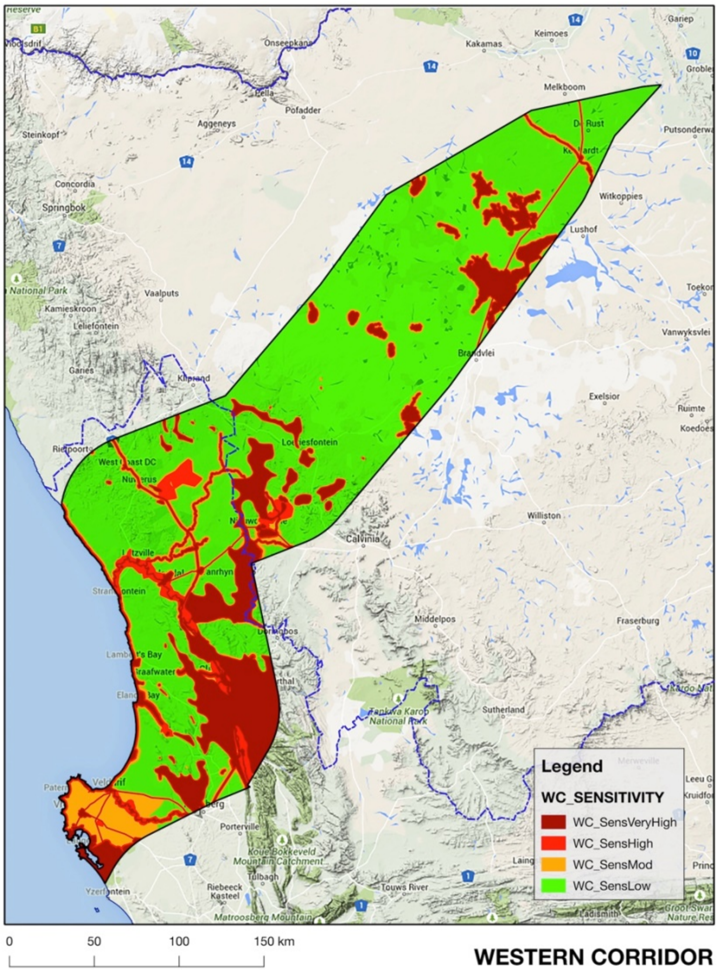
Legend

SENSITIVITY

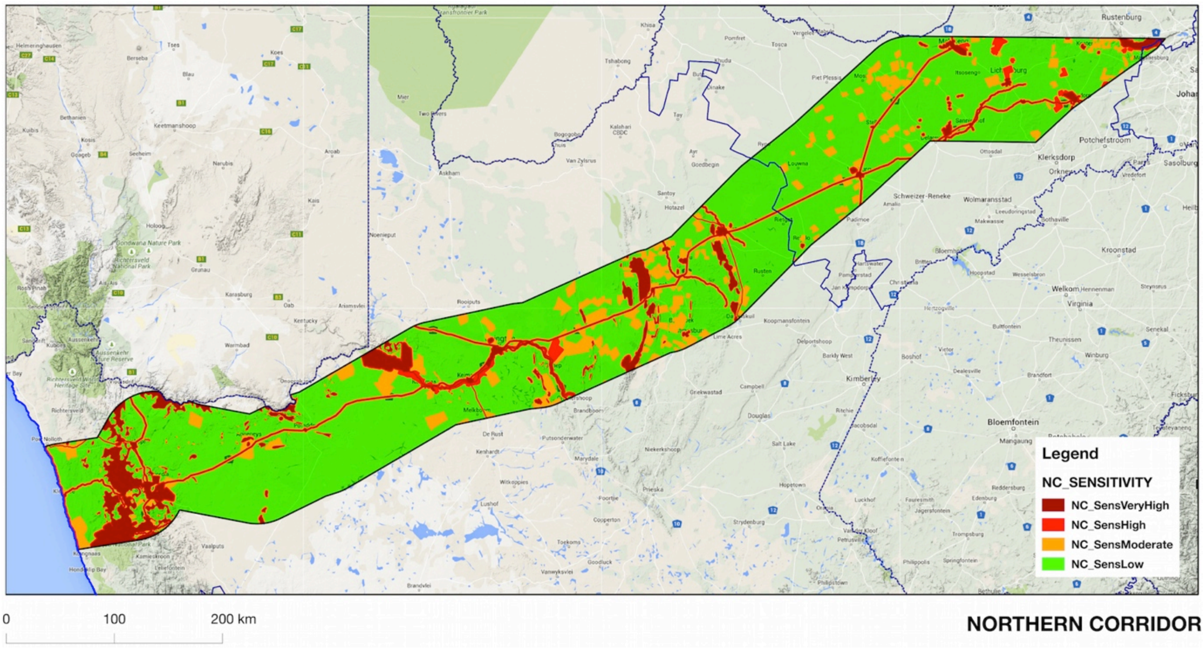
- **Very High Sensitivity**
- **High Sensitivity**
- **Moderate Sensitivity**
- **Low Sensitivity**

8.1 Four Tier sensitivity maps

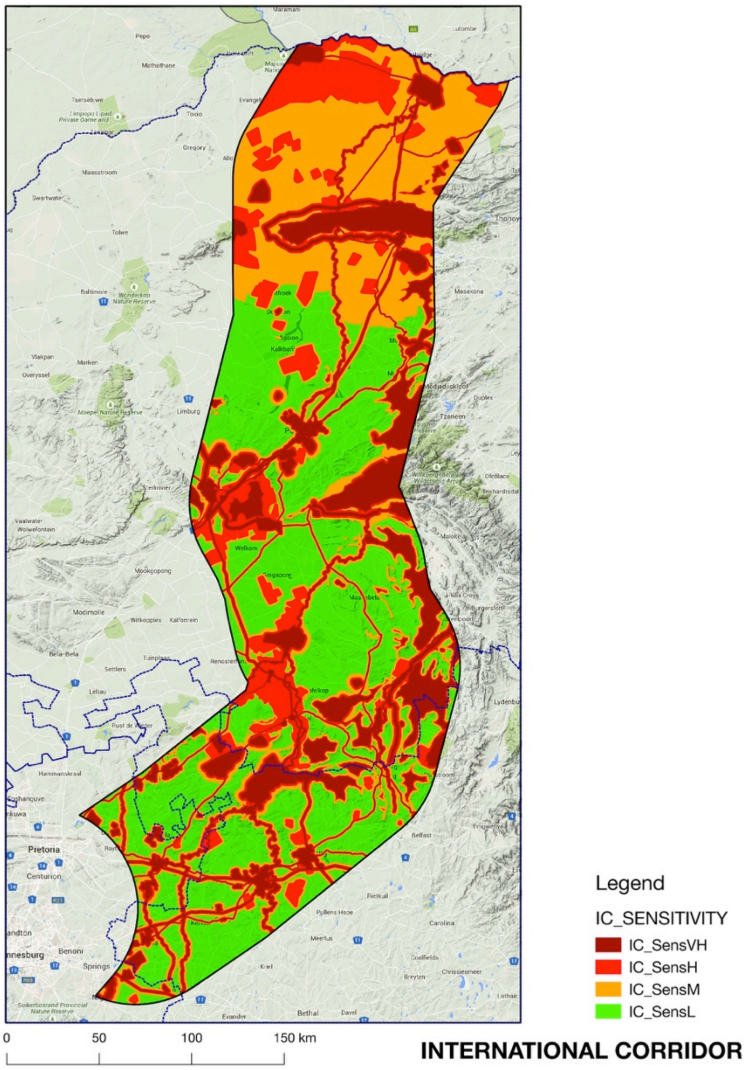
8.1.1 Western Corridor



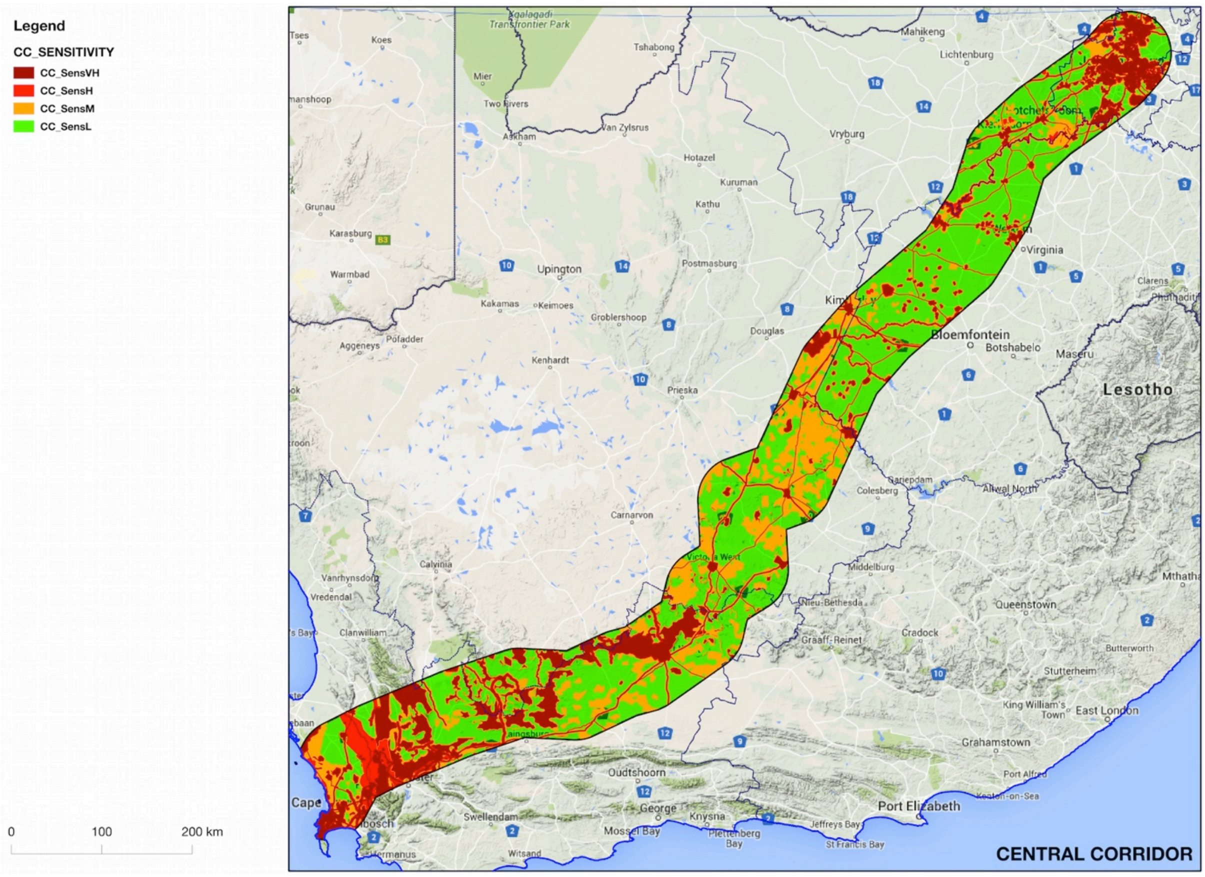
8.1.2 Northern Corridor



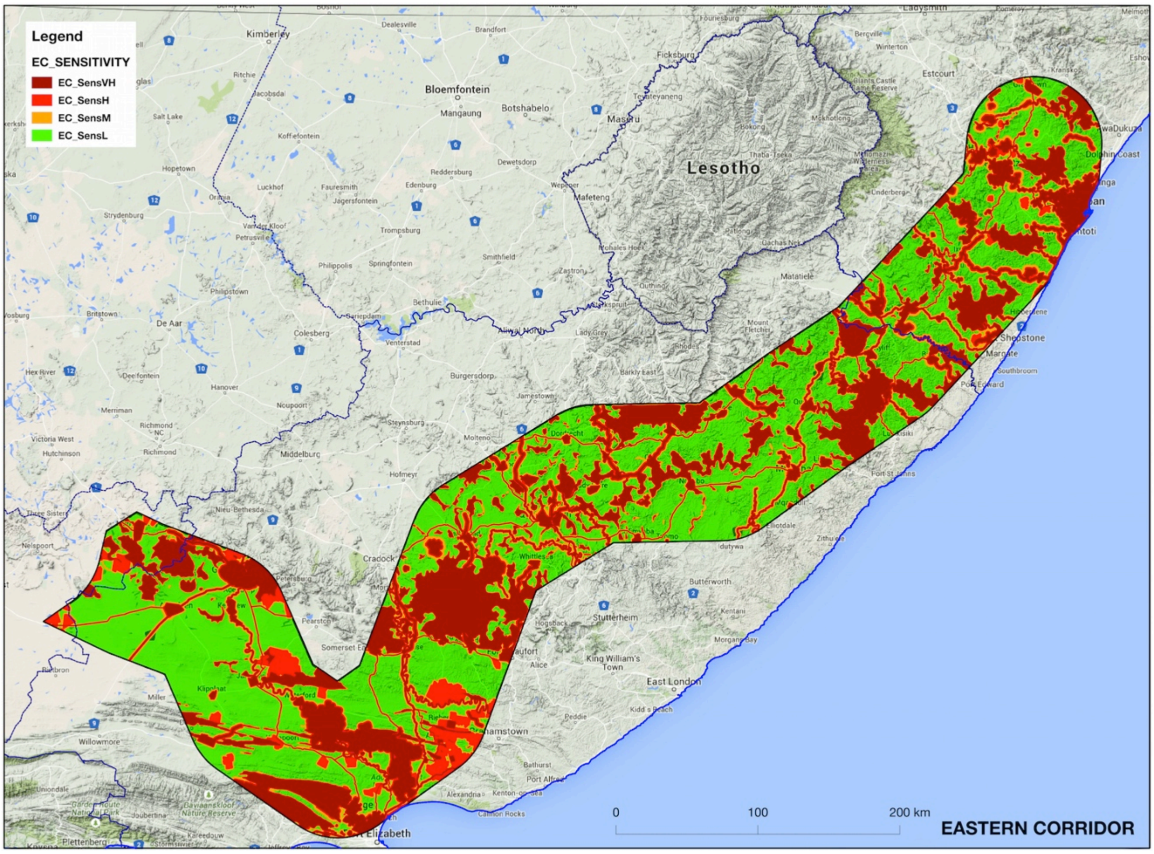
8.1.3 International Corridor



8.1.4 Central Corridor



8.1.5 Eastern Corridor



9 INTERPRETATION AND IMPLEMENTATION OF SENSITIVITY MAPS

9.1 Interpretation and implementation of the four tier map

The intention is that the information in Tables 6 and 7 below be incorporated into a Development Protocol that will determine the development of electricity grid infrastructure in the corridors.

Table 6: Interpretation of Sensitivity Levels for Visual Scoping Assessment

Sensitivity Class	Interpretation (see Note 1 below)	Assessments at project level (see Note 2 below)	Permit requirements
Very High (dark red)	Visually sensitive resources with major visual constraints and/or protected areas or sensitive receptors. (Very high potential visual impact).	A **Level 4** specialist visual assessment. (VIA with alternatives, mitigations and 3D modeling / montages. Independent review if necessary).	Permit from SAHRA or appropriate provincial heritage agency if heritage features are affected.
High (red)	High level of visual constraints and/or proximity of protected areas or sensitive receptors. (High potential visual impact).	A **Level 3** specialist visual assessment. (VIA with recommended mitigations).	Permit from SAHRA or appropriate provincial heritage agency if heritage features are affected.
Medium (orange)	Moderate level visual constraints and intermediate proximity of protected areas / sensitive receptors. (Moderate potential visual impact).	A **Level 2** specialist visual assessment. (Basic assessment with recommended mitigations).	Comment from SAHRA or appropriate provincial heritage agency if heritage features are affected.
Low (green)	Few visual constraints and/or sensitive receptors. Disturbed or transformed land. (Minimal potential visual impact).	A **Level 1** specialist visual assessment. (Site visit and statement by a visual specialist).	

Note 1: Definitions of potential visual impacts are given below:

Very high potential visual impact:
- Significant visual effect on wilderness / rural quality or scenic resources;
- Fundamental change in visual character of the area;
- Creates a major precedent for development in the area.

High potential visual impact:
- Intrusion on intact landscape or scenic resources;
- Noticeable change in visual character of the area;
- Creates a new precedent for development in the area.

Moderate potential visual impact:
- Some effect on intact landscape or scenic resources;
- Some change in visual character of the area;
- Adds to development in the area.

Minimal potential visual impact:
- Low level of intrusion on landscapes or scenic resources;
- Limited change in visual character of the area;
- Similar in nature or compatible with existing development.

Note 2: Categories of visual assessments and the definition of visual specialist are as follows:
Specialist assessment 'Levels' 1 to 4 are adapted from the *Guideline for Involving Visual and Aesthetic Specialists in EIA Processes*. CSIR Report No. ENV-S-C 2005 053, (Oberholzer, B. 2005).

The same Guideline indicates that Power lines would fall under Type A assessments, being large in areal extent and involving natural or rural landscapes. A visual specialist would preferably have qualifications in landscape architecture or environmental planning, or alternatively, recognised expertise and experience in the field of visual assessments.

9.2 Mitigatory Measures

The visual effect of transmission lines, in particular the pylons, are difficult to screen or mitigate visually because of their construction and size, as well as the long distances of power line routes. Numerous transmission lines in parallel add to the visual impact, which together with substations, create an industrial landscape. A number of best-practice measures are indicated below.

1 At the macro scale transmission lines should be aligned with the grain, or flow, of the landscape, following longitudinal valleys rather than cutting across ridges and scarps.
2 In agricultural landscapes transmission lines should adhere to the rectilinear pattern of fields by following fencelines and hedgerows rather than awkwardly cutting across field patterns.
3 Transmission lines should preferably be located in industrial or mining areas rather than recreation or resort areas. They should also be located in existing disturbed or degraded areas in preference to pristine landscapes.
4 Transmission lines could share corridors with other linear routes or utilities, reducing the the amount of right-of-way required, and reducing the the number of new corridors that fragment the landscape.
5 Similarly, new transmission lines should be located where existing power line corridors occur, except where the existing ones are in sensitive areas, or where the cumulative visual impact would be too high.
6 In new development areas, consideration could be given to burying the cables underground, for example in tandem with new road construction. Underground cables are usually only considered in urban areas and over short distances, particularly where visual impacts would be significant.
7 Transmission lines should be located against a background of either topography or vegetation, such as treebelts. The objective is to avoid seeing power lines in silhouette against the skyline if possible.
8 Strategically placed foreground planting can be used to screen views from sensitive viewpoints or receptors.
9 Alternative pylon designs could be used, such as the more modern mono-pole and T-pylon, as used in Europe, which create less visual 'clutter' than lattice type towers. The use of several different pylon types should be avoided where these are in visual proximity.
10 Direct connection of users to renewable energy sources may even eliminate the need for transmission lines in certain instances.
11 Substations should be located in unobtrusive low-lying positions, rather than on hill crests, preferably away from roads, and screened with berms and / or shrub planting.
12 Buildings that form part of substations should be in keeping with their local context, and should be in sympathy with the regional or vernacular architecture.
13 Maintenance roads required for transmission lines and substations should use existing access roads or farm roads as far as possible.
14 Lighting related to substations should be fixed to walls or buildings and fitted with reflectors to avoid light spillage. High mast lighting should be avoided.

Typical visual impacts together with possible mitigations are listed for each corridor in Table 5.2 below.

Table 7: Key Impacts and Mitigations for Visual Scoping Assessment

Corridor	Key Impacts	Site Specific Descriptions	Possible Effect	Opportunities to avoid/reduce/offset
Western Corridor	Potential visual intrusion on scenic mountain ranges escarpment and dolerite koppies.	Piketberg, Olifantsrivierberg, Cederberg and Bokkeveld mountains.	Loss of mountain wilderness character, recreation amenity and tourism value.	Avoid development on visually sensitive mountain ridge skylines.
	Potential visual impact on a national park, nature reserves and tourist facilities.	West Coast NP, Cederberg Wilderness Area, Elands-baai NR, Oorlogskloof NR, Nieuwoudtville Wild Flower Reserve, Rocher Pan NR.	Visual effect on pristine landscapes, recreation amenity and tourism economy.	Avoid development within viewshed of protected landscapes. Screen substations from view.
	Potential visual impact on river valleys and cultural landscapes.	Olifants River, Groot Berg River, Verlorenvlei and Tra-Tra - Biedouw Valleys.	Visual effect on rural character, recreation amenity and natural areas.	Avoid transmission lines along river corridors and across cultural landscapes.
	Potential visual impact on mission village and other historic settlements	Wupperthal, Papendorp, Paternoster, Redelinghuys, Nieuwoudtville.	Negative visual effect on historical settlements and heritage sites.	Avoid power lines intruding on historic settlements. Maintain recommended visual buffers.
	Potential visual impact on major and scenic routes and on rural quality of the area.	N7, particularly in the Olifants River Valley area. Versveld, Piekenierskloof, Middelberg, Cederberg, Pakhuis and Vanryn's mountain passes.	Visual effect on major routes, historical and scenic passes and on tourism economy.	Screen substations. Avoid power lines crossing scenic routes.
Northern Corridor	Visual impact on the rugged peaks and ridges of the escarpment and on ridges, koppies and outcrops.	Namaqualand area mountains, Gariep River gorge, Magaliesberg and numerous geological outcrops.	Visual intrusion on mountain scenery and loss of wilderness experience.	Avoid power lines on visually prominent peaks, ridges and outcrops, particularly on the skyline.
	Visual impact on national parks and nature reserves, and related wilderness experience.	Namaqua NP, Augrabies Falls NP, Mafikeng Game Reserve, numerous nature reserves and Magaliesberg Nature Area.	Effect on pristine landscapes, recreation amenity and tourism economy.	Avoid development within viewsheds of protected landscapes. Screen substations from view.
	Visual impact on Gariep River recreational and agricultural landscape, and on rivers in the arid landscape.	Mainly the Gariep River and associated agricultural land between Upington and Keimoes. Also Buffels, Ga-Mogara, Kuruman and Harts Rivers.	Effect on rural character, recreation amenity and natural heritage.	Avoid power lines across rivers, tributaries and gorges, and across cultural farming landscapes. Maintain recommended visual buffers.

Corridor	Key Impacts	Site Specific Descriptions	Possible Effect	Opportunities to avoid/reduce/offset
	Potential visual impact on national roads and scenic passes.	N7 incl. Burke's Pass. N14 and N10 Routes, particularly along the Gariep River. Passes incl. Aninous, Spektakel, Wildeperdhoek and Messelpad Passes.	Visual effect on historical and scenic passes and on tourism economy.	Avoid power lines across national, coastal and scenic routes or passes. Maintain recommended buffers.
	Potential visual impacts on historic towns and mission settlements.	Concordia, Steinkopf, Pella, Mafikeng, and towns on the Gariep River such as Upington, Kakamas and Keimoes.	Negative visual effect on historical settlements and heritage sites, and their surrounding context.	Avoid power lines intruding on historic settlements. Maintain recommended visual buffers.
International Corridor	Visual impact on prominent mountain ridgelines, scarps and granite outcrops in flat terrain.	Particularly mountains in scenic areas such Loskop Dam, Stydpoortberg, Soutpansberg, Blouberg and around Mokopane.	Visual intrusion on mountain scenery and loss of wilderness experience.	Avoid power lines on visually prominent ridgelines and outcrops, particularly on the skyline.
	Visual impact on national parks and nature reserves, game reserves and wilderness areas.	Mapungubwe NP, Loskop Dam NR, Polokwane GR, Bewaarkloof NR, Blouberg NR, Langjan NR.	Visual effect on pristine landscapes, recreation amenity and tourism economy.	Avoid development within viewsheds of protected landscapes. Screen substations from view.
	Visual impact on rivers and dams with scenic, recreational and amenity value.	Mainly the Olifants and Steelpoort river valleys, and Sand River in the north. Limpopo River in particular.	Visual effect on wilderness, rural and cultural value of river valleys, and recreation amenity of dams.	Avoid power lines across rivers and gorges. Maintain recommended visual buffers.
	Potential visual impact on national roads and routes with scenic value.	N1 and N11, particularly thro' Mokopane mountainous area, Loskop Dam, Sout-pansberg. Also scenic routes in the Mokopane-Zebediela, Morebeng, Louis Trichardt and Waterpoort areas.	Visual effect on scenic passes and poorts, and on tourism economy.	Avoid power lines across national and scenic routes where possible. Maintain recommended buffers.
	Potential visual impacts on historic towns and traditional villages.	Particularly towns and villages identified by the heritage specialists.	Visual effect on historical settlements and heritage sites, and their surrounding context.	Avoid power lines intruding on historic settlements. Maintain recommended visual buffers.
Central Corridor	Potential visual intrusion on scenic mountain ranges, escarpment, dolerite koppies and geological features.	Table Mt. and Peninsula Mts. Numerous ranges of the high Cape Fold mountains. Smaller iconic landforms: Helderberg,	Visual intrusion on mountain scenery, loss of wilderness experience, recreation amenity and tourism value.	Avoid development on visually sensitive mountain ridge skylines, escarpments and dolerite koppies.

Corridor	Key Impacts	Site Specific Descriptions	Possible Effect	Opportunities to avoid/reduce/offset
		Piketberg, Kasteelberg, Paarl Mt, Three Sisters. Dolerite outcrops in the Karoo. Skurweberg and Magaliesberg in the north.		
	Potential visual impact on national parks, nature reserves, wilderness areas and tourist facilities.	Table Mountain, West Coast, Karoo and Mokala National Parks. Large reserves incl. Hottentots-Holland, Hawequa, Groot Winterhoek and Magalieberg Nature Area. Numerous small nature reserves, and particularly Karoo Desert National Botanical Garden. Sutherland Astronomical Observatory.	Visual effect on pristine landscapes, recreation amenity, scientific value and tourism economy.	Avoid development within viewshed of protected landscapes. Screen substations from view.
	Potential visual impact on river valleys, cultural landscapes and pans.	Berg, Breede and Hex River valleys are important cultural landscapes in W. Cape, along with the Gariep in the Great Karoo and the Vaal in the North West.	Visual effect on wilderness, rural and cultural value of river valleys, and on recreation amenity.	Avoid transmission lines along river corridors and across cultural landscapes.
	Potential visual impact on historic towns and settlements, and heritage sites incl. battle sites.	Towns in the W. Cape, such as Paarl, Ceres and Tulbagh. Kimberley in Griqualand, and towns, villages and heritage sites identified by the heritage specialists.	Visual effect on historical towns and heritage sites, and their surrounding context.	Avoid power lines intruding on historic settlements and battle sites. Maintain recommended visual buffers.
	Potential visual impact on national and scenic routes, and historical rail lines.	Sections of the N1, N2, N12, N10, N8, N3 and N4. A number of wine routes, historical mountain passes, such as Bain's Kloof, du Toit's Kloof, Mitchell's and Gydo Passes.	Visual effect on scenic passes and poorts, heritage value and tourism economy.	Screen substations. Avoid power lines crossing scenic routes and mountain passes.
Eastern Corridor	Potential visual intrusion on scenic mountain ranges, escarpment, dolerite koppies and geological features.	Eastern extent of the high Cape Fold mountains, incl. Klein and Groot Winterhoek Mts. Scenic dolerite outcrops such as Valley of Desolation, Camdeboo and Queenstown areas. Drakensberg north of Elliot. Steep river gorges of Transkei and southern Kwazulu- Natal. Valley of a	Visual intrusion on mountain scenery, loss of wilderness experience, recreation amenity and tourism value.	Avoid development on visually sensitive mountain ridge skylines, escarpments and dolerite koppies.

Corridor	Key Impacts	Site Specific Descriptions	Possible Effect	Opportunities to avoid/reduce/offset
		Thousand Hills NW of Durban.		
	Potential visual impact on national parks, nature reserves, wilderness areas and tourist facilities.	Camdeboo, Mountain Zebra and Addo Elephant National Parks. Large Baviaanskloof Wilderness area and numerous nature reserves and game farms.	Visual effect on pristine landscapes, recreation amenity and tourism economy.	Avoid development within viewshed of protected landscapes. Screen substations from view.
	Potential visual impact on river valleys, and cultural landscapes.	Sundays, Great Fish and Kei River valleys in the E. Cape. Numerous large rivers in Transkei and Kwazulu-Natal draining the Drakensberg.	Visual effect on rural and cultural value of river valleys, and on recreation amenity and tourism economy.	Avoid transmission lines along river corridors and across cultural landscapes.
	Potential visual impact on historic towns and settlements, and heritage sites incl. battle sites.	Historical towns such as Graaff-Reinet. Numerous traditional settlements. Towns, villages and heritage sites identified by the heritage specialists.	Visual effect on historical towns and heritage sites, and their surrounding context.	Avoid power lines intruding on historic settlements and battle sites. Maintain recommended visual buffers.
	Potential visual impact on national and scenic routes, and historical rail lines.	Sections of the N9, N10, N2, N6 and N3. A number of scenic passes such as Suurberg Pass and passes leading to the Drakensberg. Numerous scenic routes in rural and coastal areas.	Visual effect on scenic passes, heritage value and rural / tourism economy.	Screen substations. Avoid power lines crossing scenic routes and mountain passes.

10 GENERAL COMMENTS AND DISCUSSION

10.1 General comments

General comments on the suitability for electrical grid infrastructure within each corridor are given below.

Site	Overall Suitability	Comment
Western Corridor	The Coastal area, including the Langebaan Lagoon and West Coast National Park, is an area of very high scenic and tourism value, and visually sensitive with regard to siting transmission lines and substations. The industrial area around Saldanha is however severely altered and therefore not sensitive from a visual perspective. Further inland, the high Olifantsrivier and Cederberg Mountains have very high scenic value and visually sensitive ridge skylines. The Olifants River Valley, through which the N7 passes,also has high scenic and cultural landscape value. The rim of the escarpment, formed by the Bokkeveld Mountains, is particularly visually sensitive. The inland plateau area tends to be flatter and less visually sensitive, although transmission lines would be visible over	The southern portion of the Corridor consists of varied and complex landscapes high in scenic and cultural value, requiring careful siting and micro-siting of transmission lines. Valleys or side-slopes tend to be less visually sensitive. The inland areas in the east of the Corridor have few visual constraints. Care with micro-siting of transmission facilities is needed to protect local topographic and drainage features.

Site	Overall Suitability	Comment
	large distances. Prominent koppies and the large pans provide scenic interest in a relatively featureless landscape, and should be avoided.	
Northern Corridor	In the west, the coastline, Namaqua National Park and rugged escarpment mountains west of Springbok are all visually sensitive features. Further inland on the plateau the landscape is similar to that of the Western Corridor interior, being relatively flat with dispersed koppies and pans. Farming areas along the Gariep River, in the Pella, Kakamas and Upington areas, as well as the Augrabies Falls National Park, have high scenic and cultural landscape value, particulary in an otherwise arid landscape, and transmission development along the river corridor in these areas should be avoided. The flat landscapes in the east of the Corridor have few visual constraints, except for the Langeberge near Olifantshoek and the Kurumanheuwels, in a largely featureless Northern Cape landscape. The frequency of settlements increase in the North West Province, which is also relatively flat except for the Magaliesberg range near Rustenberg, an important Nature Area and therefore visually sensitive.	The western portion of the corridor between the coast and the N7 Route consists of relatively complex landscapes, high in scenic and cultural value. The interior has relatively few visual constraints for the development of transmission facilities, except for the Gariep River corridor. Care with micro-siting is needed to avoid topographic and drainage features. Protected landscapes, including the National Parks and Magaliesberg Nature Area, should generally be avoided.
International Corridor	Parts of the southern portion of the Corridor are urbanised and industrialised, including mining activities, power stations and power lines, and therefore less sensitive for future transmission development. The Loskop Dam Nature Reserve has high wilderness and scenic value, along with the Olifants and Steelpoort River valleys leading northwards. The topographically featureless Springbok Vlaktes in the west of the Corridor has existing power lines, and is less visually sensitive than the Leolo Mountains to the east. The Stydompoort Mountains are a prominent feature with a visually sensitive ridge skyline. Most of the northern portion of the Corridor is topographically featureless, except for the Blouberg and Soutpansberg ranges, which rise from the flat bushveld plains. These mountains have very high scenic, conservation and tourism value. Game farms in the area tend to be visually sensitive.	The southern portion of the Corridor is the least visually sensitive, except for the Loskop Dam area, and around settlements. The flat plains are also less visually sensitive, although power lines can be seen over long distances. Careful micro-siting is needed, preferably using low-lying areas. The several mountain ranges are important for their scenic, wilderness and recreation value and should therefore generally be avoided.
Central Corridor	As in the case of the Western Corridor, the area along the coast and in the high Cape Fold Mountains is of very high scenic value and visual sensitivity. The protected landscapes of the Table Mountain and West Coast National Parks present additional visual constraints. Fruit and wine farming along the W. Cape river valleys and footslopes have high landscape and cultural value, including the Stellenbosch, Paarl, Tulbagh and Ceres areas. Numerous mountain passes of the area have high scenic and historical value. The inland Karoo region tends to be less visually sensitive, except for the exposed ridgelines of the Roggeveld and Nuweveld mountains forming an escarpment. The relatively	The visual constraints along the coast and across the Cape Fold Mountains are similar to those of the Western Corridor, the complex landscapes having high scenic value and visual sensitivity, making the siting of transmission lines difficult. The interior plateau areas on the other hand have few visual constraints, except for the scattered dolerite koppies of the Karoo and the protected landscapes of the Karoo and Mokala National Parks.

Site	Overall Suitability	Comment
	featureless plains of the Great Karoo and Griqualand areas are also less visually sensitive except for the characteristic dolerite koppies. The northern portion of the Corridor consists of relatively flat plains of the Free State and North West Provinces, with few visual constraints until reaching the Witwatersrand and Magaliesberg areas. Dense population centres and nature reserves add to the visual constraints in this region.	Careful micro-siting of transmission facilities is needed, preferably using low-lying areas. The Magaliesberg Nature Area and densely populated areas in the north of the Corridor present some challenges for the siting of transmission facilities.
Eastern Corridor	In the western portion of the Corridor, broad valleys between the Cape Fold Mountains tend to be less visually sensitive than the sandstone mountain ridges. The dolerite outcrops around Graaff-Reinet have high scenic value and visual sensitivity, while the Camdeboo, Mountain Zebra and Addo National Parks add to the visual constraints in this region. North of Fort Beaufort, towards Queenstown and Mthatha, the landscape becomes more complex, with numerous dolerite koppies and ridges. Although the skyline ridges are visually sensitive, the valleys provide opportunities for siting power lines. The southern section of the Drakensberg has higher elevations and steeper slopes, which make the area visually sensitive. The eastern portion of the Corridor, across theTranskei and southern Kwazulu-Natal, has deeply incised ravines created by rivers flowing from the Drakensberg, the broken topography having scenic and rural qualities.	The long and broad valleys of the western portion of the Corridor present some opportunities for the siting of transmission lines. Power lines across ridges and national parks, however need to generally be avoided. The complex and incised topography of the eastern portion of the Corridor results in a fine network of tributaries with steep slopes, making the alignment of transmission lines difficult.

11 CONCLUSIONS AND FURTHER RECOMMENDATIONS

A methodology and framework has been created to categorise and rate scenic features, and their visual sensitivity, together with recommended buffers for each type of feature. It should therefore be possible to supplement the information contained in this study with more detailed and accurate data over time as the alignment of the actual transmission infrastructure emerges.

The sensitivity mapping for scenic features should provide a general indication of suitable routes for transmission lines taking into account visual and heritage criteria using the four-tiered sensitivity approach. The mapping revealed that for the most part opportunities exist for the alignment of transmission lines, although many pinch-points occur. Appropriate mitigation measures will therefore play an important role.

Given the broad scale of the proposed corridors across the country, the visual specialist study has of necessity been carried out at a coarse regional level, and therefore only major features have been captured. Some of these are represented as large polygons, which can be further interrogated through fine-scale mapping.

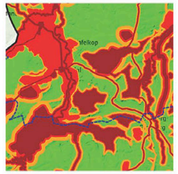
It will be important at the project scale to ensure that additional more detailed field work and mapping is carried out, as well as viewshed analyses. This could in turn help to identify both smaller scale features and opportunities for power line alignments, particularly where pinch-points occur.
Also, given the varied nature and widespread ocurrence of scenic and heritage resources in the five corridors, it is clear that careful micro-siting at the project level will be essential, using visual and heritage expertise.

12 APPENDIX 1: LIST OF FEATURES

National Electricity Grid Infrastructure SEA

Visual Specialist Report
Appendix 1: List of Features





WESTERN CORRIDOR

Corridor	Feature Class	GIS Visual ID	Feature Name / Type	V. high sensitivity buffer	High sensitivity buffer	Moderate sensitivity buffer	Attributes, significance, observations
Western	Landforms / Geological Features / Steep Slopes	Wm1	Piketberg Mt.	-	500 m	1 000 m	Prominent landscape feature in the Sandveld, with fruit farms in the valleys. Includes Goedverwacht mission settlement. Regional scenic and cultural value.
		Wm2	Olifantsrivier Mts.	-	500 m	1 000 m	Includes scenic Piekenierskloof Pass. Visually sensitive ridgeline. Local scenic value.
		Wm3	Cederberg Mts.	-	500 m	1 000 m	Includes 'protected wilderness area', Biedouw Valley and several passes including Pakhuis Pass. Regional scenic, wilderness and recreation value. Archaeological cave and rock art sites.
		Wm4	Bokkeveld Mts.	-	500 m	1 000 m	Prominent scarp face feature. Includes Vanryn's Pass and Oorlogskloof Nature Reserve. Visually sensitive scarp rim. Regional scenic value.
		Wm5	Langberg	-	500 m	1 000 m	Prominent ridges NW of Loeriesfontein. Local scenic value.
		Wm6	Skurweberg	-	500 m	1 000 m	Dolerite koppies south of Loeriesfontein. Local scenic value.
		Wm7	Hantamsberg outliers	-	500 m	1 000 m	Shale and dolerite koppies north of Calvinia. Local scenic value.
		Wm8	Konfytpoort se Koppe	-	500 m	1 000 m	Granite / gneiss outcrops in the Knersvlakte NE of Bitterfontein. Local scenic value.
		Wm9	Nuwerus Outliers	-	500 m	1 000 m	
		Wm10	Eland's Bay Outliers	-	500 m	1 000 m	
		Wm11	Vredenburg Peninsula Hills	-	500 m	1 000 m	
	Major and Perennial Rivers	Wr1	Berg River	500 m	1 000 m	2 000 m	Includes estuary and wetlands. Regional scenic, agricultural and recreational value.
		Wr2	Olifants River	500 m	1 000 m	2 000 m	Includes estuary. Citrus farming. Regional scenic, cultural and recreation value.
		Wr3	Doring River	500 m	1 000 m	2 000 m	Tributary of the Olifants River. Local scenic, wilderness and recreational value.
		Wr4	Doring/ Sout Rivers	500 m	1 000 m	2 000 m	Includes scenic waterfall area north of Nieuwoudtville. Local scenic value.
		Wr5	Oorlogskloof/ Koebee River	500 m	1 000 m	2 000 m	Includes scenic gorges and nature reserve south of Nieuwoudtville. Local scenic value.
		Wr6	Hartbees River	500 m	1 000 m	2 000 m	Major dry river feature near Kenhardt. Local visual interest.
	Water Bodies / Dams / Wetlands	Ww1	Wadrif Salt Pan	500 m	1 000 m	2 000 m	Local scenic and estuarine value.
		Ww2	Clanwilliam Dam	500 m	1 000 m	2 000 m	Local scenic, resort and recreation value. Agricultural irrigation importance.
		Ww3	Bulshoek Dam	500 m	1 000 m	2 000 m	Dam in the Olifants River Valley. Local scenic, recreation and resort value.
		Ww4	Varsrivier Dam	500 m	1 000 m	2 000 m	Dam north of Vanrynsdorp. Local scenic feature.
		Ww5	Driekop Dam	500 m	1 000 m	2 000 m	Dam north of Nieuwoudtville. Local scenic feature.
		Ww6	Swartkolvloer Pan	500 m	1 000 m	2 000 m	Local landscape feature in an arid region.
		Ww7	Voelvlei se Vloer Pan	500 m	1 000 m	2 000 m	Local landscape feature in an arid region.
		Ww8	Commissioner's Salt Pan/ Bitterputs	500 m	1 000 m	2 000 m	Regional landscape feature in an arid region.
		Ww9	Dwaggassoutpan	500 m	1 000 m	2 000 m	Local landscape feature in an arid region.
		Ww10	Konnes se Pan	500 m	1 000 m	2 000 m	Local landscape feature in an arid region.
		Ww11	Rietfontein se Pan	500 m	1 000 m	2 000 m	Local landscape feature in an arid region.
		Ww12	Groetvloer/ Sakrivier Pan	500 m	1 000 m	2 000 m	Regional landscape feature in an arid region.
		Ww13	Dagab se Laagte Pan	500 m	1 000 m	2 000 m	Local landscape feature in an arid region.
		Ww14	Geelvloer Pan	500 m	1 000 m	2 000 m	Local landscape feature in an arid region.
		Ww15	Verskepvloer Pan	500 m	1 000 m	2 000 m	Local landscape feature in an arid region.
		Ww16	Bosduiflaagte Pans	500 m	1 000 m	2 000 m	Local landscape feature in an arid region.

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WESTERN CORRIDOR

Corridor	Feature Class	GIS Visual ID	Feature Name / Type	V. high sensitivity buffer	High sensitivity buffer	Moderate sensitivity buffer	Attributes, significance, observations
		Ww17	Rooidam	500 m	1 000 m	2 000 m	Dam south of Kenhardt. Local visual interest.
	Ramsar Sites	Wz1	Langebaan Lagoon	1 000 m	2 000 m	3 000 m	Part of West Coast National Park. Includes Churchhaven historical settlement. Regional conservation, scenic, cultural and recreation value.
		Wz2	Verlorenvlei	1 000 m	2 000 m	3 000 m	Includes estuary and wetlands. Regional conservation, scenic, cultural and recreation value.
	Coastal zones	Wc1	Saldanha Bay	1 000 m	2 000 m	3 000 m	Regional scenic and recreational (sailing) value.
		Wc2	Cape Columbine	1 000 m	2 000 m	3 000 m	Granite promontories and small coves. Local scenic, archaeological and recreation value.
		Wc3	St Helena Bay	1 000 m	2 000 m	3 000 m	Coastline with local scenic, residential and recreation value.
		Wc4	Elands Bay	1 000 m	2 000 m	3 000 m	Coastline and estuary with local scenic, residential and recreation value.
		Wc5	Lambert's Bay	1 000 m	2 000 m	3 000 m	Coastline with fishing harbour. Local scenic and cultural value.
	National Parks	Wp1	West Coast National Park	2 000 m	3 000 m	4 000 m	National conservation and scenic value.
	Nature Reserves / Protected areas / Biosphere Cores	Wn1	Cederberg Wilderness Area	1 000 m	2 000 m	4 000 m	Regional conservation and scenic value.
		Wn2	Elandsbaai Nature Reserve	1 000 m	2 000 m	4 000 m	Local conservation and scenic value.
		Wn3	Oorlogskloof Nature R.	1 000 m	2 000 m	4 000 m	Local conservation and scenic value.
		Wn4	Nieuwoudtville Wild Flowr R.	1 000 m	2 000 m	4 000 m	Local conservation and scenic value.
		Wn5	Rocher Pan Nature Reserve	1 000 m	2 000 m	4 000 m	Local conservation (incl. birds) and scenic value.
		Wn6	SAS Saldanha Nature R.	1 000 m	2 000 m	4 000 m	Local conservation and scenic value.
		Wn7	Columbine Nature Reserve	1 000 m	2 000 m	4 000 m	Local conservation and scenic value.
		Wn8	Ramskop Nature Reserve	1 000 m	2 000 m	4 000 m	Local conservation and scenic value.
		Wn9	Langebaan Nature Area	1 000 m	2 000 m	4 000 m	Local conservation and scenic value.
		Wn10	Postberg Nature Reserve	1 000 m	2 000 m	4 000 m	Local conservation and scenic value.
		Wn11	Hantam National Botanical Garden	1 000 m	2 000 m	4 000 m	National conservation and scenic value.
	Mountain Catchments / Biosphere buffers	Wo1	Cape West Coast Biosphere R.	-	-	1 000 m	Regional conservation and scenic value.
		Wo2	Cederberg Mt. Catch. Area	-	-	1 000 m	Regional conservation and scenic value.
		Wo3	Winterhoek Mt. Catch. Area	-	-	1 000 m	Regional conservation and scenic value.
	Private Reserves / Game Farms	Wg1	Moederverloren Nature R.	-	1 000 m	2 000 m	Local conservation and scenic value.
		Wg2	Gannabos Protected Area	-	1 000 m	2 000 m	Local conservation and scenic value.
		Wg3	Nieuwoudtville Wild Flower Private R	-	1 000 m	2 000 m	Local conservation and scenic value.
	Cultural Landscapes	Wl1	Olifants River Valley	-	500 m	1 000 m	Includes Citrusdal / Clanwilliam farming areas. Regional cultural, heritage and scenic value.
		Wl2	Lower Olifants coastal plain	-	500 m	1 000 m	Includes Klawer, Vredendal and Lutzville farming areas. Regional cultural, heritage and scenic value.
		Wl3	Groot Berg River Valley	-	500 m	1 000 m	Regional cultural, heritage and scenic value.
		Wl4	Verlorenvlei Valley	-	500 m	1 000 m	Includes Redelinghuys farming area. Regional cultural, heritage and scenic value.
		Wl5	Tra-Tra / Biedouw Valleys	-	500 m	1 000 m	Includes Wupperthal farming area. Regional cultural, heritage and scenic value.
	Heritage and Archaeological Sites	Wh1	Baboon Point, Elands Bay	-	500 m	1 000 m	Cave feature. Provincial Heritage Site. Local scenic value.
		Wh2	West Coast Fossil Park	-	500 m	1 000 m	West of Langebaanweg. Regional heritage and scientific value.

2

WESTERN CORRIDOR

Corridor	Feature Class	GIS Visual ID	Feature Name / Type	V. high sensitivity buffer	High sensitivity buffer	Moderate sensitivity buffer	Attributes, significance, observations
	Historical Towns and Villages	Wt1	Saldanha Bay	500 m	1 000 m	2 000 m	Local heritage, scenic and recreation value.
		Wt2	Paternoster	500 m	1 000 m	2 000 m	Fishing village. Local heritage, scenic and recreation value.
		Wt3	Veldrif / Laaiplek	500 m	1 000 m	2 000 m	Fishing village. Local heritage, archaeological and recreation value.
		Wt4	Elands Bay	500 m	1 000 m	2 000 m	Fishing village. Local heritage and social value.
		Wt5	Lambert's Bay	500 m	1 000 m	2 000 m	Fishing settlement (1820). Mission settlement (1831). Local heritage, cultural value.
		Wt6	Papendorp/ Ebenhaezer	500 m	1 000 m	2 000 m	Church town (1836). Church is a PHS. Local heritage and architectural value.
		Wt7	Piketberg	500 m	1 000 m	2 000 m	Church settlement (1906). Nearby astronomical beacon site 1751 (PHS). Local heritage value.
		Wt8	Aurora	500 m	1 000 m	2 000 m	Church town (1906). Local heritage and architectural value.
		Wt9	Redelinghuys	500 m	1 000 m	2 000 m	Administrative town. Local heritage and architectural value.
		Wt10	Citrusdal	500 m	1 000 m	2 000 m	Administrative town (1814). Local heritage and architectural value, incl. Provincial Heritage Sites.
		Wt11	Clanwilliam	500 m	1 000 m	2 000 m	Mission Village (1830). Local heritage, architectural and social value.
		Wt12	Wupperthal	500 m	1 000 m	2 000 m	Administrative town on N7. Victorian architecture. Local heritage value.
		Wt13	Nuwerus	500 m	1 000 m	2 000 m	Administrative town on N7. Local heritage value.
		Wt14	Bitterfontein	500 m	1 000 m	2 000 m	Church town (1887). Mission settlement 1751. Provincial Heritage Sites. Historical and architectural value.
		Wt15	Vanrynsdorp	500 m	1 000 m	2 000 m	Fishing village. Local heritage, archaeological and recreation value.
		Wt16	Nieuwoudtville	500 m	1 000 m	2 000 m	Church town (1887). Historic sandstone buildings. Local heritage and architectural value.
		Wt17	Loeriesfontein	500 m	1 000 m	2 000 m	Agricultural centre/ spring flowers. Old mill at Rheboksfontein. Local heritage, scenic value.
		Wt18	Kenhardt	500 m	1 000 m	2 000 m	Sheep farming centre (1868).
		Wt19	Eendekuil	500 m	1000 m	2000 m	Historical railway terminus. Cheese-making centre.
		Wt20	Graafwater	500 m	1000 m	2000 m	Church town founded c. 1920.
		Wt21	Hopefield	500 m	1000 m	2000 m	Church town 1851. Wheat and sheep farming centre. Historical and architectural value.
		Wt22	Klawer	500 m	1000 m	2000 m	Railhead and farming centre, 1915.
		Wt23	Langebaan	500 m	1000 m	2000 m	Village founded c. 1870. Residential and Resort centre.
		Wt24	Leipoldtville	500 m	1000 m	2000 m	Church town 1905.
		Wt25	Lutzville	500 m	1000 m	2000 m	Viticulture, fruit and vegetable-growing village, 1923. Vlermuisklip rock shelter.
		Wt26	Rietpoort	500 m	1000 m	2000 m	Mission village, 1913 north of Bitterfontein. Historical rock shelter.
		Wt27	Vredenburg	500 m	1000 m	2000 m	Church town 1875. First residential stands surveyed 1883. Farming and commercial centre.
		Wt28	Vredendal	500 m	1000 m	2000 m	Church town, 1933. Irrigated wine and wheat-growing centre.
	Other Towns and Settlements	Wp1	Doringbaai	250 m	500 m	1 000 m	Fishing Village. Local recreation value.
		Wp2	Jacobsbaai	250 m	500 m	1 000 m	Residential and resort area.
		Wp3	St Helena Bay	250 m	500 m	1 000 m	Fish processing and residential centre.
		Wp4	Strandfontein	250 m	500 m	1 000 m	Holiday Resort

3

WESTERN CORRIDOR

Corridor	Feature Class	GIS Visual ID	Feature Name / Type	V. high sensitivity buffer	High sensitivity buffer	Moderate sensitivity buffer	Attributes, significance, observations
	National Roads	Wa1	N7 Route	500 m	1 000 m	2 000 m	National road through Swartland and Olifants River Valley. Includes Piekenierskloof Pass. Regional scenic value.
	Arterial / Provincial Roads	Wb1	R45 Route	250 m	500 m	1 000 m	Local scenic value in the Saldanha area.
		Wb2	R27 Route south	250 m	500 m	1 000 m	Linking scenic route Vanrynsdorp to Nieuwoudtville. Includes Vanryn's Pass. Local scenic value.
		Wb3	R27 Route north	250 m	500 m	1 000 m	Linking route Brandvlei to Kenhardt. Includes area of large pans. Local scenic value.
		Wb4	R399 Route	250 m	500 m	1 000 m	Linking route Piketberg to Vredenburg. Includes Berg River estuary.
	Scenic Routes / Passes / Poorts	Ws1	Versveld Pass	1 000 m	2 000 m	3 000 m	Pass onto the Piketberg. Local scenic and heritage value.
		Ws2	Piekenierskloof Pass	1 000 m	2 000 m	3 000 m	N7 through Oliefantsrivier Mountain. Regional historical and scenic value, dating to 1675.
		Ws3	R303 and Middelberg Pass	1 000 m	2 000 m	3 000 m	R303 between Citrusdal and Kouebokkeveld. Local scenic value.
		Ws4	Nieuwoudtspas/ Cederberg Pass	1 000 m	2 000 m	3 000 m	Between N7 and Cederberg, dating to 1880. Regional historical, scenic and recreational value.
		Ws5	Pakhuis Pass	1 000 m	2 000 m	3 000 m	Between Clanwilliam and Biedouw Valley, (1877). Includes Leipold's Grave. Regional historical, scenic and tourism value.
		Ws6	Uitkyk Pass	1 000 m	2 000 m	3 000 m	Pass to Wuppertal. Local historical and scenic value.
		Ws7	Vanryn's Pass	1 000 m	2 000 m	3 000 m	R27 Vanrynsdorp to Nieuwoudtville, (1880). Historical, scenic and tourism value.
		Ws8	R364 Route	1 000 m	2 000 m	3 000 m	Clanwilliam to Graafwater through Uitkomstberge. Local scenic value.

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NORTHERN CORRIDOR

Corridor	Feature Class	GIS Visual ID	Feature Name / Type	V. high sensitivity buffer	High sensitivity buffer	Moderate sensitivity buffer	Attributes, significance, observations
	Landforms / Geological Features / Steep Slopes	**Nm1**	**Namaqualand area mts.**	-	**500 m**	**1 000 m**	**Extensive range of rugged mountains west of Springbok and Steinkopf. Regional geological, scenic and wilderness value.**
		Nm2	Gariep River area mts.	-	500 m	1 000 m	Extensive area of rugged topography and river gorges along the Gariep River. Regional scenic and wilderness value.
		Nm3	Naib se Berg	-	500 m	1 000 m	Geological outcrop feature in flat plain of Koa River Valley. Local scenic value.
		Nm4	Aggeneys se Berg/ Black Mt.	-	500 m	1 000 m	Small ridge north of Aggeneys, along N14 Route.
		Nm5	Namiesberge	-	500 m	1 000 m	Small ridge near Koa River Valley.
		Nm6	Pella se Berge	-	500 m	1 000 m	Long range along Gariep River near Pella.
		Nm7	Skuitklipkop	-	500 m	1 000 m	Geological outcrop feature in a flat plain. Local scenic value.
		Nm8	Augrabies Falls area mts.	-	500 m	1 000 m	Includes Augrabies Falls and part of Augrabies Falls National Park. National scenic value.
		Nm9	Neusberg	-	500 m	1 000 m	Geological outcrop feature in a flat plain. Local scenic value.
		Nm10	Witberg mts.	-	500 m	1 000 m	Narrow range along Gariep River. Local scenic value.
		Nm11	Skurweberge	-	500 m	1 000 m	Narrow range along railway line. Local scenic value.
		Nm12	outcrops	-	500 m	1 000 m	Geological outcrop features in a flat plain. Local scenic value.
		Nm13	Langberg	-	500 m	1 000 m	Long range west of Postmasburg. Local scenic value.
		Nm14	Klipfonteinheuwels	-	500 m	1 000 m	Small ridge north of Postmasburg. Local scenic value.
		Nm15	Kurumanheuwels	-	500 m	1 000 m	Long range SW of Kuruman. Local scenic value.
		Nm16	Magaliesberg	-	500 m	1 000 m	Long range SE of Rustenburg. Part of Magaliesburg Nature Area. Regional scenic value.
	Major and Perennial Rivers	Nr1	Gariep River (Orange River)	500 m	1 000 m	2 000 m	A major river in the country. Important for irrigation. National scenic, cultural and recreation value.
		Nr2	Buffels River	500 m	1 000 m	2 000 m	Includes mountain gorges (Spektakel Pass) and estuary at Kleinzee. Local scenic value.
		Nr3	Ga-Mogara River	500 m	1 000 m	2 000 m	Dry river feature and pans west of Kuruman. Joins Kuruman River to the North. Local scenic value.
		Nr4	Kuruman River	500 m	1 000 m	2 000 m	Dry river feature north of Kuruman. Local scenic value.
		Nr5	Harts River	500 m	1 000 m	2 000 m	Includes Groot- and Klein Harts Rivers east of Delareyville. Local scenic value.
	Water Bodies / Dams / Wetlands	Nw1	Bosluis se Pan	500 m	1 000 m	2 000 m	Koa River Valley south of Aggeneys. Local scenic value.
		Nw2	Pans south of Upington	500 m	1 000 m	2 000 m	Dry river features and pans. Local scenic value.
		Nw3	Barbers Pan	500 m	1 000 m	2 000 m	Barbers Pan and associated pans NE of Delareyville. Local scenic value.
		Nw4	Disaneng / Modimola Dams	500 m	1 000 m	2 000 m	On Molopo River west of Mafikeng. Local scenic value.
		Nw5	Rietspruit Dam	500 m	1 000 m	2 000 m	South of Ventersdorp. Includes recreation resorts. Local scenic value.
	Ramsar Sites	Nz1	Barber's Pan Sanctuary	1 000 m	2 000 m	3 000 m	NE of Delareyville. Regional conservation and scenic value.
	Coastal zones	Nc1	Namaqualand Coast	1 000 m	2 000 m	3 000 m	Includes dune features, rock outcrops, old open cast diamond mines and shipwrecks. Regional scenic, archaeological and recreational value.
	National Parks	Np1	Namaqua National Park	2 000 m	3 000 m	4 000 m	National conservation and scenic value.
		Np2	Augrabies Falls National P.	2 000 m	3 000 m	4 000 m	National conservation and scenic value.
	Nature Reserves / Protected areas	Nn1	Goegap Nature Reserve	1 000 m	2 000 m	3 000 m	East of Springbok. Local conservation and scenic value.
		Nn2	Spitskop Nature reserve	1 000 m	2 000 m	3 000 m	NW of Upington. Local conservation and scenic value.
		Nn3	Witsand Nature Reserve	1 000 m	2 000 m	3 000 m	SW of Postmasburg. 'Roaring dunes' feature. Local conservation and scenic value.
		Nn4	Barbers Pan Nature Reserve	1 000 m	2 000 m	3 000 m	NE of Delareyville. Local conservation and scenic value.
		Nn5	Schoonspruit Nature R.	1 000 m	2 000 m	3 000 m	Ventersdorp. Local conservation and scenic value.
		Nn6	Magaliesburg Nature Area	1 000 m	2 000 m	3 000 m	SE of Rustenburg. Includes Mountain Sanctuary Park. Regional scenic value.
		Nn7	Billy Duvenhage Nature R.	1 000 m	2 000 m	3 000 m	NW of Kuruman. Local conservation and scenic value.
		Nn8	Leon Taljaard Nature R.	1 000 m	2 000 m	3 000 m	NW of Vryburg. Local conservation and scenic value.
		Nn9	Tierberg Nature Reserve	1 000 m	2 000 m	3 000 m	Within Keimoes town. Local conservation and scenic value.

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NORTHERN CORRIDOR

Corridor	Feature Class	GIS Visual ID	Feature Name / Type	V. high sensitivity buffer	High sensitivity buffer	Moderate sensitivity buffer	Attributes, significance, observations
	Private Nature Reserves	Ng1	Arabos Private Nature Reserve	-	1 000 m	2 000 m	SW of the Magaliesberg
		Ng2	Bettie Private Nature Reserve	-	1 000 m	2 000 m	S of the Molemane NR., East of Mahikeng (Mafikeng)
		Ng3	Flintbeck Private Nature Reserve	-	1 000 m	2 000 m	SW of the Magaliesberg
		Ng4	FM Safaris	-	1 000 m	2 000 m	East of Upington
		Ng5	Fred Coetzee Private Nature Reserve	-	1 000 m	2 000 m	NE of Ventersdorp
		Ng6	Klipstraat Private Nature Reserve	-	1 000 m	2 000 m	NW of Ventersdorp
		Ng7	Lichtenburg Game Breeding Centre	-	1 000 m	2 000 m	N of Lichtenburg. Conservation and scientific value.
		Ng8	Mafikeng Game Reserve	-	1 000 m	2 000 m	East of Mahikeng (Mafikeng) Local conservation and scenic value.
		Ng9	Makokskraal Private Nature Reserve	-	1 000 m	2 000 m	West of Ventersdorp
		Ng10	Molemane Eye Nature Reserve	-	1 000 m	2 000 m	E of Mafikeng on R505. Local conservation and scenic value.
		Ng11	Molopo Oog Private Nature Reserve	-	1 000 m	2 000 m	S of the Molemane NR., East of Mahikeng (Mafikeng)
		Ng12	Quarry Private Nature Reserve	-	1 000 m	2 000 m	NW of Koster
		Ng13	Rall Broers Private Nature Reserve	-	1 000 m	2 000 m	North of Lichtenburg
		Ng14	Somerville Private Nature Reserve	-	1 000 m	2 000 m	NE of Ventersdorp
		Ng15	Witkrans Private Nature Reserve	-	1 000 m	2 000 m	East of Upington.
		No1	Achab	-	-	1 000 m	
		No2	Aggeneys Game Camp	-	-	1 000 m	
		No3	Assegaai Hoek	-	-	1 000 m	
		No4	Aucampsrus	-	-	1 000 m	
		No5	Bakoven	-	-	1 000 m	
		No6	Bankdrift	-	-	1 000 m	
		No7	Bauwel	-	-	1 000 m	
		No8	Beaufort	-	-	1 000 m	
		No9	Beaulieu	-	-	1 000 m	
		No10	Berg En Dal	-	-	1 000 m	
		No11	Biesieput	-	-	1 000 m	
		No12	Billy Duvenage Game Camp	-	-	1 000 m	
		No13	Bolham Game Farm (Sisibala)	-	-	1 000 m	
		No14	Boplaas	-	-	1 000 m	
		No15	Boschfontein	-	-	1 000 m	
		No16	Brakkies	-	-	1 000 m	
		No17	Bredenkamp	-	-	1 000 m	
		No18	Broughton	-	-	1 000 m	
		No19	Broughton Game Camp 1 & 2	-	-	1 000 m	
		No20	Brulpan	-	-	1 000 m	
		No21	Buckreef	-	-	1 000 m	
		No22	Buffels	-	-	1 000 m	
		No23	Buffelsfontein	-	-	1 000 m	
		No24	Buffelshoek	-	-	1 000 m	
		No25	Bulkrans	-	-	1 000 m	

NORTHERN CORRIDOR

Corridor	Feature Class	GIS Visual ID	Feature Name / Type	V. high sensitivity buffer	High sensitivity buffer	Moderate sensitivity buffer	Attributes, significance, observations
		No26	Cadwallader Wildkamp	-	-	1 000 m	
		No27	Christiana	-	-	1 000 m	
		No28	Clober	-	-	1 000 m	
		No29	Commissiesdrift	-	-	1 000 m	
		No30	Dartmoor	-	-	1 000 m	
		No31	De Rust	-	-	1 000 m	
		No32	Demaneng	-	-	1 000 m	
		No33	Denmark	-	-	1 000 m	
		No34	Doorn Bult	-	-	1 000 m	
		No35	Doornkom	-	-	1 000 m	
		No36	Doornpan	-	-	1 000 m	
		No37	Dublin	-	-	1 000 m	
		No38	Duikerbult	-	-	1 000 m	
		No39	Dwaling	-	-	1 000 m	
		No40	Ebenhaezer	-	-	1 000 m	
		No41	Edinburgh	-	-	1 000 m	
		No42	Eileen's Home	-	-	1 000 m	
		No43	Elandsfontein	-	-	1 000 m	
		No44	Elandskraal	-	-	1 000 m	
		No45	Elgin	-	-	1 000 m	
		No46	Elibank	-	-	1 000 m	
		No47	Ferndale	-	-	1 000 m	
		No48	Fernleigh	-	-	1 000 m	
		No49	Flatlands	-	-	1 000 m	
		No50	Fm Safaris	-	-	1 000 m	
		No51	Fouross	-	-	1 000 m	
		No52	Freedom	-	-	1 000 m	
		No53	Gamagara	-	-	1 000 m	
		No54	Gannavlakte	-	-	1 000 m	
		No55	Geduld	-	-	1 000 m	
		No56	Genade	-	-	1 000 m	
		No57	Glen Lyon	-	-	1 000 m	
		No58	Glimlach	-	-	1 000 m	
		No59	Glynville	-	-	1 000 m	
		No60	Goodhope Wildkamp	-	-	1 000 m	
		No61	Graham	-	-	1 000 m	
		No62	Grasvlakte	-	-	1 000 m	
		No63	Gringley	-	-	1 000 m	
		No64	Groenkloof	-	-	1 000 m	
		No65	Grootfontein	-	-	1 000 m	

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NORTHERN CORRIDOR

Corridor	Feature Class	GIS Visual ID	Feature Name / Type	V. high sensitivity buffer	High sensitivity buffer	Moderate sensitivity buffer	Attributes, significance, observations
		No66	Guildford	-	-	1 000 m	
		No67	Happy Valley	-	-	1 000 m	
		No68	Hartebeestfontein	-	-	1 000 m	
		No69	Hartland Game Camp	-	-	1 000 m	
		No70	Hartley Wildkamp	-	-	1 000 m	
		No71	Helpmakaar	-	-	1 000 m	
		No72	Heuningkrantz	-	-	1 000 m	
		No73	Homeward	-	-	1 000 m	
		No74	Honingklip	-	-	1 000 m	
		No75	Hoop Vlei	-	-	1 000 m	
		No76	Hopkins	-	-	1 000 m	
		No77	Inkruip	-	-	1 000 m	
		No78	Jackals Dans	-	-	1 000 m	
		No79	Jenkins	-	-	1 000 m	
		No80	Josephs Dal	-	-	1 000 m	
		No81	Kakoup	-	-	1 000 m	
		No82	Kalkfontein	-	-	1 000 m	
		No83	Kalkpan	-	-	1 000 m	
		No84	Kalkwerfputz And Ezelfontein Zuid	-	-	1 000 m	
		No85	Kameel	-	-	1 000 m	
		No86	Kameel Bult	-	-	1 000 m	
		No87	Kameelfontein	-	-	1 000 m	
		No88	Kameelfontein	-	-	1 000 m	
		No89	Kannikwa, Gemsbokvlei, Nieuwefontein And Vaalpan	-	-	1 000 m	
		No90	Kappies	-	-	1 000 m	
		No91	Kareekloof	-	-	1 000 m	
		No92	Kerby	-	-	1 000 m	
		No93	Khamkirri	-	-	1 000 m	
		No94	Klein Goegap	-	-	1 000 m	
		No95	Klein Koegab	-	-	1 000 m	
		No96	Klein Quagga Blatt	-	-	1 000 m	
		No97	Kleinbegin	-	-	1 000 m	
		No98	Kleinbegin 418	-	-	1 000 m	
		No99	Klip Pan	-	-	1 000 m	
		No100	Klipgat	-	-	1 000 m	
		No101	Klipnes	-	-	1 000 m	
		No102	Koisabes	-	-	1 000 m	
		No103	Kookfontein	-	-	1 000 m	
		No104	Koperfontein	-	-	1 000 m	
		No105	Kouwater	-	-	1 000 m	

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NORTHERN CORRIDOR

Corridor	Feature Class	GIS Visual ID	Feature Name / Type	V. high sensitivity buffer	High sensitivity buffer	Moderate sensitivity buffer	Attributes, significance, observations
		No106	Krugersdam	-	-	1 000 m	
		No107	Langley Annex	-	-	1 000 m	
		No108	Lanham	-	-	1 000 m	
		No109	Laparisa	-	-	1 000 m	
		No110	Lapfontein	-	-	1 000 m	
		No111	Leeubosch	-	-	1 000 m	
		No112	Leeuw Bosch	-	-	1 000 m	
		No113	Leeuwpoort	-	-	1 000 m	
		No114	Lemoenfontein	-	-	1 000 m	
		No115	Lewis	-	-	1 000 m	
		No116	Lichtenburg Town & Townlands	-	-	1 000 m	
		No117	Likatlong	-	-	1 000 m	
		No118	Lime Ridge	-	-	1 000 m	
		No119	Lochnagar	-	-	1 000 m	
		No120	Lomoteng And Hilliard	-	-	1 000 m	
		No121	Lucadam	-	-	1 000 m	
		No122	Lucknow	-	-	1 000 m	
		No123	Lyndoch	-	-	1 000 m	
		No124	Lynn	-	-	1 000 m	
		No125	Mac Mac	-	-	1 000 m	
		No126	Mahemsvlakte	-	-	1 000 m	
		No127	Makokskraal	-	-	1 000 m	
		No128	Mallepoos Oog Or Nooitgedacht	-	-	1 000 m	
		No129	Mamaghodi	-	-	1 000 m	
		No130	Melton	-	-	1 000 m	
		No131	Mesklip	-	-	1 000 m	
		No132	Middel Kop	-	-	1 000 m	
		No133	Middelburg	-	-	1 000 m	
		No134	Middelpos Conservancy	-	-	1 000 m	
		No135	Miershoop Holte	-	-	1 000 m	
		No136	Mistake	-	-	1 000 m	
		No137	Molineux Nature Reserve	-	-	1 000 m	
		No138	Mooimeisjesfontein	-	-	1 000 m	
		No139	Mooiwater Wildkamp	-	-	1 000 m	
		No140	Morgenzon	-	-	1 000 m	
		No141	Mount Carmel	-	-	1 000 m	
		No142	Nabot	-	-	1 000 m	
		No143	Namakwa Game Lodge	-	-	1 000 m	
		No144	Namakwari	-	-	1 000 m	
		No145	Naries	-	-	1 000 m	

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NORTHERN CORRIDOR

Corridor	Feature Class	GIS Visual ID	Feature Name / Type	V. high sensitivity buffer	High sensitivity buffer	Moderate sensitivity buffer	Attributes, significance, observations
		No146	Newry	-	-	1 000 m	
		No147	Neylan (Obo J.Nel)	-	-	1 000 m	
		No148	Nick	-	-	1 000 m	
		No149	Nonen Ranch	-	-	1 000 m	
		No150	Nottingham	-	-	1 000 m	
		No151	Nuwedam	-	-	1 000 m	
		No152	Nyatsifontein	-	-	1 000 m	
		No153	Olievenfontein	-	-	1 000 m	
		No154	Olifants Hoek	-	-	1 000 m	
		No155	Omdraai	-	-	1 000 m	
		No156	Pad Rooi And Reingeluk	-	-	1 000 m	
		No157	Paling And Doornfontein	-	-	1 000 m	
		No158	Palmietfontein	-	-	1 000 m	
		No159	Pan	-	-	1 000 m	
		No160	Pauwbult	-	-	1 000 m	
		No161	Pering	-	-	1 000 m	
		No162	Perseel 1768	-	-	1 000 m	
		No163	Pioneer (Portion 3 Of O'poort 384)	-	-	1 000 m	
		No164	Pringleton	-	-	1 000 m	
		No165	Pudu Game Lodge	-	-	1 000 m	
		No166	Pypklip	-	-	1 000 m	
		No167	Ratelkraal	-	-	1 000 m	
		No168	Rebliek	-	-	1 000 m	
		No169	Rhenosterfontein	-	-	1 000 m	
		No170	Rhenosterhoek	-	-	1 000 m	
		No171	Richtersveld National Park B	-	-	1 000 m	
		No172	Rietfontein	-	-	1 000 m	
		No173	Riries	-	-	1 000 m	
		No174	Roodekranz	-	-	1 000 m	
		No175	Roodemanskloof	-	-	1 000 m	
		No176	Roodewal	-	-	1 000 m	
		No177	Rooibees	-	-	1 000 m	
		No178	Rooipoort	-	-	1 000 m	
		No179	Roscoe	-	-	1 000 m	
		No180	Rosmincol	-	-	1 000 m	
		No181	Rossville	-	-	1 000 m	
		No182	Rubyvale	-	-	1 000 m	
		No183	Salem	-	-	1 000 m	
		No184	Sandvlei	-	-	1 000 m	
		No185	Sanville	-	-	1 000 m	

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NORTHERN CORRIDOR

Corridor	Feature Class	GIS Visual ID	Feature Name / Type	V. high sensitivity buffer	High sensitivity buffer	Moderate sensitivity buffer	Attributes, significance, observations
		No186	Saunders	-	-	1 000 m	
		No187	Savoy	-	-	1 000 m	
		No188	Scholtzrus	-	-	1 000 m	
		No189	Schuitdrift	-	-	1 000 m	
		No190	Schuitdrift Oos	-	-	1 000 m	
		No191	Schuitdrift-Wes	-	-	1 000 m	
		No192	Schulpfontein	-	-	1 000 m	
		No193	Secretaris Vlakte	-	-	1 000 m	
		No194	Sherwood	-	-	1 000 m	
		No195	Sishen Privaat Natuurreservaat	-	-	1 000 m	
		No196	Smithers	-	-	1 000 m	
		No197	Sout Oup	-	-	1 000 m	
		No198	Soutwaterkloof	-	-	1 000 m	
		No199	Spence	-	-	1 000 m	
		No200	Spes Bona	-	-	1 000 m	
		No201	Spitskop	-	-	1 000 m	
		No202	Spitskop Nature Reserve	-	-	1 000 m	
		No203	Steenkampsput	-	-	1 000 m	
		No204	Stillerus	-	-	1 000 m	
		No205	Stonehenge	-	-	1 000 m	
		No206	Stukkendedam	-	-	1 000 m	
		No207	Sweetwater	-	-	1 000 m	
		No208	Syferfontein	-	-	1 000 m	
		No209	Taaiboschpan	-	-	1 000 m	
		No210	Tafelkop	-	-	1 000 m	
		No211	Tampan	-	-	1 000 m	
		No212	Therons Rust	-	-	1 000 m	
		No213	Tierkop	-	-	1 000 m	
		No214	Toto	-	-	1 000 m	
		No215	Trekdrift	-	-	1 000 m	
		No216	Tweedam	-	-	1 000 m	
		No217	Uitkoms	-	-	1 000 m	
		No218	Uitloer	-	-	1 000 m	
		No219	Vaalkop	-	-	1 000 m	
		No220	Vlakhoek	-	-	1 000 m	
		No221	Vlaknek	-	-	1 000 m	
		No222	Vogelstruisfontein	-	-	1 000 m	
		No223	Vogelstruispan	-	-	1 000 m	
		No224	Vroeggedeel	-	-	1 000 m	
		No225	Wagenpadspruit	-	-	1 000 m	

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NORTHERN CORRIDOR

Corridor	Feature Class	GIS Visual ID	Feature Name / Type	V. high sensitivity buffer	High sensitivity buffer	Moderate sensitivity buffer	Attributes, significance, observations
		No226	Warmbad	-	-	1 000 m	
		No227	Waterval	-	-	1 000 m	
		No228	Weltevreden	-	-	1 000 m	
		No229	Weston	-	-	1 000 m	
		No230	Wilde Als	-	-	1 000 m	
		No231	Wit Kudu	-	-	1 000 m	
		No232	Witberg	-	-	1 000 m	
		No233	Witberg (Keboes)	-	-	1 000 m	
		No234	Witklip	-	-	1 000 m	
		No235	Witkrans	-	-	1 000 m	
		No236	Wolhaarkop	-	-	1 000 m	
		No237	Woodstock	-	-	1 000 m	
		No238	Wydpoort	-	-	1 000 m	
		No239	Un-named Farm	-	-	1 000 m	
		No240	Un-named Farm	-	-	1 000 m	
		No241	Un-named Farm	-	-	1 000 m	
		No242	Un-named Farm	-	-	1 000 m	
		No243	Un-named Farm	-	-	1 000 m	
		No244	Un-named Farm	-	-	1 000 m	
		No245	Un-named Farm	-	-	1 000 m	
		No246	Un-named Farm	-	-	1 000 m	
		No247	Un-named Farm	-	-	1 000 m	
		No248	Un-named Farm	-	-	1 000 m	
		No249	Un-named Farm	-	-	1 000 m	
		No250	Un-named Farm	-	-	1 000 m	
		No251	Un-named Farm	-	-	1 000 m	
		No252	Un-named Farm	-	-	1 000 m	
		No253	Un-named Farm	-	-	1 000 m	
		No254	Un-named Farm	-	-	1 000 m	
		No255	Un-named Farm	-	-	1 000 m	
		No256	Un-named Farm	-	-	1 000 m	
		No257	Un-named Farm	-	-	1 000 m	
		No258	Un-named Farm	-	-	1 000 m	
		No259	Un-named Farm	-	-	1 000 m	
		No260	Un-named Farm	-	-	1 000 m	
		No261	Un-named Farm	-	-	1 000 m	
		No262	Un-named Farm	-	-	1 000 m	
		No263	Un-named Farm	-	-	1 000 m	
		No264	Un-named Farm	-	-	1 000 m	
		No265	Un-named Farm	-	-	1 000 m	

NORTHERN CORRIDOR

Corridor	Feature Class	GIS Visual ID	Feature Name / Type	V. high sensitivity buffer	High sensitivity buffer	Moderate sensitivity buffer	Attributes, significance, observations
		No266	Un-named Farm	-	-	1 000 m	
		No267	Un-named Farm	-	-	1 000 m	
		No268	Un-named Farm	-	-	1 000 m	
		No269	Un-named Farm	-	-	1 000 m	
		No270	Un-named Farm	-	-	1 000 m	
		No271	Un-named Farm	-	-	1 000 m	
		No272	Un-named Farm	-	-	1 000 m	
		No273	Un-named Farm	-	-	1 000 m	
		No274	Un-named Farm	-	-	1 000 m	
		No275	Un-named Farm	-	-	1 000 m	
		No276	Un-named Farm	-	-	1 000 m	
		No277	Un-named Farm	-	-	1 000 m	
		No278	Un-named Farm	-	-	1 000 m	
		No279	Un-named Farm	-	-	1 000 m	
		No280	Un-named Farm	-	-	1 000 m	
		No281	Un-named Farm	-	-	1 000 m	
		No282	Un-named Farm	-	-	1 000 m	
		No283	Un-named Farm	-	-	1 000 m	
		No284	Un-named Farm	-	-	1 000 m	
		No285	Un-named Farm	-	-	1 000 m	
		No286	Un-named Farm	-	-	1 000 m	
		No287	Un-named Farm	-	-	1 000 m	
		No288	Un-named Farm	-	-	1 000 m	
		No289	Un-named Farm	-	-	1 000 m	
		No290	Un-named Farm	-	-	1 000 m	
		No291	Un-named Farm	-	-	1 000 m	
		No292	Un-named Farm	-	-	1 000 m	
		No293	Un-named Farm	-	-	1 000 m	
		No294	Un-named Farm	-	-	1 000 m	
		No295	Un-named Farm	-	-	1 000 m	
		No296	Un-named Farm	-	-	1 000 m	
		No297	Un-named Farm	-	-	1 000 m	
		No298	Un-named Farm	-	-	1 000 m	
		No299	Un-named Farm	-	-	1 000 m	
		No300	Un-named Farm	-	-	1 000 m	
		No301	Un-named Farm	-	-	1 000 m	
		No302	Un-named Farm	-	-	1 000 m	
		No303	Un-named Farm	-	-	1 000 m	
		No304	Un-named Farm	-	-	1 000 m	
		No305	Un-named Farm	-	-	1 000 m	

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NORTHERN CORRIDOR

Corridor	Feature Class	GIS Visual ID	Feature Name / Type	V. high sensitivity buffer	High sensitivity buffer	Moderate sensitivity buffer	Attributes, significance, observations
		No306	Un-named Farm	-	-	1 000 m	
		No307	Un-named Farm	-	-	1 000 m	
		No308	Un-named Farm	-	-	1 000 m	
		No309	Un-named Farm	-	-	1 000 m	
		No310	Un-named Farm	-	-	1 000 m	
		No311	Un-named Farm	-	-	1 000 m	
		No312	Un-named Farm	-	-	1 000 m	
		No313	Un-named Farm	-	-	1 000 m	
		No314	Un-named Farm	-	-	1 000 m	
		No315	Un-named Farm	-	-	1 000 m	
		No316	Un-named Farm	-	-	1 000 m	
		No317	Un-named Farm	-	-	1 000 m	
		No318	Un-named Farm	-	-	1 000 m	
		No319	Un-named Farm	-	-	1 000 m	
		No320	Un-named Farm	-	-	1 000 m	
		No321	Un-named Farm	-	-	1 000 m	
		No322	Un-named Farm	-	-	1 000 m	
		No323	Un-named Farm	-	-	1 000 m	
		No324	Un-named Farm	-	-	1 000 m	
		No325	Un-named Farm	-	-	1 000 m	
		No326	Un-named Farm	-	-	1 000 m	
		No327	Un-named Farm	-	-	1 000 m	
		No328	Un-named Farm	-	-	1 000 m	
		No329	Un-named Farm	-	-	1 000 m	
		No330	Un-named Farm	-	-	1 000 m	
		No331	Un-named Farm	-	-	1 000 m	
		No332	Un-named Farm	-	-	1 000 m	
		No333	Un-named Farm	-	-	1 000 m	
		No334	Un-named Farm	-	-	1 000 m	
		No335	Un-named Farm	-	-	1 000 m	
		No336	Un-named Farm	-	-	1 000 m	
		No337	Un-named Farm	-	-	1 000 m	
		No338	Un-named Farm	-	-	1 000 m	
		No339	Un-named Farm	-	-	1 000 m	
		No340	Un-named Farm	-	-	1 000 m	
		No341	Un-named Farm	-	-	1 000 m	
		No342	Un-named Farm	-	-	1 000 m	
		No343	Un-named Farm	-	-	1 000 m	
		No344	Un-named Farm	-	-	1 000 m	
		No345	Un-named Farm	-	-	1 000 m	

NORTHERN CORRIDOR

Corridor	Feature Class	GIS Visual ID	Feature Name / Type	V. high sensitivity buffer	High sensitivity buffer	Moderate sensitivity buffer	Attributes, significance, observations
		No346	Un-named Farm	-	-	1 000 m	
		No347	Un-named Farm	-	-	1 000 m	
		No348	Un-named Farm	-	-	1 000 m	
		No349	Un-named Farm	-	-	1 000 m	
		No350	Un-named Farm	-	-	1 000 m	
		No351	Un-named Farm	-	-	1 000 m	
		No352	Un-named Farm	-	-	1 000 m	
		No353	Un-named Farm	-	-	1 000 m	
		No354	Un-named Farm	-	-	1 000 m	
		No355	Un-named Farm	-	-	1 000 m	
		No356	Un-named Farm	-	-	1 000 m	
		No357	Un-named Farm	-	-	1 000 m	
		No358	Un-named Farm	-	-	1 000 m	
		No359	Un-named Farm	-	-	1 000 m	
		No360	Un-named Farm	-	-	1 000 m	
		No361	Un-named Farm	-	-	1 000 m	
		No362	Un-named Farm	-	-	1 000 m	
		No363	Un-named Farm	-	-	1 000 m	
		No364	Un-named Farm	-	-	1 000 m	
		No365	Un-named Farm	-	-	1 000 m	
		No366	Un-named Farm	-	-	1 000 m	
		No367	Un-named Farm	-	-	1 000 m	
		No368	Un-named Farm	-	-	1 000 m	
		No369	Un-named Farm	-	-	1 000 m	
		No370	Un-named Farm	-	-	1 000 m	
		No371	Un-named Farm	-	-	1 000 m	
		No372	Un-named Farm	-	-	1 000 m	
		No373	Un-named Farm	-	-	1 000 m	
		No374	Un-named Farm	-	-	1 000 m	
		No375	Un-named Farm	-	-	1 000 m	
		No376	Un-named Farm	-	-	1 000 m	
		No377	Un-named Farm	-	-	1 000 m	
		No378	Un-named Farm	-	-	1 000 m	
		No379	Un-named Farm	-	-	1 000 m	
		No380	Un-named Farm	-	-	1 000 m	
		No381	Un-named Farm	-	-	1 000 m	
		No382	Un-named Farm	-	-	1 000 m	
		No383	Un-named Farm	-	-	1 000 m	
		No384	Un-named Farm	-	-	1 000 m	
		No385	Un-named Farm	-	-	1 000 m	

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NORTHERN CORRIDOR

Corridor	Feature Class	GIS Visual ID	Feature Name / Type	V. high sensitivity buffer	High sensitivity buffer	Moderate sensitivity buffer	Attributes, significance, observations
		No386	Un-named Farm	-	-	1 000 m	
		No387	Un-named Farm	-	-	1 000 m	
		No388	Un-named Farm	-	-	1 000 m	
		No389	Un-named Farm	-	-	1 000 m	
		No390	Un-named Farm	-	-	1 000 m	
		No391	Un-named Farm	-	-	1 000 m	
		No392	Un-named Farm	-	-	1 000 m	
		No393	Un-named Farm	-	-	1 000 m	
		No394	Un-named Farm	-	-	1 000 m	
		No395	Un-named Farm	-	-	1 000 m	
		No396	Un-named Farm	-	-	1 000 m	
		No397	Un-named Farm	-	-	1 000 m	
		No398	Un-named Farm	-	-	1 000 m	
		No399	Un-named Farm	-	-	1 000 m	
		No400	Un-named Farm	-	-	1 000 m	
		No401	Un-named Farm	-	-	1 000 m	
		No402	Un-named Farm	-	-	1 000 m	
		No403	Un-named Farm	-	-	1 000 m	
		No404	Un-named Farm	-	-	1 000 m	
		No405	Un-named Farm	-	-	1 000 m	
		No406	Un-named Farm	-	-	1 000 m	
		No407	Un-named Farm	-	-	1 000 m	
		No408	Un-named Farm	-	-	1 000 m	
		No409	Un-named Farm	-	-	1 000 m	
		No410	Un-named Farm	-	-	1 000 m	
		No411	Un-named Farm	-	-	1 000 m	
		No412	Un-named Farm	-	-	1 000 m	
		No413	Un-named Farm	-	-	1 000 m	
		No414	Un-named Farm	-	-	1 000 m	
		No415	Un-named Farm	-	-	1 000 m	
		No416	Un-named Farm	-	-	1 000 m	
		No417	Un-named Farm	-	-	1 000 m	
		No418	Un-named Farm	-	-	1 000 m	
		No419	Un-named Farm	-	-	1 000 m	
		No420	Un-named Farm	-	-	1 000 m	
		No421	Un-named Farm	-	-	1 000 m	
		No422	Un-named Farm	-	-	1 000 m	
		No423	Un-named Farm	-	-	1 000 m	
		No424	Un-named Farm	-	-	1 000 m	
		No425	Un-named Farm	-	-	1 000 m	

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NORTHERN CORRIDOR

Corridor	Feature Class	GIS Visual ID	Feature Name / Type	V. high sensitivity buffer	High sensitivity buffer	Moderate sensitivity buffer	Attributes, significance, observations
		No426	Un-named Farm	-	-	1 000 m	
		No427	Un-named Farm	-	-	1 000 m	
		No428	Un-named Farm	-	-	1 000 m	
		No429	Un-named Farm	-	-	1 000 m	
		No430	Un-named Farm	-	-	1 000 m	
		No431	Un-named Farm	-	-	1 000 m	
		No432	Un-named Farm	-	-	1 000 m	
		No433	Un-named Farm	-	-	1 000 m	
		No434	Un-named Farm	-	-	1 000 m	
		No435	Un-named Farm	-	-	1 000 m	
		No436	Un-named Farm	-	-	1 000 m	
		No437	Un-named Farm	-	-	1 000 m	
		No438	Un-named Farm	-	-	1 000 m	
		No439	Un-named Farm	-	-	1 000 m	
		No440	Un-named Farm	-	-	1 000 m	
		No441	Un-named Farm	-	-	1 000 m	
		No442	Un-named Farm	-	-	1 000 m	
		No443	Un-named Farm	-	-	1 000 m	
		No444	Un-named Farm	-	-	1 000 m	
		No445	Un-named Farm	-	-	1 000 m	
		No446	Un-named Farm	-	-	1 000 m	
		No447	Un-named Farm	-	-	1 000 m	
		No448	Un-named Farm	-	-	1 000 m	
		No449	Un-named Farm	-	-	1 000 m	
		No450	Un-named Farm	-	-	1 000 m	
		No451	Un-named Farm	-	-	1 000 m	
		No452	Un-named Farm	-	-	1 000 m	
		No453	Un-named Farm	-	-	1 000 m	
		No454	Un-named Farm	-	-	1 000 m	
		No455	Un-named Farm	-	-	1 000 m	
		No456	Un-named Farm	-	-	1 000 m	
		No457	Un-named Farm	-	-	1 000 m	
		No458	Un-named Farm	-	-	1 000 m	
		No459	Un-named Farm	-	-	1 000 m	
		No460	Un-named Farm	-	-	1 000 m	
		No461	Un-named Farm	-	-	1 000 m	
		No462	Un-named Farm	-	-	1 000 m	
		No463	Un-named Farm	-	-	1 000 m	
		No464	Un-named Farm	-	-	1 000 m	
		No465	Un-named Farm	-	-	1 000 m	

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NORTHERN CORRIDOR

Corridor	Feature Class	GIS Visual ID	Feature Name / Type	V. high sensitivity buffer	High sensitivity buffer	Moderate sensitivity buffer	Attributes, significance, observations
		No466	Un-named Farm	-	-	1 000 m	
		No467	Un-named Farm	-	-	1 000 m	
		No468	Un-named Farm	-	-	1 000 m	
		No469	Un-named Farm	-	-	1 000 m	
		No470	Un-named Farm	-	-	1 000 m	
		No471	Un-named Farm	-	-	1 000 m	
		No472	Un-named Farm	-	-	1 000 m	
		No473	Un-named Farm	-	-	1 000 m	
		No474	Un-named Farm	-	-	1 000 m	
		No475	Un-named Farm	-	-	1 000 m	
		No476	Un-named Farm	-	-	1 000 m	
		No477	Un-named Farm	-	-	1 000 m	
		No478	Un-named Farm	-	-	1 000 m	
		No479	Un-named Farm	-	-	1 000 m	
		No480	Un-named Farm	-	-	1 000 m	
		No481	Un-named Farm	-	-	1 000 m	
		No482	Un-named Farm	-	-	1 000 m	
		No483	Un-named Farm	-	-	1 000 m	
	Cultural Landscapes	Nl1	Gariep River Valley	-	500 m	1 000 m	Irrigated farmland along the Gariep (Orange) River including Augrabies, Kakamas, Keimoes, Upington, Gariep and Volgraaffsig. Regional cultural and scenic value.
	Heritage and Archaeological Sites	Nh	See heritage study	-	500 m	1 000 m	
	Historical Towns and Villages	Nt1	Aggeneys	500 m	1 000 m	2 000 m	Mining village.
		Nt2	Bankhara-Bodulong	500 m	1 000 m	2 000 m	(see Kuruman).
		Nt3	Biesiesvlei	500 m	1 000 m	2 000 m	(see Lichtenburg).
		Nt4	Bulletrap	500 m	1 000 m	2 000 m	(see Springbok).
		Nt5	Carolusberg	500 m	1 000 m	2 000 m	Historical copper mining town 10km NE of Springbok.
		Nt6	Coligny	500 m	1 000 m	2 000 m	Construction of railway 1911. Town proclaimed 1923. Agricultural centre.
		Nt7	Concordia	500 m	1 000 m	2 000 m	Historical copper mining town. Mission church dates from 1876.
		Nt8	Danielskuil	500 m	1 000 m	2 000 m	Mining village incl. lime, marble and diamonds.
		Nt9	Deben	500 m	1 000 m	2 000 m	(see Kathu).
		Nt10	Delareyville	500 m	1 000 m	2 000 m	Founded in 1914. Salt pan area. Agricultural centre.
		Nt11	Derby	500 m	1 000 m	2 000 m	Settlement near Koster. Scene of Anglo-Boer War battle.
		Nt12	Kakamas	500 m	1 000 m	2 000 m	Irrigated farming settlement since 1898 on Gariep River. Township established 1931.
		Nt13	Kathu	500 m	1 000 m	2 000 m	Township NE of Dingleton (Sishen). Camelthorn forest and nature reserve. Large archaeological site.
		Nt14	Keimoes	500 m	1 000 m	2 000 m	DR mission church 1889. Agricultural village with irrigated farmland on Gariep River.
		Nt15	Kleinzee	500 m	1 000 m	2 000 m	Coastal town in the alluvial diamond area.
		Nt16	Komaggas	500 m	1 000 m	2 000 m	Started as a mission station in 1829, 30km west of Springbok. Supplied by a strong spring.
		Nt17	Koster	500 m	1 000 m	2 000 m	Village proclaimed in 1913. Railway siding. Mixed farming. Several large caves in nearby hills.
		Nt18	Kuruman	500 m	1 000 m	2 000 m	Mission settlement 1824. Laid out in 1887. Prolific spring supplies water. Agricultural, commercial and mining centre.
		Nt19	Lichtenburg	500 m	1 000 m	2 000 m	Established 1873. Diamond rush in 1926. Agricultural centre.

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NORTHERN CORRIDOR

Corridor	Feature Class	GIS Visual ID	Feature Name / Type	V. high sensitivity buffer	High sensitivity buffer	Moderate sensitivity buffer	Attributes, significance, observations
		Nt20	Mafikeng	500 m	1 000 m	2 000 m	Laid out in late 19th Century. Anglo-Boer War siege of 1899. Served as British administrative seat for Bechuanaland Protectorate until 1965.
		Nt21	Mmabatho	500 m	1 000 m	2 000 m	North West provincial capital right next to Mafikeng. Buildings date from 1970s.
		Nt22	Mooinooi	500 m	1 000 m	2 000 m	Platinum and Palladium mining town in the North-West
		Nt23	Mothibistad	500 m	1 000 m	2 000 m	Township outside Kuruman.
		Nt24	Nababeep	500 m	1 000 m	2 000 m	Copper mining since 1860s. Mining museum.
		Nt25	O'Kiep	500 m	1 000 m	2 000 m	Copper mining since 1860s. Rail line to Port Nolloth started 1876. Anglo-Boer War siege 1902.
		Nt26	Olifantshoek	500 m	1 000 m	2 000 m	Originally a police post 1897. Village founded in 1912. Iron ore mining and cattle country.
		Nt27	Pella	500 m	1 000 m	2 000 m	Mission station founded in 1814. Became a Roman Catholic mission in 1874. Dates, grapes an vegetables cultivated.
		Nt28	Pofadder	500 m	1 000 m	2 000 m	Originally a mission station 1875. The perrenial spring attracted settlers from c. 1889. Township proclaimed in 1936. Sheep farming district.
		Nt29	Port Nolloth	500 m	1 000 m	2 000 m	Established in 1855 as an export port for the copper towns. Alluvial diamonds discovered along the coast in 1926.
		Nt30	Postmasburg	500 m	1 000 m	2 000 m	Originally a mission station. Village proclaimed in 1892. Diamonds and Manganese mined in the area. Stock farming.
		Nt31	Reivilo	500 m	1 000 m	2 000 m	DRC parish village established 1883. Cattle and dairy farming.
		Nt32	Sannieshof	500 m	1 000 m	2 000 m	Post office opened in 1920 and first stands of the then Roosville village sold in 1928. Maize farming.
		Nt33	Springbok	500 m	1 000 m	2 000 m	Historical mining since 1852. Town laid out in 1862. Anglo-Boer War siege 1902. Main town of Namaqualand.
		Nt34	Steinkopf	500 m	1 000 m	2 000 m	Mission settlement founded 1818. Known for the traditional mat huts.
		Nt35	Stella	500 m	1 000 m	2 000 m	Small trading settlement laid out in the form of a star.
		Nt36	Upington	500 m	1 000 m	2 000 m	First settled in the mid 1800s and named Upington in 1884. Administrative and agricultural centre on Gariep River.
		Nt37	Ventersdorp	500 m	1 000 m	2 000 m	DRC parish established 1866 and a village 1887. Boer War graves. Cattle, sheep and maize farming.
		Nt38	Vryburg	500 m	1 000 m	2 000 m	The capital of Stellaland, proclaimed an independent republic in 1883. The church dates to 1904. Boer War graves. Area known for beef cattle farming.
	National Roads	Na1	N7 Route	500 m	1 000 m	2 000 m	National Road to Namibia. Scenic and historical value.
		Na2	N14 Route	500 m	1 000 m	2 000 m	National Road between Springbok, Upington and Johannesburg. Scenic value along Gariep River between Kakamas and Upington.
		Na3	N10 Route	500 m	1 000 m	2 000 m	National Road between de Aar and Upington.
		Na4	N18 Route	500 m	1 000 m	2 000 m	National Road between Vryburg and Mafikeng.
	Arterial / Provincial Roads	Nb1	R27 Route	250 m	500 m	1 000 m	Between Kenhardt and Keimoes. Scenic bridge over Gariep River.
		Nb2	R31 Route	250 m	500 m	1 000 m	Regional connection route between Danielskuil, Kuruman, Hotazel
	Scenic Routes / Passes / Poorts	Ns1	N7 Burke's Pass	1 000 m	2 000 m	3 000 m	N7 south of Springbok. Local scenic value.
		Ns2	R382 Aninous Pass	1 000 m	2 000 m	3 000 m	Pass and road W of Steinkopf. Local scenic value.
		Ns3	R355 Spektakel Pass	1 000 m	2 000 m	3 000 m	Pass W of Springbok in Buffels River gorge. Local scenic value.
		Ns4	Wildeperdhoek Pass/ Messelpad Pass	1 000 m	2 000 m	3 000 m	District road between N7 and Namaqua National Park. Local scenic value.
		Ns5	Bergenaarspad Pass	1 000 m	2 000 m	3 000 m	SW of Postmasburg. Small pass through the Langberg. Local scenic value.
	Passenger Rail Lines	Nv1	Old railway line	250 m	500 m	1 000 m	Historical abandoned rail line between Nababeep / Okiep and Port Nolloth.

INTERNATIONAL CORRIDOR

Corridor	Feature Class	GIS Visual ID	Feature Name / Type		High sensitivity buffer	Moderate sensitivity buffer	Attributes, significance, observations
International	Landforms / Geological Features / Steep Slopes	Im1	Ditlhabane mt.	-	500 m	1 000 m	Hills north of Tweefontein. Local scenic value.
		Im2	Renosterkop	-	500 m	1 000 m	Outcrop feature north of Bronhorstspruit on R25. Local scenic value.
		Im3	Loskop Dam area mts.	-	500 m	1 000 m	Olifants River gorge and mountains. Includes Loskop Dam Nature R. Regional scenic value.
		Im4	Mineral Range	-	500 m	1 000 m	Mountains NE of Loskop Dam. Local scenic value.
		Im5	Bothaberg	-	500 m	1 000 m	Mountains east of Loskop Dam. Local scenic value.
		Im6	Dullstroom area mts.	-	500 m	1 000 m	Mountains west of Dullstroom. Numerous resorts. Local scenic and tourism value.
		Im7	Thaba ya Sekhukhune	-	500 m	1 000 m	Mountains and scarp west of Steelpoort River Valley. Local scenic value.
		Im8	Dwarsrivier area mts.	-	500 m	1 000 m	Mountains and scarp east of Steelpoort River Valley. Local scenic and tourism value.
		Im9	Leolo mts.	-	500 m	1 000 m	Mountain range south of R37. Local scenic value.
		Im10	Strydpoort Mts.	-	500 m	1 000 m	Prominent mountain range south of Polokwane. Incl. Bewaarkloof NR. Regional scenic value.
		Im11	Highlands Mts.	-	500 m	1 000 m	Mountains east of Mokopane. Local scenic value.
		Im12	Mokopane area mts.	-	500 m	1 000 m	Mountains west of Mokopane. Local scenic value.
		Im13	Mogoshi	-	500 m	1 000 m	Outcrop feature east of N11. Local scenic value.
		Im14	Sandrivierpoort	-	500 m	1 000 m	Outcrop feature north of Polokwane on N1. Local scenic value.
		Im15	Woodbush Forest Reserve mts.	-	500 m	1 000 m	Mountains between Polokwane and Tzaneen. Includes Ebenezer Dam. Local resort, recreation and scenic value.
		Im16	Elim area hills	-	500 m	1 000 m	Ridges and valleys south of Elim. Local scenic value.
		Im17	Soutpansberg	-	500 m	1 000 m	Prominent mountain range north of Louis Trichardt. Includes mountain pass, Wyllie's Poort and several mountain resorts. Regional scenic va
		Im18	Blouberg	-	500 m	1 000 m	Part of Blouberg range. Includes Blouberg nature reserve. Regional scenic value.
		Im19	Donwa	-	500 m	1 000 m	Part of Soutpansberg range. Local scenic value.
		Im20	Mulenga	-	500 m	1 000 m	Northern edge of Soutpansberg. Local scenic value.
	Major and Perennial Rivers	Ir1	Olifants River	500 m	1 000 m	2 000 m	Prominent river of the region. Flows from Emalahleni to the Kruger National Park. Regional scenic, cultural and recreational value.
		Ir2	Bronkhorstspruit/ Wilgerivier	500 m	1 000 m	2 000 m	Tributaries of the Olifants River east of Bronkhorspruit. Local scenic value.
		Ir3	Elands River	500 m	1 000 m	2 000 m	Rises east of Pretoria joining the Olifants north of Marble Hall. Local scenic value.
		Ir4	Steelpoort River	500 m	1 000 m	2 000 m	Rises west of Belfast joining the Olifants in the Drakensberg to the east. Local scenic value.
		Ir5	Sand River	500 m	1 000 m	2 000 m	A long river rising SW of Polokwane, cutting a gorge through the Soutpansberg and joining the Limpopo in the north. Local scenic value.
		Ir6	Limpopo River	500 m	1 000 m	2 000 m	A major river in the region at the northern boundary. Includes Mapungubwe NP. Regional scenic value.
	Water Bodies / Dams / Wetlands	Iw1	Witbank Dam	500 m	1 000 m	2 000 m	SE of Emalahleni. Local scenic and resort value.
		Iw2	Loskop Dam	500 m	1 000 m	2 000 m	N of Middelburg. Part of nature reserve. Local scenic and recreation value.
		Iw3	Flag Boshielo Dam	500 m	1 000 m	2 000 m	NE of Marble Hall. Local Scenic and resort value.
		Iw4	Piet Gouws Dam	500 m	1 000 m	2 000 m	On R579 Route, at GaMasemola.
		Iw5	Ebenezer Dam	500 m	1 000 m	2 000 m	E of Haenertsburg on R71 Route, in Woodbush Forest Reserve.
		Iw6	Lorna Dawn Dam	500 m	1 000 m	2 000 m	E of Morebeng (Soekmekaar).
		Iw7	Albasini Dam	500 m	1 000 m	2 000 m	E of Louis Trichardt.
		Iw8	Nzhelele Dam	500 m	1 000 m	2 000 m	N of Soutpansberg.
		Iw9	Bronkhorstspruit Dam	500 m	1 000 m	2 000 m	S of Bronkhorstspruit. Part of nature reserve. Local scenic and recreation value.
	Ramsar Sites	Iz1	Blesbokspruit Wetland R.	1 000 m	2 000 m	3 000 m	Includes Marieval Bird Sanctuary Provincial Nature Reserve NE of Nigel.
		Iz2	Verlorenvallei Nature R.	1 000 m	2 000 m	3 000 m	N of Dullstroom.
	National Parks	Ip1	Mapungubwe National Park	2 000 m	3 000 m	4 000 m	On R572 Route, bordering on Limpopo River. National heritage and scenic value.
	Nature Reserves / Protected areas /Biosphere Reserves	In1	Bronkhorstspruit Dam NR	1 000 m	2 000 m	4 000 m	S of Bronkhorstspruit. Includes Bronkhorstspruit Dam.
		In2	Loskop Dam Nature R.	1 000 m	2 000 m	4 000 m	N of Middelburg. Includes Loskop Dam.
		In3	Percy Fife Nature Reserve	1 000 m	2 000 m	4 000 m	NE of Mokopane.
		In4	Kuschke Nature Reserve	1 000 m	2 000 m	4 000 m	South of Polokwane.
		In5	Polokwane Game Reserve	1 000 m	2 000 m	4 000 m	South of Polokwane.
		In6	Bewaarkloof Nature Reserve	1 000 m	2 000 m	4 000 m	Part of the Strydpoortberge.
		In7	Ben Lavin Nature Reserve	1 000 m	2 000 m	4 000 m	South of Louis Trichardt.
		In8	Blouberg Nature Reserve	1 000 m	2 000 m	4 000 m	Part of Blouberg Mt.
		In9	Langjan Nature Reserve	1 000 m	2 000 m	4 000 m	North of Carlow on R572 Route.
		In10	Honnet Game Reserve	1 000 m	2 000 m	4 000 m	At Tshipise on R525 Route
		In11	Musina Nature Reserve	1 000 m	2 000 m	4 000 m	At Musina on N1 Route.
		In12	N'Jelele Nature Reserve	1 000 m	2 000 m	4 000 m	

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INTERNATIONAL CORRIDOR

Corridor	Feature Class	GIS Visual ID	Feature Name / Type		High sensitivity buffer	Moderate sensitivity buffer	Attributes, significance, observations
		In13	Verloren Vallei Nature R.	1 000 m	2 000 m	4 000 m	
		In14	Witvinger Nature Reserve	1 000 m	2 000 m	4 000 m	N of Mokopane.
		In15	Kwaggavoetpad Nature R.	1 000 m	2 000 m	4 000 m	
		In16	Schuinsdraai Nature R.	1 000 m	2 000 m	4 000 m	
		In17	Mabusa Nature R.	1 000 m	2 000 m	4 000 m	
		In18	Moutse Nature Reserve	1 000 m	2 000 m	4 000 m	
		In19	S.S. Skosana Nature R.	1 000 m	2 000 m	4 000 m	
		In20	Mantrombi Nature Reserve	1 000 m	2 000 m	4 000 m	
		In21	Marble Hall Fisheries	1 000 m	2 000 m	4 000 m	
		In22	Marievale Bird Sanctuary	1 000 m	2 000 m	4 000 m	
		In23	Moletzie Bird Sanctuary	1 000 m	2 000 m	4 000 m	
		In24	Potlake Nature Reserve	1 000 m	2 000 m	4 000 m	
		In25	Grootbosch F. Nature R.	1 000 m	2 000 m	4 000 m	
		In26	Skelmwater F. Nature R.	1 000 m	2 000 m	4 000 m	
	Mountain Catchments / Biosphere buffers	Io1	Kruger to Canyons Bio R.	-	-	1 000 m	Regional conservation and scenic value.
		Io2	Vhembe Biosphere Reserve	-	-	1 000 m	Regional conservation and scenic value.
	Private Reserves / Game Farms	Ig1	Amsterdam Private Nature Reserve	-	1 000 m	2 000 m	
		Ig2	Annasdal Private Nature Reserve	-	1 000 m	2 000 m	
		Ig3	Avarel Private Nature Reserve	-	1 000 m	2 000 m	
		Ig4	Balaai Private Nature Reserve	-	1 000 m	2 000 m	
		Ig5	Basveld Private Nature Reserve	-	1 000 m	2 000 m	
		Ig6	Bellevue Private Nature Reserve	-	1 000 m	2 000 m	
		Ig7	Berg-en-Dal Private Nature Reserve	-	1 000 m	2 000 m	
		Ig8	Berghoek Private Nature Reserve	-	1 000 m	2 000 m	
		Ig9	Bergsig Private Nature Reserve	-	1 000 m	2 000 m	
		Ig10	Blesbokfontein Private Nature Reserve	-	1 000 m	2 000 m	
		Ig11	Blijdschap Private Nature Reserve	-	1 000 m	2 000 m	
		Ig12	Blouberg Private Nature Reserve	-	1 000 m	2 000 m	
		Ig13	Botshabelo Private Nature Reserve	-	1 000 m	2 000 m	
		Ig14	Brakrivier Private Nature Reserve	-	1 000 m	2 000 m	
		Ig15	Buks Private Nature Reserve	-	1 000 m	2 000 m	
		Ig16	Burnside Private Nature Reserve	-	1 000 m	2 000 m	
		Ig17	Capricorn Private Nature Reserve	-	1 000 m	2 000 m	
		Ig18	Chapudi Private Nature Reserve	-	1 000 m	2 000 m	
		Ig19	Christiaans Private Nature Reserve	-	1 000 m	2 000 m	
		Ig20	Cooksley Private Nature Reserve	-	1 000 m	2 000 m	
		Ig21	D. J. Dercksen Private Nature Reserve	-	1 000 m	2 000 m	
		Ig22	Davel Private Nature Reserve	-	1 000 m	2 000 m	
		Ig23	De Hoop Private Nature Reserve	-	1 000 m	2 000 m	
		Ig24	Diana Ranch Private Nature Reserve	-	1 000 m	2 000 m	
		Ig25	Dianne Private Nature Reserve	-	1 000 m	2 000 m	
		Ig26	Doelen Private Nature Reserve	-	1 000 m	2 000 m	
		Ig27	Dongola Belvedere Private Nature Reserve	-	1 000 m	2 000 m	
		Ig28	Doornfontein Private Reserve	-	1 000 m	2 000 m	
		Ig29	Ermelo Private Nature Reserve	-	1 000 m	2 000 m	
		Ig30	Fontainebleau Private Nature Reserve	-	1 000 m	2 000 m	
		Ig31	Glenesk Private Nature Reserve	-	1 000 m	2 000 m	
		Ig32	Gogga Private Nature Reserve	-	1 000 m	2 000 m	
		Ig33	Grootrietvley Private Nature Reserve	-	1 000 m	2 000 m	
		Ig34	H. L. Crause Private Nature Reserve	-	1 000 m	2 000 m	

INTERNATIONAL CORRIDOR

Corridor	Feature Class	GIS Visual ID	Feature Name / Type		High sensitivity buffer	Moderate sensitivity buffer	Attributes, significance, observations
		Ig35	Hanglip Private Nature Reserve	-	1 000 m	2 000 m	
		Ig36	Hertzog Private Nature Reserve	-	1 000 m	2 000 m	
		Ig37	Heyns Private Nature Reserve	-	1 000 m	2 000 m	
		Ig38	Houtenbek Private Nature Reserve	-	1 000 m	2 000 m	
		Ig39	J. W. van Niekerk Private Nature Reserve	-	1 000 m	2 000 m	
		Ig40	Johanna F. Uys Private Nature Reserve	-	1 000 m	2 000 m	
		Ig41	John Cairns Private Nature Reserve	-	1 000 m	2 000 m	
		Ig42	Kilian Private Nature Reserve No. 2	-	1 000 m	2 000 m	
		Ig43	Kliprivier Private Nature Reserve	-	1 000 m	2 000 m	
		Ig44	Kruger Dam Nature Reserve	-	1 000 m	2 000 m	
		Ig45	L. J. Steyn Private Nature Reserve	-	1 000 m	2 000 m	
		Ig46	Lala ya tau Private Nature Reserve	-	1 000 m	2 000 m	
		Ig47	Langjan Private Nature Reserve	-	1 000 m	2 000 m	
		Ig48	Langkloof Private Nature Reserve	-	1 000 m	2 000 m	
		Ig49	Letolo Private Nature Reserve	-	1 000 m	2 000 m	
		Ig50	Leyden Private Nature Reserve	-	1 000 m	2 000 m	
		Ig51	Limpopo Private Nature Reserve	-	1 000 m	2 000 m	
		Ig52	Luvhondo Private Nature Reserve	-	1 000 m	2 000 m	
		Ig53	Mary Lavin No. 2 Private Nature Reserve	-	1 000 m	2 000 m	
		Ig54	Mary Lavin No. 3 Private Nature Reserve	-	1 000 m	2 000 m	
		Ig55	Mecklenburg Private Nature Reserve	-	1 000 m	2 000 m	
		Ig56	Mogoto Private Nature Reserve	-	1 000 m	2 000 m	
		Ig57	Mollevel Private Nature Reserve	-	1 000 m	2 000 m	
		Ig58	Mopanie Private Nature Reserve	-	1 000 m	2 000 m	
		Ig59	Naboom Private Nature Reserve	-	1 000 m	2 000 m	
		Ig60	Nawilger Private Nature Reserve	-	1 000 m	2 000 m	
		Ig61	Nederwelt Private Nature Reserve	-	1 000 m	2 000 m	
		Ig62	Nicolaas Private Nature Reserve	-	1 000 m	2 000 m	
		Ig63	Nieuw Geneve Private Nature Reserve	-	1 000 m	2 000 m	
		Ig64	Nora Ellis Private Nature Reserve	-	1 000 m	2 000 m	
		Ig65	Nyl Valley Private Nature Reserve	-	1 000 m	2 000 m	
		Ig66	P. A. Coetzer Private Nature Reserve	-	1 000 m	2 000 m	
		Ig67	P. Goetsch Private Nature Reserve	-	1 000 m	2 000 m	
		Ig68	P.R. de Jager Private Nature Reserve	-	1 000 m	2 000 m	
		Ig69	Pasop Private Nature Reserve	-	1 000 m	2 000 m	
		Ig70	Philip Herd Private Nature Reserve	-	1 000 m	2 000 m	
		Ig71	Queenie Private Nature Reserve	-	1 000 m	2 000 m	
		Ig72	Renfrew Private Nature Reserve	-	1 000 m	2 000 m	
		Ig73	Roodewal Private Nature Reserve	-	1 000 m	2 000 m	
		Ig74	Saamwerk Private Nature Reserve	-	1 000 m	2 000 m	
		Ig75	Seduka Private Nature Reserve	-	1 000 m	2 000 m	
		Ig76	Sigetti Private Nature Reserve	-	1 000 m	2 000 m	
		Ig77	Skutwater Ranch Private Nature Reserve	-	1 000 m	2 000 m	
		Ig78	Smit Private Nature Reserve	-	1 000 m	2 000 m	
		Ig79	Somerset Private Nature Reserve	-	1 000 m	2 000 m	
		Ig80	Stavoren Private Nature Reserve	-	1 000 m	2 000 m	
		Ig81	Steelpoort Private Nature Reserve	-	1 000 m	2 000 m	
		Ig82	Sunningdale Private Nature Reserve	-	1 000 m	2 000 m	
		Ig83	Tanga Private Nature Reserve	-	1 000 m	2 000 m	
		Ig84	Tinus Eyssell Private Nature Reserve	-	1 000 m	2 000 m	

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INTERNATIONAL CORRIDOR

Corridor	Feature Class	GIS Visual ID	Feature Name / Type		High sensitivity buffer	Moderate sensitivity buffer	Attributes, significance, observations
		Ig85	Uitzoek Private Nature Reserve	-	1 000 m	2 000 m	
		Ig86	Uys Private Nature Reserve	-	1 000 m	2 000 m	
		Ig87	Vaalbank Private Nature Reserve	-	1 000 m	2 000 m	
		Ig88	Vembe Private Nature Reserve	-	1 000 m	2 000 m	
		Ig89	Vercueil Private Nature Reserve	-	1 000 m	2 000 m	
		Ig90	Vlakfontein Private Nature Reserve	-	1 000 m	2 000 m	
		Ig91	Voortrekker Kleinkind Private Nature Reserve	-	1 000 m	2 000 m	
		Ig92	W. W. Bezuidenhout Private Nature Reserve	-	1 000 m	2 000 m	
		Ig93	Webtex Estates Private Nature Reserve	-	1 000 m	2 000 m	
		Ig94	Welmi Private Nature Reserve	-	1 000 m	2 000 m	
		Ig95	Willem van der Merwe Private Nature Reserve	-	1 000 m	2 000 m	
		Ig96	Witbank Private Nature Reserve	-	1 000 m	2 000 m	
		Ig97	Zemvelo game park	-	1 000 m	2 000 m	
	Cultural Landscapes	Il1	Zebediela farmlands	-	500 m	1 000 m	Fruit farming area SE of Mokopane.
		Il2	Limpopo River Valley	-	500 m	1 000 m	Irrigated farmland east of Weipe in the Limpopo River Valley.
		Il3	Olifants River Valley	-	500 m	1 000 m	Irrigated farmland around Marble Hall and Groblersdal in the Olifants River Valley.
		Il4	Fossil Hominid Sites of SA: Makapan Valley (B	-	500 m	1 000 m	
		Il5	Fossil Hominid Sites of SA: Makapan Valley (C	-	500 m	1 000 m	
		Il6	Mapungubwe Cultural Landscape (Buffer)	-	500 m	1 000 m	
		Il7	Mapungubwe Cultural Landscape (Core)	-	500 m	1 000 m	
	Heritage and Archaeological Sites	Ih	See heritage study				
	Historical Towns and Villages	It1	Bronkhorstspruit	500 m	1 000 m	2 000 m	Gauteng town, (1905). Site of a Boer War battle.Farming centre.
		It2	Cullinan	500 m	1 000 m	2 000 m	Gauteng town. Site of the largest diamond found (1905).
		It3	Delmas	500 m	1 000 m	2 000 m	Mpumalanga town. Agricultural, commercial and rail centre.
		It4	Dendron	500 m	1 000 m	2 000 m	Limpopo town at the western end of the Soutpansberg.
		It5	Devon	500 m	1 000 m	2 000 m	Gauteng village near Springs.
		It6	Dullstroom	500 m	1 000 m	2 000 m	Mpumalanga town. Trout farms and tourism centre.
		It7	Ekangala	500 m	1 000 m	2 000 m	Gauteng town.
		It8	Emalahleni (Witbank)	500 m	1 000 m	2 000 m	Mpumalanga town (1903). Large coal mining area.
		It9	Groblersdal	500 m	1 000 m	2 000 m	Limpopo town (1938). Important agricultural centre of the Olifants River Valley.
		It10	Haenertsburg	500 m	1 000 m	2 000 m	Limpopo mining and forestry village with trout streams.
		It11	Kranspoort Vakansiedorp	500 m	1 000 m	2 000 m	
		It12	Kwamahlanga	500 m	1 000 m	2 000 m	
		It13	Makhado (Louis Trichardt)	500 m	1 000 m	2 000 m	Limpopo town at the foot of the Soutpansberg (1899). Agricultural and administrative centre.
		It14	Marble Hall	500 m	1 000 m	2 000 m	Limpopo town (1942). Agricultural centre and marble / lime mining.
		It15	Middelburg	500 m	1 000 m	2 000 m	Mpumalanga town (1866). Agricultural, coal mining and industrial centre.
		It16	Mokopane (Potgietersrus)	500 m	1 000 m	2 000 m	Limpopo town (1858). Agricultural and cattle ranching centre.
		It17	Morebeng	500 m	1 000 m	2 000 m	
		It18	Musina (Messina)	500 m	1 000 m	2 000 m	Limpopo town (1915). Mining centre, including copper.
		It19	Nigel	500 m	1 000 m	2 000 m	
		It20	Ogies	500 m	1 000 m	2 000 m	Mpumalanga town. Rural coal mining centre.
		It21	Phola	500 m	1 000 m	2 000 m	Mpumalanga town.
		It22	Polokwane (Pietersburg)	500 m	1 000 m	2 000 m	Limpopo town (1884). Commercial and agricultural centre on the road to the north.
		It23	Rayton	500 m	1 000 m	2 000 m	Gauteng town.
		It24	Roodeplaat	500 m	1 000 m	2 000 m	Gauteng town.
		It25	Roossenekal	500 m	1 000 m	2 000 m	Limpopo town.
		It26	Steelpoort	500 m	1 000 m	2 000 m	
		It27	Vischkuil	500 m	1 000 m	2 000 m	Gauteng town.
		It28	Zebediela	500 m	1 000 m	2 000 m	Limpopo town. Centre of large scale citrus farming.
	National Roads	Ia1	N4 Route	500 m	1 000 m	2 000 m	National Road Bronkhorstspruit - Middelburg.

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INTERNATIONAL CORRIDOR

Corridor	Feature Class	GIS Visual ID	Feature Name / Type		High sensitivity buffer	Moderate sensitivity buffer	Attributes, significance, observations
		Ia2	N12 Route	500 m	1 000 m	2 000 m	National Road Benoni - Emalahleni.
		Ia3	N11 Route	500 m	1 000 m	2 000 m	National Road Middelburg – Mokopane. Includes Loskop Dam / Mokopane scenic mountain areas.
		Ia4	N1 Route	500 m	1 000 m	2 000 m	National Road Polokwane - Louis Trichardt – Musina. Includes Mokopane / Soutpansberg scenic mountain areas.
		Ia5	N17 Route	500 m	1 000 m	2 000 m	National Road Johannesburg – Ermelo.
	Arterial / Provincial Roads	Ib1	R555 Route	250 m	500 m	1 000 m	
		Ib2	R579 Route	250 m	500 m	1 000 m	
		Ib3	R33 Route	250 m	500 m	1 000 m	
		Ib4	R25 Route	250 m	500 m	1 000 m	
		Ib5	R573 Route	250 m	500 m	1 000 m	
		Ib6	R519 Route	250 m	500 m	1 000 m	
		Ib7	R518 Route	250 m	500 m	1 000 m	
		Ib8	R101 Route	250 m	500 m	1 000 m	
		Ib9	R81 Route	250 m	500 m	1 000 m	
		Ib10	R572 Route	250 m	500 m	1 000 m	
		Ib11	R578 Route	250 m	500 m	1 000 m	
		Ib12	R525 Route	250 m	500 m	1 000 m	
	Scenic Routes / Passes / Poorts	Is1	N11 Loskop Dam area	1 000 m	2 000 m	3 000 m	North of Middelburg. Local scenic value.
		Is2	N11 Mokopane mt. area	1 000 m	2 000 m	3 000 m	East and west of Mokopane. Local scenic value.
		Is3	N1 Mokopane mt. area	1 000 m	2 000 m	3 000 m	East and west of Mokopane. Local scenic value.
		Is4	N1 Soutpansberg mt. area	1 000 m	2 000 m	3 000 m	North of Louis Trichardt. Regional scenic value.
		Is5	R555 mountain area	1 000 m	2 000 m	3 000 m	Laersdrif to Steelpoort. Mountains and Steelpoort River area. Local scenic value.
		Is6	R37 Strydpoortberg mt. area	1 000 m	2 000 m	3 000 m	Mainly Zeekoeigat to Chuniespoort through Strydpoortberg. Local scenic value.
		Is7	R519 Highland area	1 000 m	2 000 m	3 000 m	Mokopane – Zebediela. Mountain poort and citrus plantations. Local scenic value.
		Is8	R71 Strydpoortberg mt. area	1 000 m	2 000 m	3 000 m	Woodbush Forest Reserve area. Local scenic value.
		Is9	R36 Morebeng area	1 000 m	2 000 m	3 000 m	Morebeng (Soekmekaar) mountain area. Local scenic value.
		Is10	R524 Soutpansberg area	1 000 m	2 000 m	3 000 m	Vivo – Louis Trichardt – Ratombo along southern Soutpansberg. Local scenic value.
		Is11	R523 Soutpansberg area	1 000 m	2 000 m	3 000 m	Vivo – Waterpoort – Wyllies Poort along northern Soutpansberg. Local scenic value.
	Passenger Rail Lines	Iv1	Johannesburg - Messina	250 m	500 m	1 000 m	
		Iv2	Pretoria - Nelspruit	250 m	500 m	1 000 m	

CENTRAL CORRIDOR

Corridor	Feature Class	GIS Visual ID	Feature Name / Type	V. high sensitivity buffer	High sensitivity buffer	Moderate sensitivity buffer	Attributes, significance, observations
	Landforms / Geological Features / Steep Slopes	Cm1	Table Mt. and Peninsula mts.	-	500 m	1 000 m	Prominent mountain chain of Cape Town and Cape Peninsula. Includes Table Mt. National Park. National scenic, cultural and tourism value.
		Cm2	Tygerberg, Kanonkop	-	500 m	1 000 m	Series of hills NW of Belville. Local scenic, cultural and conservation value.
		Cm3	Helderberg	-	500 m	1 000 m	N of Somerset West. Includes Helderberg Nature Reserve. Local scenic and conservation value.
		Cm4	Hottentots Holland Mts.	-	500 m	1 000 m	Includes Stellenboschberg, Jonkershoek, Groot Drakenstein and Simonsberg mts. Regional scenic and conservation value.
		Cm5	Paarl Mountain	-	500 m	1 000 m	Prominent granite outcrop W of Paarl. Includes 'Taal Monument'. National cultural and scenic value.
		Cm6	Perdeberg	-	500 m	1 000 m	SE of Malmesbury. Local scenic and conservation value.
		Cm7	Darling Hills	-	500 m	1 000 m	SW of Darling. Includes Kapokberg and Dassenberg. Local scenic and conservation value.
		Cm8	Kasteelberg, Kanonkop	-	500 m	1 000 m	W of Riebeek-Kasteel. Prominent feature of the Swartland. Local scenic and conservation value.
		Cm9	Koringberg, Swartberg	-	500 m	1 000 m	N of Moorreesburg. Local scenic and conservation value.
		Cm10	Piketberg	-	500 m	1 000 m	W of Piketberg. Prominent feature of the Swartland. Local scenic and conservation value.
		Cm11	Du Toit's, Slanghoek Mts.	-	500 m	1 000 m	E of Paarl. Includes Limietberge, Elandskloof, Voelvlei and Waterval Mts. Also Du Toitskloof and Bain's Kloof passes. Regional scenic and conservation value.
		Cm12	Witsenberg, Skurweberg	-	500 m	1 000 m	N of Ceres. Includes Mitchell's Pass. Local scenic, heritage and conservation value.
		Cm13	Groot Winterhoek, Kouebokkeveld Mts.	-	500 m	1 000 m	N of Tulbagh, E of Porterville. Includes Groot Winterhoek Wilderness Area, Beaverlac Nature Reserve and Dasklip Pass. Regional scenic, conservation and recreation value.
		Cm14	Tafelberg, Houdenbeksberg	-	500 m	1 000 m	Kouebokkeveld area. Local scenic and conservation value.
		Cm15	Gydoberg, Waboomberg	-	500 m	1 000 m	NE of Ceres. Includes Gydo Pass and Theronsberg Pass. Local scenic and conservation value.
		Cm16	Swartrugberge, Baviaansberg	-	500 m	1 000 m	NE of Ceres. Includes Karoo Poort. Local scenic and conservation value.
		Cm17	Skurweberge, Swartruggens	-	500 m	1 000 m	Kouebokkeveld area. Includes Sneeukop peak 2071m. Local scenic and conservation value.
		Cm18	Hex River Mts.	-	500 m	1 000 m	N of Worcester. Includes Matroosberg 2249m (highest peak in W. Cape) and Hex River Pass. Regional scenic, conservation and recreation value.
		Cm19	Kwadouwsberg	-	500 m	1 000 m	SW of De Doorns. Includes Keeromsberg peak 2073m. Local scenic and conservation value.
		Cm20	Bontberg	-	500 m	1 000 m	NW of Touwsrivier. Local scenic and conservation value.
		Cm21	Bierkraal se Rante	-	500 m	1 000 m	NW of Touwsrivier. Local scenic and conservation value.
		Cm22	Koedoesberge	-	500 m	1 000 m	Ceres-Karoo area. Includes Pienaarsfontein se berg, Kookfonteinberg, Vaalberg. Local scenic value.
		Cm23	Klein Roggeveld Mts.	-	500 m	1 000 m	Moordenaarskaroo area. Includes Karookop and Tafelkop. Local scenic and conservation value.
		Cm24	Komsberg	-	500 m	1 000 m	Moordenaarskaroo area. Includes Komsberg Pass. Local scenic and conservation value.
		Cm25	Roggeveld Mts.	-	500 m	1 000 m	Roggeveld area. Includes Sutherland Astronomical Observatory. Regional scenic value.
		Cm26	Gatsberg, Besemgoedberg	-	500 m	1 000 m	Moordenaarskaroo area. Local scenic and conservation value.
		Cm27	Nuweveld Mts.	-	500 m	1 000 m	Long range defining the escarpment to north of Beaufort West. Regional scenic value.
		Cm28	Kwaggashoogte	-	500 m	1 000 m	SE of Loxton. Dolerite outcrop feature. Local scenic value.
		Cm29	Kapokberg	-	500 m	1 000 m	SW of Hutchinson. Includes Wolwekop. Dolerite outcrop features. Local scenic value.
		Cm30	The Horseshoe	-	500 m	1 000 m	S of Hutchinson. Dolerite outcrop feature. Local scenic value.
		Cm31	The Three Sisters	-	500 m	1 000 m	NE of Nelspoort. Includes Kalkberg 1636m and Perdeberg.
		Cm32	Winterberge	-	500 m	1 000 m	SE of Nelspoort. Includes Vaalberg. Dolerite outcrop feature. Local scenic value.
		Cm33	Vaalberg	-	500 m	1 000 m	NW of Murraysburg. Dolerite outcrop feature. Local scenic value.
		Cm34	Aasvoelberge	-	500 m	1 000 m	SW of De Aar. Includes other dolerite outcrops in the area. Local scenic value.
		Cm35	Tierberg	-	500 m	1 000 m	NW of Philipstown. Dolerite outcrop feature. Local scenic value.
		Cm36	Renosterberg	-	500 m	1 000 m	S of Vanderkloof. Rolfontein Nature Reserve. Dolerite outcrop feature. Local scenic value.
		Cm37	Joostenberg	-	500 m	1 000 m	S of Luckhoff. Dolerite outcrop feature. Local scenic value.
		Cm38	Vredefort Dome	-	500 m	1 000 m	W and N of Parys. Geological interest and local scenic value.

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CENTRAL CORRIDOR

Corridor	Feature Class	GIS Visual ID	Feature Name / Type	V. high sensitivity buffer	High sensitivity buffer	Moderate sensitivity buffer	Attributes, significance, observations
		Cm39	Suikerbosrand	-	500 m	1 000 m	W of Heidelberg. Part of Suikerbosrand Nature Reserve. Local scenic and conservation value.
		Cm40	Skurweberg	-	500 m	1 000 m	E of Centurion. Long ridge feature. Local scenic and conservation value.
		Cm41	Witwatersrand	-	500 m	1 000 m	E of Pretoria. Long ridge feature. Local scenic and conservation value.
		Cm42	Magaliesberg	-	500 m	1 000 m	E of Pretoria. Part of Magaliesberg Nature Area. Regional conservation and scenic value.
		Cm43	Krugersdorp ridge	-	500 m	1 000 m	Includes Walter Sisulu National Botanical Garden and Protea Ridge.
	Major and Perennial Rivers	Cr1	Berg River	500 m	1 000 m	2 000 m	Rises S of Paarl. Regional scenic, cultural and recreational value.
		Cr2	Breede River	500 m	1 000 m	2 000 m	Rises NW of Worcester. Cape. Regional scenic, cultural and recreational value.
		Cr3	Hex River	500 m	1 000 m	2 000 m	Rises NE of De Dooms. Noted for vineyards. Regional scenic, cultural and recreational value.
		Cr4	Doring River (south)	500 m	1 000 m	2 000 m	Ceres Karoo area. Mainly seasonal. Regional conservation value
		Cr5	Tankwa River	500 m	1 000 m	2 000 m	Ceres Karoo area. Mainly seasonal. Flows into Oudebaaskraal Dam. Reg. conservation value.
		Cr6	Gariep River (Orange River)	500 m	1 000 m	2 000 m	Great Karoo area. Includes PK le Roux Dam. Regional scenic, cultural and recreational value.
		Cr7	Riet River	500 m	1 000 m	2 000 m	S of Kimberley. Includes Kalkfontein Dam. Local scenic and recreational value.
		Cr8	Modder River	500 m	1 000 m	2 000 m	S of Kimberley. Includes Krugersdrif Dam. Local scenic and recreational value.
		Cr9	Vaal River	500 m	1 000 m	2 000 m	Orkney-Parys-Sasolburg area. Includes Bloemhof Dam. Reg. scenic and recreational value.
	Water Bodies / Dams / Wetlands	Cw1	Voelvlei Dam	500 m	1 000 m	2 000 m	SW of Tulbagh. Berg River catchment. Local scenic value.
		Cw2	Verkeerde Vlei	500 m	1 000 m	2 000 m	W of Touwsrivier. Hex River Mts. Catchment. Local scenic value.
		Cw3	Leeugamka Dam	500 m	1 000 m	2 000 m	N of Leeu-Gamka. Local scenic value.
		Cw4	Beaufort West Dam	500 m	1 000 m	2 000 m	N of Beaufort West. Local scenic value.
		Cw5	Grootpan	500 m	1 000 m	2 000 m	S of Beaufort West. Includes Dwaalpan, Walpan, Kroonpan. Local conservation, scenic value.
		Cw6	Victoria West Dam	500 m	1 000 m	2 000 m	Victoria West. Local scenic value.
		Cw7	Smart Syndicate Dam	500 m	1 000 m	2 000 m	W of Britstown. Local scenic value.
		Cw8	Brinkspan	500 m	1 000 m	2 000 m	N of Britstown. Local conservation and scenic value.
		Cw9	Barberspan / Biesiespan	500 m	1 000 m	2 000 m	SE of Philipstown. Local conservation and scenic value.
		Cw10	Kaalpan	500 m	1 000 m	2 000 m	S of Hopetown. Large pan. Local conservation and scenic value.
		Cw11	PK le Roux Dam	500 m	1 000 m	2 000 m	SE of Vanderkloof on Gariep River. Includes Rolfontein NR and Doornkloof NR. Regional scenic and recreation value.
		Cw12	Frederiksfonteinpan	500 m	1 000 m	2 000 m	E of Hopetown. Includes Gannapan and several other pans. Local conservation, scenic value.
		Cw13	Liebenbergspan	500 m	1 000 m	2 000 m	W of Petrusburg. Includes Saamsuippan and several other pans. Salt works. Local cultural value.
		Cw14	Dealesville pans	500 m	1 000 m	2 000 m	Numerous pans around Dealesville and Hertzogville. Local conservation and scenic value.
		Cw15	Wesselsbron pans	500 m	1 000 m	2 000 m	Numerous pans incl. Witpan. Local conservation and scenic value.
		Cw16	Bloemhof Dam	500 m	1 000 m	2 000 m	E. of Bloemhof on the Vaal River. Regional scenic value.
		Cw17	Loch Vaal	500 m	1 000 m	2 000 m	W of Sasolburg on the Vaal River. Local scenic value.
		Cw18	Klipdrif Dam	500 m	1 000 m	2 000 m	NE of Potchefstroom. Local scenic value.
		Cw19	Boskop Dam	500 m	1 000 m	2 000 m	N of Potchefstroom. Local scenic value.
		Cw20	Klerkskraal Dam	500 m	1 000 m	2 000 m	E of Ventersdorp on the Mooi River. Local scenic value.
		Cw21	Hartbeespoort Dam	500 m	1 000 m	2 000 m	W of Pretoria in the Magaliesberg Nature Area. Regional scenic and recreation value.
	Ramsar Sites	Cz1	Blesbokspruit Bird Sanctuary	1 000 m	2 000 m	3 000 m	S of Springs.
	Coastal zones	Cc1	West Coast	1 000 m	2 000 m	3 000 m	Yzerfontein to Table View. Views of Robben Eiland and Table Mt. Regional scenic, cultural and recreational value.
		Cc2	Atlantic Coast	1 000 m	2 000 m	3 000 m	Table Bay to Kommetjie. Includes Victoria Drive and Chapman's Peak scenic routes. Part of Table Mountain National Park. National scenic, cultural and recreational value.

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CENTRAL CORRIDOR

Corridor	Feature Class	GIS Visual ID	Feature Name / Type	V. high sensitivity buffer	High sensitivity buffer	Moderate sensitivity buffer	Attributes, significance, observations
		Cc3	False Bay	1 000 m	2 000 m	3 000 m	Simon's Town to Strand. Includes Simon's Town naval harbour and Wolfgat Nature Reserve. Macassar limestone cliffs. Regional heritage and recreational value.
	National Parks	Cp1	Table Mountain National Park	2 000 m	3 000 m	4 000 m	Cape Peninsula area. World Heritage Site.
		Cp2	West Coast National Park	2 000 m	3 000 m	4 000 m	Langebaan Lagoon area. National scenic, conservation and tourism value.
		Cp3	Tankwa Karoo National Park	2 000 m	3 000 m	4 000 m	Ceres-Karoo / Roggeveld area.
		Cp4	Karoo National Park	2 000 m	3 000 m	4 000 m	Beaufort West area. National conservation, scenic and tourism value.
		Cp5	Mokala National Park	2 000 m	3 000 m	4 000 m	Kimberley area. National conservation, scenic and tourism value.
		Cp6	Groenkloof National Park	2 000 m	3 000 m	4 000 m	Near Pretoria.
	Nature Reserves / Protected areas	Cn1	Assegaaibos Provincial Nature Reserve	1 000 m	2 000 m	4 000 m	
		Cn2	Austin Roberts Bird Sanctuary	1 000 m	2 000 m	4 000 m	
		Cn3	Beaulieu Bird Sanctuary	1 000 m	2 000 m	4 000 m	
		Cn4	Ben Etive Nature Reserve	1 000 m	2 000 m	4 000 m	N of Worcester. Local conservation and scenic value.
		Cn5	Blaauwberg Conservation Area Local Nature Reserve	1 000 m	2 000 m	4 000 m	
		Cn6	Blesbokspruit	1 000 m	2 000 m	4 000 m	
		Cn7	Bloemhof/Sandveld Nature Reserve	1 000 m	2 000 m	4 000 m	E of Bloemhof. Includes the Bloemhof Dam. Local conservation and scenic value.
		Cn8	Blouberg Provincial Nature Reserve	1 000 m	2 000 m	4 000 m	
		Cn9	Blougat Municipal Nature Reserve	1 000 m	2 000 m	4 000 m	Krugersdorp west.
		Cn10	Bokkeriviere Nature Reserve	1 000 m	2 000 m	4 000 m	N of Hex River Pass. Local conservation and scenic value.
		Cn11	Boshof Nature Reserve	1 000 m	2 000 m	4 000 m	
		Cn12	Bracken Nature Reserve	1 000 m	2 000 m	4 000 m	
		Cn13	Cape Peninsula Nature Area	1 000 m	2 000 m	4 000 m	
		Cn14	Ceres Bergfynbos Reserve	1 000 m	2 000 m	4 000 m	
		Cn15	Darling Local Nature Reserve	1 000 m	2 000 m	4 000 m	
		Cn16	Darling Renosterveld Local Nature Reserve	1 000 m	2 000 m	4 000 m	
		Cn17	Dassen Island Provincial Nature Reserve	1 000 m	2 000 m	4 000 m	
		Cn18	De Aar Nature Reserve	1 000 m	2 000 m	4 000 m	
		Cn19	Diepsloot Nature Reserve	1 000 m	2 000 m	4 000 m	NW of Randburg. Local conservation and scenic value.
		Cn20	Driftsands Nature Reserve	1 000 m	2 000 m	4 000 m	
		Cn21	Durbanville Nature Reserve	1 000 m	2 000 m	4 000 m	
		Cn22	Fonteintjiesberg Nature Reserve	1 000 m	2 000 m	4 000 m	N of Worcester. Local conservation and scenic value.
		Cn23	Frank Struben Bird Sanctuary	1 000 m	2 000 m	4 000 m	
		Cn24	Galgeheuwel Local Nature Reserve	1 000 m	2 000 m	4 000 m	
		Cn25	Glen Austinpan Bird Sanctuary	1 000 m	2 000 m	4 000 m	
		Cn26	Greater Zandvlei Estuary Nature Reserve	1 000 m	2 000 m	4 000 m	
		Cn27	Groenkloof Nature Reserve	1 000 m	2 000 m	4 000 m	
		Cn28	Hartbeespoort Dam Nature Reserve	1 000 m	2 000 m	4 000 m	N of Krugersdorp. Local conservation and scenic value.
		Cn29	Hawequas Mountain Catchment Area	1 000 m	2 000 m	4 000 m	S of Du Toit's Kloof. Local conservation and scenic value.
		Cn30	Helderberg Nature Reserve	1 000 m	2 000 m	4 000 m	N of Somerset West. Local conservation and scenic value.
		Cn31	Hottentots Holland Nature Reserve	1 000 m	2 000 m	4 000 m	E of Stellenbosch. Local conservation and scenic value.
		Cn32	J. N. Briers-Louw Nature Reserve	1 000 m	2 000 m	4 000 m	
		Cn33	Kalbaskraal Nature Reserve	1 000 m	2 000 m	4 000 m	

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CENTRAL CORRIDOR

Corridor	Feature Class	GIS Visual ID	Feature Name / Type	V. high sensitivity buffer	High sensitivity buffer	Moderate sensitivity buffer	Attributes, significance, observations
		Cn34	Kalkfontein Dam Nature Reserve	1 000 m	2 000 m	4 000 m	SE of Koffiefontein. On the Riet River. Local conservation and scenic value.
		Cn35	Karroo Desert National Botanic Garden	1 000 m	2 000 m	4 000 m	N of Worcester. National botanical, and scenic value.
		Cn36	Klipriviersberg Nature Reserve	1 000 m	2 000 m	4 000 m	
		Cn37	Kloofendal Municipal Nature Reserve	1 000 m	2 000 m	4 000 m	Krugersdorp east.
		Cn38	Krugersdorp Municipal Nature Reserve	1 000 m	2 000 m	4 000 m	W of Krugersdorp. Local conservation and scenic value.
		Cn39	Leeuwkuil Nature Reserve	1 000 m	2 000 m	4 000 m	
		Cn40	Magaliesberg Protected Natural Environment	1 000 m	2 000 m	4 000 m	W of Pretoria. Includes Hartbeespoort Dam. Regional conservation and scenic value.
		Cn41	Melville Koppies Nature Reserve	1 000 m	2 000 m	4 000 m	
		Cn42	Olifantsvlei Nature Reserve	1 000 m	2 000 m	4 000 m	
		Cn43	Onderstepoort Nature Reserve	1 000 m	2 000 m	4 000 m	N of Pretoria, Includes Bon Accord Dam. Local conservation and scenic value.
		Cn44	Paardenberg Nature Reserve	1 000 m	2 000 m	4 000 m	
		Cn45	Paarl Mountain Nature Reserve	1 000 m	2 000 m	4 000 m	W of Paarl. Afrikaans language monument. Local conservation, cultural and scenic value.
		Cn46	Raapenberg Bird Sancutary Nature Reserve	1 000 m	2 000 m	4 000 m	
		Cn47	Rhenosterspruit Nature Reserve	1 000 m	2 000 m	4 000 m	NW of Randburg. Local conservation and scenic value.
		Cn48	Rietvlei Nature Area	1 000 m	2 000 m	4 000 m	S of Pretoria. Includes Rietvlei Dam. Local conservation and scenic value.
		Cn49	Riverlands Provincial Nature Reserve	1 000 m	2 000 m	4 000 m	
		Cn50	Rolfontein Provincial Nature Reserve	1 000 m	2 000 m	4 000 m	SE of Vanderkloof. PK le Roux Dam on Gariep River. Local conservation and scenic value.
		Cn51	Rondebult Bird Sanctuary	1 000 m	2 000 m	4 000 m	
		Cn52	Rondevlei Bird Sanctuary	1 000 m	2 000 m	4 000 m	
		Cn53	Roodeplaat Dam Nature Reserve	1 000 m	2 000 m	4 000 m	NE of Pretoria. Local conservation and scenic value.
		Cn54	Silvermine Nature Reserve	1 000 m	2 000 m	4 000 m	
		Cn55	Soetdoring Nature Reserve	1 000 m	2 000 m	4 000 m	NW of Bloemfontein. Includes the Krugerdrif Dam. Local conservation and scenic value.
		Cn56	Suikerbosrand Nature Reserve	1 000 m	2 000 m	4 000 m	W of Heidelberg. Local conservation and scenic value.
		Cn57	Table Mountain Nature Reserve	1 000 m	2 000 m	4 000 m	
		Cn58	The Cradle	1 000 m	2 000 m	4 000 m	N of Krugersdorp. World Heritage Site. Fossil Hominid sites.
		Cn59	Touw Local Nature Reserve	1 000 m	2 000 m	4 000 m	
		Cn60	Tygerberg Nature Reserve	1 000 m	2 000 m	4 000 m	N of Belville. Local conservation and scenic value.
		Cn61	Van Riebeeck Nature Reserve	1 000 m	2 000 m	4 000 m	
		Cn62	Victoria West Nature Reserve	1 000 m	2 000 m	4 000 m	
		Cn63	Viljoenskroon Nature Reserve	1 000 m	2 000 m	4 000 m	
		Cn64	Voëlvlei Provincial Nature Reserve	1 000 m	2 000 m	4 000 m	
		Cn65	Waldrift Nature Reserve	1 000 m	2 000 m	4 000 m	
		Cn66	Walter Sisulu National Botanical Garden	1 000 m	2 000 m	4 000 m	Krugersdorp Ridge.
		Cn67	Waterval Nature Reserve	1 000 m	2 000 m	4 000 m	E of Wellington. Local conservation and scenic value.
		Cn68	Westdene Pan Nature Reserve	1 000 m	2 000 m	4 000 m	
		Cn69	Wolfgat Nature Reserve	1 000 m	2 000 m	4 000 m	False Bay coast. Local conservation and scenic value.
		Cn70	Wonderboom Nature Reserve	1 000 m	2 000 m	4 000 m	
		Cn71	Yzerfontein Local Nature Reserve	1 000 m	2 000 m	4 000 m	
		Cn72	Zeekoevlei Local Nature Reserve	1 000 m	2 000 m	4 000 m	
	Mountain Catchments /	Co1	Cape West Coast Bio. R.	-	-	1 000 m	Biosphere Reserve

CENTRAL CORRIDOR

Corridor	Feature Class	GIS Visual ID	Feature Name / Type	V. high sensitivity buffer	High sensitivity buffer	Moderate sensitivity buffer	Attributes, significance, observations
	Biosphere buffers	Co2	Cape Winelands Bio. R.	-	-	1 000 m	Biosphere Reserve
		Co3	Hawequas Mt. Catch. Area	-	-	1 000 m	Mountain Catchment Area
		Co4	Hottentots-Holland Mt. Catch	-	-	1 000 m	Mountain Catchment Area
		Co5	Koue Bokkeveld Mt. Catch.	-	-	1 000 m	Mountain Catchment Area
		Co6	Matroosberg Mt. Catch. Area	-	-	1 000 m	Mountain Catchment Area
		Co7	Sederberg Mt. Catch. Area	-	-	1 000 m	Mountain Catchment Area
		Co8	Winterhoek Mt. Catch Area	-	-	1 000 m	Mountain Catchment Area
		Co9	Cape Floral Region: Boland Mt. Complex	-	-	1 000 m	World Heritage Site.
		Co10	Cape Floral Region: Groot Winterhoek Wilderness Area	-	-	1 000 m	World Heritage Site.
		Co11	Cape Floral Region: Table Mountain Complex	-	-	1 000 m	World Heritage Site.
		Co12	Vredefort Dome	-	-	1 000 m	World Heritage Site.
		Co13	Fossil Hominid Sites: Cradle of Humankind	-	-	1 000 m	World Heritage Site.
		Co14	Robben Island	-	-	1 000 m	World Heritage Site.
	Private Reserves	Cg1	Aquila/Elim Private Reserve	-	1 000 m	2 000 m	
		Cg2	Beaverlac Nature Reserve	-	1 000 m	2 000 m	
		Cg3	Blouberg Private Nature Reserve	-	1 000 m	2 000 m	
		Cg4	Bosworth Private Nature Reserve	-	1 000 m	2 000 m	
		Cg5	Buffelsfontein Game and Nature Reserve	-	1 000 m	2 000 m	NE of Yzerfontein.
		Cg6	Bushybend Private Nature Reserve	-	1 000 m	2 000 m	
		Cg7	Chanbe/Wiets Game Reserve	-	1 000 m	2 000 m	NE of Kimberley. Local conservation and tourism value.
		Cg8	Faan Meintjes Private Nature Reserve	-	1 000 m	2 000 m	
		Cg9	Fred Coetzee Private Nature Reserve	-	1 000 m	2 000 m	
		Cg10	Hoffman Private Nature Reserve	-	1 000 m	2 000 m	
		Cg11	Jakkalsfontein Private Nature Reserve	-	1 000 m	2 000 m	SE of Yzerfontein.
		Cg12	Kasteelberg Nature Reserve	-	1 000 m	2 000 m	W of Riebeek-Kasteel.
		Cg13	Koeberg Private Nature Reserve	-	1 000 m	2 000 m	N of Melbosstrand.
		Cg14	M'Nandi Private Nature Reserve	-	1 000 m	2 000 m	
		Cg15	Nooitgedacht Private Nature Reserve	-	1 000 m	2 000 m	
		Cg16	Riebeekriviers/Hans's Gift Private Nature Reserve	-	1 000 m	2 000 m	W of Riebeek-West.
		Cg17	Rondeberg Private Nature Reserve	-	1 000 m	2 000 m	
		Cg18	Sasolburg Private Nature Reserve	-	1 000 m	2 000 m	
		Cg19	Venterskroon Private Nature Reserve	-	1 000 m	2 000 m	
	Game Farms	Co1	Aarfontein, Witfontein and Kameelsbron	-	1 000 m	2 000 m	
		Co2	Aasvogelpan	-	1 000 m	2 000 m	
		Co3	Abraham's Rust	-	1 000 m	2 000 m	
		Co4	Alandia and Lemoenput	-	1 000 m	2 000 m	
		Co5	Aletheim	-	1 000 m	2 000 m	
		Co6	Alexandersfontein	-	1 000 m	2 000 m	
		Co7	Annex Beauclaire	-	1 000 m	2 000 m	
		Co8	Arauna	-	1 000 m	2 000 m	

CENTRAL CORRIDOR

Corridor	Feature Class	GIS Visual ID	Feature Name / Type	V. high sensitivity buffer	High sensitivity buffer	Moderate sensitivity buffer	Attributes, significance, observations
		Co9	Arizona	-	1 000 m	2 000 m	
		Co10	Arnotsdal	-	1 000 m	2 000 m	
		Co11	Baartmanskoppie	-	1 000 m	2 000 m	
		Co12	Basberg	-	1 000 m	2 000 m	
		Co13	Basrand	-	1 000 m	2 000 m	
		Co14	Beentjeskraal	-	1 000 m	2 000 m	
		Co15	Belmont	-	1 000 m	2 000 m	
		Co16	Benfontein	-	1 000 m	2 000 m	
		Co17	Bezuidenhoutskraal	-	1 000 m	2 000 m	
		Co18	Biesielaagte and Populierbos	-	1 000 m	2 000 m	
		Co19	Biesiesvlei and Zoetfontein	-	1 000 m	2 000 m	
		Co20	Biesjesfontein	-	1 000 m	2 000 m	
		Co21	Biezenput	-	1 000 m	2 000 m	
		Co22	Blaauwbosput	-	1 000 m	2 000 m	
		Co23	Blaauwkrantz	-	1 000 m	2 000 m	
		Co24	Blauwbosputs	-	1 000 m	2 000 m	
		Co25	Blenheim	-	1 000 m	2 000 m	
		Co26	Blikpan	-	1 000 m	2 000 m	
		Co27	Blinkwater	-	1 000 m	2 000 m	
		Co28	Bloemfontein	-	1 000 m	2 000 m	
		Co29	Blouboskuil	-	1 000 m	2 000 m	
		Co30	Bloudrif	-	1 000 m	2 000 m	
		Co31	Bokkraal	-	1 000 m	2 000 m	
		Co32	Boschput	-	1 000 m	2 000 m	
		Co33	Bosdam	-	1 000 m	2 000 m	
		Co34	Boshof Rd	-	1 000 m	2 000 m	
		Co35	Botha's Put	-	1 000 m	2 000 m	
		Co36	Bothashoek	-	1 000 m	2 000 m	
		Co37	Brakfontein	-	1 000 m	2 000 m	
		Co38	Brakfontein	-	1 000 m	2 000 m	
		Co39	Brakriver	-	1 000 m	2 000 m	
		Co40	Bronkhorstfontein	-	1 000 m	2 000 m	
		Co41	Brosdoornput	-	1 000 m	2 000 m	
		Co42	Brulfontein	-	1 000 m	2 000 m	
		Co43	Brumelands	-	1 000 m	2 000 m	
		Co44	Brummersdam	-	1 000 m	2 000 m	
		Co45	Buffelsvlei	-	1 000 m	2 000 m	
		Co46	Buisfontein	-	1 000 m	2 000 m	
		Co47	Bultfontein	-	1 000 m	2 000 m	
		Co48	Bultfontein	-	1 000 m	2 000 m	

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CENTRAL CORRIDOR

Corridor	Feature Class	GIS Visual ID	Feature Name / Type	V. high sensitivity buffer	High sensitivity buffer	Moderate sensitivity buffer	Attributes, significance, observations
		Co49	Bultfontein	-	1 000 m	2 000 m	
		Co50	Burton	-	1 000 m	2 000 m	
		Co51	Butler's Haven	-	1 000 m	2 000 m	
		Co52	Ceerust	-	1 000 m	2 000 m	
		Co53	Cloetespan	-	1 000 m	2 000 m	
		Co54	Cypherfontein	-	1 000 m	2 000 m	
		Co55	Cypherkuil	-	1 000 m	2 000 m	
		Co56	Cypreslaagte	-	1 000 m	2 000 m	
		Co57	Damara Game Ranch	-	1 000 m	2 000 m	
		Co58	Damfontein	-	1 000 m	2 000 m	
		Co59	De Brak and Ratelfontein	-	1 000 m	2 000 m	
		Co60	De Dam	-	1 000 m	2 000 m	
		Co61	De Krans	-	1 000 m	2 000 m	
		Co62	De Poort	-	1 000 m	2 000 m	
		Co63	De Put	-	1 000 m	2 000 m	
		Co64	De Put	-	1 000 m	2 000 m	
		Co65	De Rust	-	1 000 m	2 000 m	
		Co66	Diedericksput	-	1 000 m	2 000 m	
		Co67	Diepkloof	-	1 000 m	2 000 m	
		Co68	Donkerhoek	-	1 000 m	2 000 m	
		Co69	Doornbult	-	1 000 m	2 000 m	
		Co70	Doornfontein	-	1 000 m	2 000 m	
		Co71	Doornfontein	-	1 000 m	2 000 m	
		Co72	Doornfontein	-	1 000 m	2 000 m	
		Co73	Doornhoek	-	1 000 m	2 000 m	
		Co74	Doornkuil	-	1 000 m	2 000 m	
		Co75	Doornlaagte	-	1 000 m	2 000 m	
		Co76	Doornplaat	-	1 000 m	2 000 m	
		Co77	Driefontein	-	1 000 m	2 000 m	
		Co78	Driehoek, Salpeterpan and Witkoplaagte	-	1 000 m	2 000 m	
		Co79	Dronfield	-	1 000 m	2 000 m	
		Co80	Droogespruit	-	1 000 m	2 000 m	
		Co81	Dwaalfontein	-	1 000 m	2 000 m	
		Co82	Egerton	-	1 000 m	2 000 m	
		Co83	Egmont	-	1 000 m	2 000 m	
		Co84	Eileen's Home	-	1 000 m	2 000 m	
		Co85	Elandsfontein	-	1 000 m	2 000 m	
		Co86	Elandskloof	-	1 000 m	2 000 m	
		Co87	Elwida Trust (Wina, Klipjespan and Teekop)	-	1 000 m	2 000 m	
		Co88	Enkeldebult	-	1 000 m	2 000 m	

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CENTRAL CORRIDOR

Corridor	Feature Class	GIS Visual ID	Feature Name / Type	V. high sensitivity buffer	High sensitivity buffer	Moderate sensitivity buffer	Attributes, significance, observations
		Co89	Eureka and Moirdale	-	1 000 m	2 000 m	
		Co90	Excelsior	-	1 000 m	2 000 m	
		Co91	Exel	-	1 000 m	2 000 m	
		Co92	Fermanagh	-	1 000 m	2 000 m	
		Co93	Flamingo	-	1 000 m	2 000 m	
		Co94	Flint	-	1 000 m	2 000 m	
		Co95	Fort Richmond Game Camp	-	1 000 m	2 000 m	
		Co96	Franshoek A	-	1 000 m	2 000 m	
		Co97	Frischgewaagd	-	1 000 m	2 000 m	
		Co98	Gegund	-	1 000 m	2 000 m	
		Co99	Geluk No.243	-	1 000 m	2 000 m	
		Co100	Gemsbokfontein	-	1 000 m	2 000 m	
		Co101	Goedehoop	-	1 000 m	2 000 m	
		Co102	Goedehoop	-	1 000 m	2 000 m	
		Co103	Goedgevonden	-	1 000 m	2 000 m	
		Co104	Golding's Rust	-	1 000 m	2 000 m	
		Co105	Graspan	-	1 000 m	2 000 m	
		Co106	Groenvlei	-	1 000 m	2 000 m	
		Co107	Grootfontein	-	1 000 m	2 000 m	
		Co108	Grootrietpan	-	1 000 m	2 000 m	
		Co109	Haaskraal	-	1 000 m	2 000 m	
		Co110	Hartbeesthoek	-	1 000 m	2 000 m	
		Co111	Hartebeeskuil	-	1 000 m	2 000 m	
		Co112	Hartebeestfontein	-	1 000 m	2 000 m	
		Co113	Hartebeestfontein	-	1 000 m	2 000 m	
		Co114	Hartenbosch	-	1 000 m	2 000 m	
		Co115	Herbert	-	1 000 m	2 000 m	
		Co116	Holpan	-	1 000 m	2 000 m	
		Co117	Hondeblafsrivier	-	1 000 m	2 000 m	
		Co118	Hoogerop	-	1 000 m	2 000 m	
		Co119	Houhalersberg and Kolkop	-	1 000 m	2 000 m	
		Co120	Houtkraal	-	1 000 m	2 000 m	
		Co121	Imbasa Safaris	-	1 000 m	2 000 m	
		Co122	Inglewood	-	1 000 m	2 000 m	
		Co123	Jackalskuil	-	1 000 m	2 000 m	
		Co124	Jagpoort, Driefontein and Overschot	-	1 000 m	2 000 m	
		Co125	Jagskerm	-	1 000 m	2 000 m	
		Co126	Jakkalsfontein	-	1 000 m	2 000 m	
		Co127	Jakkalsfontein, Caroluspoort and Vetlaagte	-	1 000 m	2 000 m	
		Co128	Joe Petra	-	1 000 m	2 000 m	

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CENTRAL CORRIDOR

Corridor	Feature Class	GIS Visual ID	Feature Name / Type	V. high sensitivity buffer	High sensitivity buffer	Moderate sensitivity buffer	Attributes, significance, observations
		Co129	Kaffirskop	-	1 000 m	2 000 m	
		Co130	Kalkbult and Diephoek	-	1 000 m	2 000 m	
		Co131	Kalkfontein	-	1 000 m	2 000 m	
		Co132	Kalkfontein	-	1 000 m	2 000 m	
		Co133	Kalkgat	-	1 000 m	2 000 m	
		Co134	Kalkheuvel	-	1 000 m	2 000 m	
		Co135	Kamfersdam	-	1 000 m	2 000 m	
		Co136	Kareeboschkuil	-	1 000 m	2 000 m	
		Co137	Kareekloof	-	1 000 m	2 000 m	
		Co138	Kareepan	-	1 000 m	2 000 m	
		Co139	Kareeput	-	1 000 m	2 000 m	
		Co140	Karreeboombult	-	1 000 m	2 000 m	
		Co141	Karreelaagte	-	1 000 m	2 000 m	
		Co142	Keurfontein	-	1 000 m	2 000 m	
		Co143	Kildare and Londonberry	-	1 000 m	2 000 m	
		Co144	Klein Kareelaagte	-	1 000 m	2 000 m	
		Co145	Klerksfontein	-	1 000 m	2 000 m	
		Co146	Klerkspan	-	1 000 m	2 000 m	
		Co147	Klipdrift	-	1 000 m	2 000 m	
		Co148	Klipdrift	-	1 000 m	2 000 m	
		Co149	Klipfontein	-	1 000 m	2 000 m	
		Co150	Klipfontein	-	1 000 m	2 000 m	
		Co151	Klipfontein	-	1 000 m	2 000 m	
		Co152	Klipgat	-	1 000 m	2 000 m	
		Co153	Klipgatsfontein	-	1 000 m	2 000 m	
		Co154	Klipkuil	-	1 000 m	2 000 m	
		Co155	Knoffelfontein	-	1 000 m	2 000 m	
		Co156	Koedoekop	-	1 000 m	2 000 m	
		Co157	Koedoesfontein	-	1 000 m	2 000 m	
		Co158	Komsberg	-	1 000 m	2 000 m	
		Co159	Kookfontein Oos	-	1 000 m	2 000 m	
		Co160	Kortkop	-	1 000 m	2 000 m	
		Co161	Kraankuilsdam	-	1 000 m	2 000 m	
		Co162	Kraanvogelfontein	-	1 000 m	2 000 m	
		Co163	Kromvlei	-	1 000 m	2 000 m	
		Co164	Langda	-	1 000 m	2 000 m	
		Co165	Langdam	-	1 000 m	2 000 m	
		Co166	Langedam Wildkamp 1	-	1 000 m	2 000 m	
		Co167	Lapfontein	-	1 000 m	2 000 m	
		Co168	Larandre	-	1 000 m	2 000 m	

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CENTRAL CORRIDOR

Corridor	Feature Class	GIS Visual ID	Feature Name / Type	V. high sensitivity buffer	High sensitivity buffer	Moderate sensitivity buffer	Attributes, significance, observations
		Co169	Le Re Ranch and Koppiesdam	-	1 000 m	2 000 m	
		Co170	Leeuberg Gedeelte1 Van Bermuda	-	1 000 m	2 000 m	
		Co171	Leeufontein	-	1 000 m	2 000 m	
		Co172	Leeuwfontein	-	1 000 m	2 000 m	
		Co173	Leeuwkop	-	1 000 m	2 000 m	
		Co174	Leeuwpan	-	1 000 m	2 000 m	
		Co175	Legpan	-	1 000 m	2 000 m	
		Co176	Leinster	-	1 000 m	2 000 m	
		Co177	Lekkervlei	-	1 000 m	2 000 m	
		Co178	Lekkerwater	-	1 000 m	2 000 m	
		Co179	Lelievlei	-	1 000 m	2 000 m	
		Co180	Lentesdrif	-	1 000 m	2 000 m	
		Co181	Loskop	-	1 000 m	2 000 m	
		Co182	Lovedale and Sheephouse	-	1 000 m	2 000 m	
		Co183	Macasterfontein and Hondeblaf	-	1 000 m	2 000 m	
		Co184	Magersfontein	-	1 000 m	2 000 m	
		Co185	Marrick	-	1 000 m	2 000 m	
		Co186	Martinspan	-	1 000 m	2 000 m	
		Co187	Matjiesfontein	-	1 000 m	2 000 m	
		Co188	Mauritzfontein	-	1 000 m	2 000 m	
		Co189	Meltonwold	-	1 000 m	2 000 m	
		Co190	Merweville and Yuryatin	-	1 000 m	2 000 m	
		Co191	Middelerf	-	1 000 m	2 000 m	
		Co192	Middelfontein	-	1 000 m	2 000 m	
		Co193	Middelplaas	-	1 000 m	2 000 m	
		Co194	Middelplaas-Wes	-	1 000 m	2 000 m	
		Co195	Mierfontein	-	1 000 m	2 000 m	
		Co196	Mimosa Wildkamp 2	-	1 000 m	2 000 m	
		Co197	Mispah	-	1 000 m	2 000 m	
		Co198	Modderfdontein	-	1 000 m	2 000 m	
		Co199	Modderfontein	-	1 000 m	2 000 m	
		Co200	Mollerspan and Roodepan	-	1 000 m	2 000 m	
		Co201	Mon Desir	-	1 000 m	2 000 m	
		Co202	Mon Desir, Bosdam and Klerksfontein	-	1 000 m	2 000 m	
		Co203	Mon Repos	-	1 000 m	2 000 m	
		Co204	Montana	-	1 000 m	2 000 m	
		Co205	Morgenzon	-	1 000 m	2 000 m	
		Co206	Naauwpoort	-	1 000 m	2 000 m	
		Co207	Nature`s Sanctuary	-	1 000 m	2 000 m	
		Co208	New Castle	-	1 000 m	2 000 m	

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CENTRAL CORRIDOR

Corridor	Feature Class	GIS Visual ID	Feature Name / Type	V. high sensitivity buffer	High sensitivity buffer	Moderate sensitivity buffer	Attributes, significance, observations
		Co209	Newlands	-	1 000 m	2 000 m	
		Co210	Niekerksdam	-	1 000 m	2 000 m	
		Co211	Niekerkshoop	-	1 000 m	2 000 m	
		Co212	Nietgedacht	-	1 000 m	2 000 m	
		Co213	No Name, See Farm_Id	-	1 000 m	2 000 m	
		Co214	Nooitgedacht	-	1 000 m	2 000 m	
		Co215	Nooitgedacht	-	1 000 m	2 000 m	
		Co216	Nooitgedacht	-	1 000 m	2 000 m	
		Co217	Norfolk, The Horn, Wigton and Lillydale	-	1 000 m	2 000 m	
		Co218	Null	-	1 000 m	2 000 m	
		Co219	Nuwe De Kalk	-	1 000 m	2 000 m	
		Co220	Nuwejaarsfontein	-	1 000 m	2 000 m	
		Co221	Nuwemoed	-	1 000 m	2 000 m	
		Co222	Olienberg	-	1 000 m	2 000 m	
		Co223	Ongelukskop and Zoetvlei	-	1 000 m	2 000 m	
		Co224	Onrusfontein and Kalkfontein	-	1 000 m	2 000 m	
		Co225	Oosthuizenfontein	-	1 000 m	2 000 m	
		Co226	Orange Grove	-	1 000 m	2 000 m	
		Co227	Orange Valley and Elandskuilen	-	1 000 m	2 000 m	
		Co228	Oudam	-	1 000 m	2 000 m	
		Co229	Paalkraal	-	1 000 m	2 000 m	
		Co230	Paardeberg	-	1 000 m	2 000 m	
		Co231	Paauwpan	-	1 000 m	2 000 m	
		Co232	Palmietfontein	-	1 000 m	2 000 m	
		Co233	Palmietfontein	-	1 000 m	2 000 m	
		Co234	Palmietfontein	-	1 000 m	2 000 m	
		Co235	Palmietfontein and Skietkuil	-	1 000 m	2 000 m	
		Co236	Panorama	-	1 000 m	2 000 m	
		Co237	Pelzersbaken and Droogeheuwel	-	1 000 m	2 000 m	
		Co238	Perdeput and Wildehondehoek	-	1 000 m	2 000 m	
		Co239	Perskedam	-	1 000 m	2 000 m	
		Co240	Plaatfontein	-	1 000 m	2 000 m	
		Co241	Platfontein	-	1 000 m	2 000 m	
		Co242	Plessisdam and Stryddam	-	1 000 m	2 000 m	
		Co243	Plooysdam and Rooidam	-	1 000 m	2 000 m	
		Co244	Poortje	-	1 000 m	2 000 m	
		Co245	Potfontein and Skaapkraal	-	1 000 m	2 000 m	
		Co246	Ramah	-	1 000 m	2 000 m	
		Co247	Reebokfontein	-	1 000 m	2 000 m	
		Co248	Regina	-	1 000 m	2 000 m	

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CENTRAL CORRIDOR

Corridor	Feature Class	GIS Visual ID	Feature Name / Type	V. high sensitivity buffer	High sensitivity buffer	Moderate sensitivity buffer	Attributes, significance, observations
		Co249	Renekespan	-	1 000 m	2 000 m	
		Co250	Rheeboksfontein	-	1 000 m	2 000 m	
		Co251	Rhenosterspruit	-	1 000 m	2 000 m	
		Co252	Rhenostervlakte and Rhenosterfontein	-	1 000 m	2 000 m	
		Co253	Rietfontein	-	1 000 m	2 000 m	
		Co254	Rietfontein	-	1 000 m	2 000 m	
		Co255	Rietfontein	-	1 000 m	2 000 m	
		Co256	Rietfontein	-	1 000 m	2 000 m	
		Co257	Rietfontein	-	1 000 m	2 000 m	
		Co258	Rietgat and Mimeskloof	-	1 000 m	2 000 m	
		Co259	Rietpoort	-	1 000 m	2 000 m	
		Co260	Riversdale	-	1 000 m	2 000 m	
		Co261	Roan Camp	-	1 000 m	2 000 m	
		Co262	Roodekraal	-	1 000 m	2 000 m	
		Co263	Roodelaagte	-	1 000 m	2 000 m	
		Co264	Rooifontein	-	1 000 m	2 000 m	
		Co265	Rooikraal	-	1 000 m	2 000 m	
		Co266	Rooilaagte	-	1 000 m	2 000 m	
		Co267	Rooiwal	-	1 000 m	2 000 m	
		Co268	Roscomon	-	1 000 m	2 000 m	
		Co269	Rosslands Ranch	-	1 000 m	2 000 m	
		Co270	Ruigtepoort	-	1 000 m	2 000 m	
		Co271	Rus En Vrede	-	1 000 m	2 000 m	
		Co272	Rust En Vrede Game Camp	-	1 000 m	2 000 m	
		Co273	Ryssel	-	1 000 m	2 000 m	
		Co274	Saaidam	-	1 000 m	2 000 m	
		Co275	Sakriver	-	1 000 m	2 000 m	
		Co276	Samaria and Tafelkop	-	1 000 m	2 000 m	
		Co277	Sanddam, Wolwepan and Loskop	-	1 000 m	2 000 m	
		Co278	Sandfontein	-	1 000 m	2 000 m	
		Co279	Schmidskuilen	-	1 000 m	2 000 m	
		Co280	Schoemansfontein	-	1 000 m	2 000 m	
		Co281	Scholtzfontein-Suid	-	1 000 m	2 000 m	
		Co282	Schutsekama	-	1 000 m	2 000 m	
		Co283	Selborne	-	1 000 m	2 000 m	
		Co284	Serfonteinshoop	-	1 000 m	2 000 m	
		Co285	Slingersfontein	-	1 000 m	2 000 m	
		Co286	Slingershoek	-	1 000 m	2 000 m	
		Co287	Snymansdam	-	1 000 m	2 000 m	
		Co288	Snymanshof	-	1 000 m	2 000 m	

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CENTRAL CORRIDOR

Corridor	Feature Class	GIS Visual ID	Feature Name / Type	V. high sensitivity buffer	High sensitivity buffer	Moderate sensitivity buffer	Attributes, significance, observations
		Co289	Soutaar	-	1 000 m	2 000 m	
		Co290	South Merino and Biesman	-	1 000 m	2 000 m	
		Co291	Spioenkop Wildkamp 2	-	1 000 m	2 000 m	
		Co292	Spioenkop2	-	1 000 m	2 000 m	
		Co293	Spitskop	-	1 000 m	2 000 m	
		Co294	Spitskop	-	1 000 m	2 000 m	
		Co295	Spytfontein	-	1 000 m	2 000 m	
		Co296	Steenbokvlakte	-	1 000 m	2 000 m	
		Co297	Sterboom	-	1 000 m	2 000 m	
		Co298	Stofpan	-	1 000 m	2 000 m	
		Co299	Strydfontein	-	1 000 m	2 000 m	
		Co300	Stuurmanskuil	-	1 000 m	2 000 m	
		Co301	Stuurmanspan	-	1 000 m	2 000 m	
		Co302	Suffolk	-	1 000 m	2 000 m	
		Co303	Swartkoppies	-	1 000 m	2 000 m	
		Co304	Swartkoppies	-	1 000 m	2 000 m	
		Co305	Sweethome	-	1 000 m	2 000 m	
		Co306	Syferfontein	-	1 000 m	2 000 m	
		Co307	Taaiboschpoort	-	1 000 m	2 000 m	
		Co308	Taayboschdraai	-	1 000 m	2 000 m	
		Co309	Tafelkop	-	1 000 m	2 000 m	
		Co310	Tarentaalrand	-	1 000 m	2 000 m	
		Co311	Teerputsdam	-	1 000 m	2 000 m	
		Co312	The Grange	-	1 000 m	2 000 m	
		Co313	Tomsgat and Swartkoppies	-	1 000 m	2 000 m	
		Co314	Tuinfontein	-	1 000 m	2 000 m	
		Co315	Una	-	1 000 m	2 000 m	
		Co316	Vaalkop	-	1 000 m	2 000 m	
		Co317	Valschfontein	-	1 000 m	2 000 m	
		Co318	Van Den Berg's Rust	-	1 000 m	2 000 m	
		Co319	Vanwyngaardspan	-	1 000 m	2 000 m	
		Co320	Varkfontein	-	1 000 m	2 000 m	
		Co321	Veehthoek	-	1 000 m	2 000 m	
		Co322	Venterspoort and Biesiesvlei	-	1 000 m	2 000 m	
		Co323	Verborgenfontein Et Al.	-	1 000 m	2 000 m	
		Co324	Vergelegen	-	1 000 m	2 000 m	
		Co325	Victoria	-	1 000 m	2 000 m	
		Co326	Viljoen'shof	-	1 000 m	2 000 m	
		Co327	Viljoensrus	-	1 000 m	2 000 m	
		Co328	Villeria	-	1 000 m	2 000 m	

CENTRAL CORRIDOR

Corridor	Feature Class	GIS Visual ID	Feature Name / Type	V. high sensitivity buffer	High sensitivity buffer	Moderate sensitivity buffer	Attributes, significance, observations
		Co329	Vlakfontein	-	1 000 m	2 000 m	
		Co330	Vlakplaas	-	1 000 m	2 000 m	
		Co331	Vleiplaas Game Camp	-	1 000 m	2 000 m	
		Co332	Vloekpoort	-	1 000 m	2 000 m	
		Co333	Voelfontein	-	1 000 m	2 000 m	
		Co334	Voelfontein and Blydskap	-	1 000 m	2 000 m	
		Co335	Voermanshoek	-	1 000 m	2 000 m	
		Co336	Volstruisput	-	1 000 m	2 000 m	
		Co337	Voorspoed	-	1 000 m	2 000 m	
		Co338	Vrede and Basberg	-	1 000 m	2 000 m	
		Co339	Vryheid	-	1 000 m	2 000 m	
		Co340	Wag `N Bietjie	-	1 000 m	2 000 m	
		Co341	Wagenaarskraal	-	1 000 m	2 000 m	
		Co342	Welgegund	-	1 000 m	2 000 m	
		Co343	Weltevrede	-	1 000 m	2 000 m	
		Co344	Weltevreden	-	1 000 m	2 000 m	
		Co345	Werda	-	1 000 m	2 000 m	
		Co346	Westphaliia Park	-	1 000 m	2 000 m	
		Co347	Wildehondepan and Riverside	-	1 000 m	2 000 m	
		Co348	Wilgefontein	-	1 000 m	2 000 m	
		Co349	Winterhoek	-	1 000 m	2 000 m	
		Co350	Wintershoek	-	1 000 m	2 000 m	
		Co351	Winterson	-	1 000 m	2 000 m	
		Co352	Witpan and Spytfontein	-	1 000 m	2 000 m	
		Co353	Witpoort	-	1 000 m	2 000 m	
		Co354	Witput	-	1 000 m	2 000 m	
		Co355	Wolfhuis	-	1 000 m	2 000 m	
		Co356	Woltemade	-	1 000 m	2 000 m	
		Co357	Wolwefontein	-	1 000 m	2 000 m	
		Co358	Wolwekuil and Grasbult	-	1 000 m	2 000 m	
		Co359	Wonderboom	-	1 000 m	2 000 m	
		Co360	Wonderdraai	-	1 000 m	2 000 m	
		Co361	Zeerust	-	1 000 m	2 000 m	
		Co362	Zilkaatsnek	-	1 000 m	2 000 m	
		Co363	Zoetendal	-	1 000 m	2 000 m	
		Co364	Zoetvallei	-	1 000 m	2 000 m	
		Co365	Zoutfontein	-	1 000 m	2 000 m	
	Cultural Landscapes	Cl1	Berg River Valley	-	500 m	1 000 m	Vineyards, wine routes, wheatland, historical towns. Regional scenic and cultural value.
		Cl2	Breede River Valley	-	500 m	1 000 m	Vineyards, wine routes, wheatland, historical towns. Regional scenic and cultural value.
		Cl3	Hex River Valley	-	500 m	1 000 m	Vineyards, wine routes. Regional scenic and cultural value.

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CENTRAL CORRIDOR

Corridor	Feature Class	GIS Visual ID	Feature Name / Type	V. high sensitivity buffer	High sensitivity buffer	Moderate sensitivity buffer	Attributes, significance, observations
	Heritage and Archaeological Sites	Ch	See heritage study				
	Historical Towns and Villages	Ct1	Akasia	500 m	1 000 m	2 000 m	
		Ct2	Alberton	500 m	1 000 m	2 000 m	
		Ct3	Alexandra	500 m	1 000 m	2 000 m	
		Ct4	Allanridge	500 m	1 000 m	2 000 m	
		Ct5	Atlantis	500 m	1 000 m	2 000 m	
		Ct6	Beaufort West	500 m	1 000 m	2 000 m	Karoo town on the banks of the Gamka River. (1820).
		Ct7	Bellville	500 m	1 000 m	2 000 m	
		Ct8	Benoni	500 m	1 000 m	2 000 m	
		Ct9	Blouberg	500 m	1 000 m	2 000 m	
		Ct10	Boksburg	500 m	1 000 m	2 000 m	
		Ct11	Boshof	500 m	1 000 m	2 000 m	Free State town (1855). Includes a municipal nature reserve.
		Ct12	Bothaville	500 m	1 000 m	2 000 m	On the banks of the Valsrivier in the Free State. (1893).
		Ct13	Brakpan	500 m	1 000 m	2 000 m	
		Ct14	Britstown	500 m	1 000 m	2 000 m	N. Cape town, (1877). Sheep farming centre.
		Ct15	Cape Town	500 m	1 000 m	2 000 m	
		Ct16	Carletonville	500 m	1 000 m	2 000 m	
		Ct17	Centurion	500 m	1 000 m	2 000 m	
		Ct18	Ceres	500 m	1 000 m	2 000 m	W. Cape town on banks of Dwars River. Fruit-growing and recreation centre.
		Ct19	Darling	500 m	1 000 m	2 000 m	W. Cape town, (1853). Dairy farming centre and spring flowers.
		Ct20	De Aar	500 m	1 000 m	2 000 m	N. Cape railway centre. (1881).
		Ct21	De Doorns	500 m	1 000 m	2 000 m	W. Cape town, (1875). Wine farming centre in the Hex River Valley.
		Ct22	Dealesville	500 m	1 000 m	2 000 m	Free State farming centre with mineral springs.
		Ct23	Delft	500 m	1 000 m	2 000 m	
		Ct24	Delmas	500 m	1 000 m	2 000 m	
		Ct25	Diepkloof	500 m	1 000 m	2 000 m	
		Ct26	Durbanville	500 m	1 000 m	2 000 m	
		Ct27	Edenvale	500 m	1 000 m	2 000 m	
		Ct28	Ennerdale	500 m	1 000 m	2 000 m	
		Ct29	Evaton	500 m	1 000 m	2 000 m	
		Ct30	Germiston	500 m	1 000 m	2 000 m	
		Ct31	Gouda	500 m	1 000 m	2 000 m	
		Ct32	Grotto Bay	500 m	1 000 m	2 000 m	
		Ct33	Hartbeesfontein	500 m	1 000 m	2 000 m	Small town NW of Klerksdorp.
		Ct34	Heidelberg	500 m	1 000 m	2 000 m	
		Ct35	Hoopstad	500 m	1 000 m	2 000 m	
		Ct36	Hopefield	500 m	1 000 m	2 000 m	W. Cape town, (1844). Farming centre in the Soutrivier valley. Important palaeontological area
		Ct37	Hopetown	500 m	1 000 m	2 000 m	N. Cape town on Gariep River, (1854). Once a diamond-rush town.
		Ct38	Jacobsdal	500 m	1 000 m	2 000 m	Free State town on the Riet River. Anglo-Boer War blockhouse on the outskirts.
		Ct39	Johannesburg	500 m	1 000 m	2 000 m	

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CENTRAL CORRIDOR

Corridor	Feature Class	GIS Visual ID	Feature Name / Type	V. high sensitivity buffer	High sensitivity buffer	Moderate sensitivity buffer	Attributes, significance, observations
		Ct40	Kalbaskraal	500 m	1 000 m	2 000 m	
		Ct41	Katlehong	500 m	1 000 m	2 000 m	
		Ct42	Kempton Park	500 m	1 000 m	2 000 m	
		Ct43	Kimberley	500 m	1 000 m	2 000 m	N. Cape town famous for its diamond mining.
		Ct44	Klapmuts	500 m	1 000 m	2 000 m	
		Ct45	Klerksdorp	500 m	1 000 m	2 000 m	North West town. Centre of a gold rush in the mid 1880s.
		Ct46	Koffiefontein	500 m	1 000 m	2 000 m	Free State town. Centre of diamond mining since 1882.
		Ct47	Koringberg	500 m	1 000 m	2 000 m	
		Ct48	Krugersdorp	500 m	1 000 m	2 000 m	
		Ct49	Lawley	500 m	1 000 m	2 000 m	
		Ct50	Leeu Gamka	500 m	1 000 m	2 000 m	
		Ct51	Leeudoringstad	500 m	1 000 m	2 000 m	
		Ct52	Lenasia	500 m	1 000 m	2 000 m	
		Ct53	Magaliesburg	500 m	1 000 m	2 000 m	
		Ct54	Malmesbury	500 m	1 000 m	2 000 m	W. Cape town, (1829). Wheat-growing centre of the Swartland.
		Ct55	Mamre	500 m	1 000 m	2 000 m	W. Cape mission village, (1808).
		Ct56	Matjiesfontein	500 m	1 000 m	2 000 m	W. Cape town. Historical railway siding and hotel village.
		Ct57	Matroosfontein	500 m	1 000 m	2 000 m	
		Ct58	Meadowlands East	500 m	1 000 m	2 000 m	
		Ct59	Meadowlands West	500 m	1 000 m	2 000 m	
		Ct60	Melkbosstrand	500 m	1 000 m	2 000 m	
		Ct61	Meyerton	500 m	1 000 m	2 000 m	
		Ct62	Midrand	500 m	1 000 m	2 000 m	
		Ct63	Mitchells Plain	500 m	1 000 m	2 000 m	
		Ct64	Mooreesburg	500 m	1 000 m	2 000 m	W. Cape town, (1898). Wheat and wool farming centre.
		Ct65	Nelspoort	500 m	1 000 m	2 000 m	
		Ct66	Nigel	500 m	1 000 m	2 000 m	
		Ct67	Odendaalsrus	500 m	1 000 m	2 000 m	Oldest gold fields town in the Free State.
		Ct68	Olifantsfontein	500 m	1 000 m	2 000 m	
		Ct69	Orkney	500 m	1 000 m	2 000 m	North West town on the Vaal River, (1940). Gold mining centre.
		Ct70	Paarl	500 m	1 000 m	2 000 m	W. Cape town on the Berg River, (1687). Historical wine farming area.
		Ct71	Parys	500 m	1 000 m	2 000 m	Free State town on the Vaal River, (1887). Farming and holiday resort centre.
		Ct72	Philadelphia	500 m	1 000 m	2 000 m	W. Cape historical village.
		Ct73	Philippi	500 m	1 000 m	2 000 m	
		Ct74	Philipstown	500 m	1 000 m	2 000 m	N. Cape town, (1863). Sheep farming centre.
		Ct75	Piketberg	500 m	1 000 m	2 000 m	W. Cape town, (1835). Wheat and fruit farming centre.
		Ct76	Pniel	500 m	1 000 m	2 000 m	
		Ct77	Porterville	500 m	1 000 m	2 000 m	W. Cape town, (1863). Wheat and fruit farming centre.
		Ct78	Potchefstroom	500 m	1 000 m	2 000 m	North West town in the Mooi River Valley, (1838). University town.
		Ct79	Pretoria	500 m	1 000 m	2 000 m	

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CENTRAL CORRIDOR

Corridor	Feature Class	GIS Visual ID	Feature Name / Type	V. high sensitivity buffer	High sensitivity buffer	Moderate sensitivity buffer	Attributes, significance, observations
		Ct80	Prince Alfred Hamlet	500 m	1 000 m	2 000 m	
		Ct81	Randburg	500 m	1 000 m	2 000 m	
		Ct82	Randfontein	500 m	1 000 m	2 000 m	
		Ct83	Richmond	500 m	1 000 m	2 000 m	N. Cape town in the Karoo, (1843).
		Ct84	Riebeeck-West	500 m	1 000 m	2 000 m	W. Cape town. Historic farming area.
		Ct85	Riebeek-Kasteel	500 m	1 000 m	2 000 m	W. Cape town. Historic farming area.
		Ct86	Ritchie	500 m	1 000 m	2 000 m	
		Ct87	Roodeplaat	500 m	1 000 m	2 000 m	
		Ct88	Roodepoort	500 m	1 000 m	2 000 m	
		Ct89	Saron	500 m	1 000 m	2 000 m	W. Cape mission settlement near Riebeek-West.
		Ct90	Sasolburg	500 m	1 000 m	2 000 m	
		Ct91	Sebokeng	500 m	1 000 m	2 000 m	
		Ct92	Simon's Town	500 m	1 000 m	2 000 m	
		Ct93	Somerset West	500 m	1 000 m	2 000 m	
		Ct94	Soshanguve	500 m	1 000 m	2 000 m	
		Ct95	Soutpan	500 m	1 000 m	2 000 m	
		Ct96	Soweto	500 m	1 000 m	2 000 m	
		Ct97	Springs	500 m	1 000 m	2 000 m	
		Ct98	Stellenbosch	500 m	1 000 m	2 000 m	W. Cape town on the Eerste River, (1679). Historical wine farming area.
		Ct99	Sutherland	500 m	1 000 m	2 000 m	N. Cape town in the Roggeveld, (1857). SA Astronomical Observatory nearby.
		Ct100	Tembisa	500 m	1 000 m	2 000 m	
		Ct101	Touws River	500 m	1 000 m	2 000 m	W. Cape town, (1893). Railway junction and farming centre.
		Ct102	Tulbagh	500 m	1 000 m	2 000 m	W. Cape town, (1743). Historical wine farming area.
		Ct103	Vaal Oewer	500 m	1 000 m	2 000 m	
		Ct104	Van der Kloof	500 m	1 000 m	2 000 m	
		Ct105	Vanderbijlpark	500 m	1 000 m	2 000 m	
		Ct106	Vereeniging	500 m	1 000 m	2 000 m	
		Ct107	Victoria West	500 m	1 000 m	2 000 m	N. Cape town, (1843). Karoo wool farming centre.
		Ct108	Viljoenskroon	500 m	1 000 m	2 000 m	
		Ct109	Vosloorus	500 m	1 000 m	2 000 m	
		Ct110	Vredefort	500 m	1 000 m	2 000 m	Free State town, (1876). Farming centre. Vredefort Dome of geological interest.
		Ct111	Welkom	500 m	1 000 m	2 000 m	
		Ct112	Wellington	500 m	1 000 m	2 000 m	W. Cape town, (1840). Dried fruit industry and education centre.
		Ct113	Wesselsbron	500 m	1 000 m	2 000 m	
		Ct114	Westonaria	500 m	1 000 m	2 000 m	
		Ct115	Witpoort	500 m	1 000 m	2 000 m	
		Ct116	Wolseley	500 m	1 000 m	2 000 m	W. Cape town, (1893). Wine and fruit farming centre.
		Ct117	Worcester	500 m	1 000 m	2 000 m	W. Cape town on the Berg River, (1820). Historical wine farming area. Karoo Botanical G.
		Ct118	Yzerfontein	500 m	1 000 m	2 000 m	
	National Roads	Ca1	N2 National Road	500 m	1 000 m	2 000 m	Cape Town – Cape Flats section.

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CENTRAL CORRIDOR

Corridor	Feature Class	GIS Visual ID	Feature Name / Type	V. high sensitivity buffer	High sensitivity buffer	Moderate sensitivity buffer	Attributes, significance, observations
		Ca2	N1 National Road	500 m	1 000 m	2 000 m	Cape Town – Worcester – Beaufort West – Johannesburg.
		Ca3	N7 National Road	500 m	1 000 m	2 000 m	Cape Town - Piketberg
		Ca4	N12 National Road	500 m	1 000 m	2 000 m	Three Sisters – Johannesburg section.
		Ca5	N10 National Road	500 m	1 000 m	2 000 m	Britstown – De Aar – Hanover section.
		Ca6	N8 National Road	500 m	1 000 m	2 000 m	Kimberley – Bloemfontein section.
		Ca7	N3 National Road	500 m	1 000 m	2 000 m	Heidelberg – Johannesburg section.
		Ca8	N4 National Road	500 m	1 000 m	2 000 m	Magaliesberg – Pretoria – Bronkhorstspruit section.
		Ca9	N14 National Road	500 m	1 000 m	2 000 m	Pretoria - Ventersdorp
		Ca10	N17 National Road	500 m	1 000 m	2 000 m	Johannesburg - Springs
	Arterial / Provincial Roads	Cb1	R27	250 m	500 m	1 000 m	West Coast road
		Cb2	R304	250 m	500 m	1 000 m	Mamre - Darling
		Cb3	R407	250 m	500 m	1 000 m	Prince Albert Road
		Cb4	R61	250 m	500 m	1 000 m	Beaufort West - Aberdeen
		Cb5	R63	250 m	500 m	1 000 m	Victoria West - Murraysburg
		Cb6	R48	250 m	500 m	1 000 m	De Aar – Vanderkloof - Koffiefontein
		Cb7	R369	250 m	500 m	1 000 m	Vanderkloof - Hope Town
		Cb8	R705	250 m	500 m	1 000 m	Ritchie - Petrusburg
		Cb9	R64	250 m	500 m	1 000 m	Kimberley – Boshof - Bloemfontein
		Cb10	R708	250 m	500 m	1 000 m	Christiana - Theunissen
		Cb11	R34	250 m	500 m	1 000 m	Bloemhof - Odendaalsrus
		Cb12	R30	250 m	500 m	1 000 m	Welkomm - Ventersdorp
		Cb13	R76	250 m	500 m	1 000 m	Kroonstad – Tlokwe (Potchefstroom)
		Cb14	R59	250 m	500 m	1 000 m	Hoopstad – Bothaville - Parys
		Cb15	R502	250 m	500 m	1 000 m	Wolmaransstad - Orkney
		Cb16	R53	250 m	500 m	1 000 m	Tlokwe (Potchefstroom) - Ventersdorp
		Cb17	R500	250 m	500 m	1 000 m	Parys - Carletonville
	Scenic Routes / Passes / Poorts	Cs1	Cape Peninsula routes	1 000 m	2 000 m	3 000 m	M6, M63, M65, M4, Boyes Drive, Ou Kaapseweg, Redhill
		Cs2	R310 Baden Powell Dr.	1 000 m	2 000 m	3 000 m	False Bay coast incl. Wolfgat nature Reserve.
		Cs3	R44, R45 Routes	1 000 m	2 000 m	3 000 m	Wine routes. Regional scenic value
		Cs4	Nuwekloof Pass	1 000 m	2 000 m	3 000 m	R44 Route W of Tulbagh. Local scenic value.
		Cs5	Dasklip Pass	1 000 m	2 000 m	3 000 m	District road to Groot Winterhoek. Local scenic value.
		Cs6	Mitchell's Pass	1 000 m	2 000 m	3 000 m	R303 Route S of Ceres. Local scenic and heritage value.
		Cs7	Gydo Pass	1 000 m	2 000 m	3 000 m	R303 Route N of Ceres. Local scenic value.
		Cs8	Theronsberg Pass	1 000 m	2 000 m	3 000 m	R46 Route E of Ceres. Includes Karoo Poort. Local scenic value.
		Cs9	Helshoogte Pass	1 000 m	2 000 m	3 000 m	E of Stellenbosch. Local scenic and heritage value.
		Cs10	Bain's Kloof Pass	1 000 m	2 000 m	3 000 m	R303 Route E of Wellington. Regional scenic and heritage value.
		Cs11	Du Toit's Kloof Pass	1 000 m	2 000 m	3 000 m	N1 Route between Paarl and Worcester. Regional scenic and heritage value.
		Cs12	Hex River Pass	1 000 m	2 000 m	3 000 m	N1 Route between De Doorns and Touwsrivier. Regional scenic value.
		Cs13	Ouberg Pass	1 000 m	2 000 m	3 000 m	District road W of Sutherland. Local scenic value.
		Cs14	Verlatekloof, Rooikloof	1 000 m	2 000 m	3 000 m	R354 south of Sutherland to Matjiesfontein. Local scenic value.

CENTRAL CORRIDOR

Corridor	Feature Class	GIS Visual ID	Feature Name / Type	V. high sensitivity buffer	High sensitivity buffer	Moderate sensitivity buffer	Attributes, significance, observations
		Cs15	Komsberg Pass	1 000 m	2 000 m	3 000 m	District road S of Sutherland. Local scenic value.
		Cs16	Teekloof Pass	1 000 m	2 000 m	3 000 m	R353 Route S of Fraserburg, in Nuweveld Mts. Local scenic value.
		Cs17	Oukloof Pass	1 000 m	2 000 m	3 000 m	District road S of Fraserburg, in Nuweveld Mts. Local scenic value.
		Cs18	Roseberg / Molteno Passes	1 000 m	2 000 m	3 000 m	R381 Route N of Beaufort West, in Nuweveld Mts. Adjacent to Karoo NP. Local scenic value.
		Cs19	Magaliesberg area	1 000 m	2 000 m	3 000 m	R560 / R513, includes Magaliesberg Nature Area, Hartbeespoort Dam. Local scenic value.
	Passenger Rail Lines	Cv1	Cape Town - Johannesburg	250 m	500 m	1 000 m	
		Cv2	De Aar – Port Elizabeth	250 m	500 m	1 000 m	
		Cv3	Kimberley - Bloemfontein	250 m	500 m	1 000 m	
		Cv4	Johannesburg - Messina	250 m	500 m	1 000 m	
		Cv5	Pretoria - Nelspruit	250 m	500 m	1 000 m	
		Cv6	Johannesburg - Durban	250 m	500 m	1 000 m	
		Cv7	Johannesburg – Bloemf'tein	250 m	500 m	1 000 m	
	SALT	Cx1	Sutherland Astronomical Observatory	5 000 m	-	-	Roggeveld area. National scientific, cultural and tourism value.

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EASTERN CORRIDOR

Corridor	Feature Class	GIS Visual I	Feature Name / Type	V. high sensitivity buffer	High sensitivity buffer	Moderate sensitivity buffer	Attributes, significance, observations
Eastern	Landforms / Geological Features / Steep Slopes	Em1	Oorlogspoort Mts.	-	500 m	1 000 m	Between Beaufort West and Aberdeen. Local scenic value.
		Em2	Wolwekop, Mispunt	-	500 m	1 000 m	SW of Murraysburg. Local scenic value.
		Em3	Middelkop	-	500 m	1 000 m	W of Murraysburg. Local scenic value.
		Em4	Onder Sneuuberg	-	500 m	1 000 m	SE of Murraysburg. Regional scenic value.
		Em5	Kamdebooberg	-	500 m	1 000 m	NW of Aberdeen. Regional scenic value.
		Em6	Toorberg	-	500 m	1 000 m	N of Aberdeen. Regional scenic value.
		Em7	Kamdebooberg	-	500 m	1 000 m	NE of Aberdeen. Regional scenic value.
		Em8	Suurberg	-	500 m	1 000 m	NE of Aberdeen. Local scenic value.
		Em9	Valley of Desolation	-	500 m	1 000 m	W of Graaff-Reinet. Regional scenic, geological and historical value.
		Em10	Tandjiesberg, Aasvoelberg	-	500 m	1 000 m	SE of Graaff-Reinet. Local scenic value.
		Em11	Rooiberge	-	500 m	1 000 m	E of Aberdeen. Local scenic value.
		Em12	Bassonberg	-	500 m	1 000 m	NW of Jansenville. Local scenic value.
		Em13	Buffelshoekkop	-	500 m	1 000 m	NE of Jansenville. Local scenic value.
		Em14	Ouberg	-	500 m	1 000 m	E of Jansenville. Local scenic value.
		Em15	Grootrivier Mts.	-	500 m	1 000 m	N of Steytlerville. Local scenic value.
		Em16	Klein Winterhoek Mts.	-	500 m	1 000 m	W of Kirkwood. Regional scenic value.
		Em17	Suurberge	-	500 m	1 000 m	N of Port Elizabeth. Includes Zuurberg and Addo National parks. Regional scenic value.
		Em18	Swartwatersberg	-	500 m	1 000 m	W of Grahamstown. Local scenic value.
		Em19	Groot Winterhoek Mts.	-	500 m	1 000 m	NW of Port Elizabeth. Regional scenic value. Local scenic value.
		Em20	Elandsberg Mts.	-	500 m	1 000 m	W of Port Elizabeth. Regional scenic value. Local scenic value.
		Em21	Fish River Rand	-	500 m	1 000 m	NW of Grahamstown. Fish River gorge. Local scenic value.
		Em22	Winterberg Mts.	-	500 m	1 000 m	N of Bedford/ Fort Beaufort. Incl. Baviaansrivier Mts, Didima Range. Regional scenic value.
		Em23	Toorberg	-	500 m	1 000 m	N of Tarkastad. Includes Golden Valley. Local scenic value.
		Em24	Middelberg	-	500 m	1 000 m	NE of Tarkastad. Peak 2042m. Local scenic value.
		Em25	Bamboesberg	-	500 m	1 000 m	W of Sterkstroom. Includes Aasvoelberg 2207m. Local scenic value.
		Em26	Mount Steep	-	500 m	1 000 m	N of Queenstown. Includes Black Eagle Private NR. Local scenic value.
		Em27	Doleritic mountains	-	500 m	1 000 m	N and S of Queenstown. Dolerite dykes and cills. Local scenic value.
		Em28	Mount Arthur Range	-	500 m	1 000 m	S of Indwe. Local scenic value.
		Em29	Drakensberg	-	500 m	1 000 m	N of Indwe and Elliot. Regional scenic value.
		Em30	Mzimvubu River hills	-	500 m	1 000 m	NW of Port St Johns, Transkei. River gorges. Local scenic value.
		Em31	Ntsizwa	-	500 m	1 000 m	SW of Kokstad. Local scenic value.
		Em32	Ngele	-	500 m	1 000 m	SE of Kokstad. Local scenic value.
		Em33	Mtentu River hills	-	500 m	1 000 m	W of Port Edward. River gorges. Local scenic value.
		Em34	Mtamvuna River hills	-	500 m	1 000 m	NW of Port Edward. River gorges. Local scenic value.
		Em35	Mzimkhulu, Mzumbe R. hills	-	500 m	1 000 m	E of Harding. River gorges. Local scenic value.
		Em36	Mkomazi River hills	-	500 m	1 000 m	W of Umkomaas. River gorges. Local scenic value.
		Em37	Valley of a Thousand Hills	-	500 m	1 000 m	NW of Durban. Mgeni River gorges. Regional scenic value.
		Em38	Mvoti River hills	-	500 m	1 000 m	W of KwaDukuza. River gorges. Local scenic value.
	Major and Perennial Rivers	Er1	Sundays River	500 m	1 000 m	2 000 m	Rises in the Camdeboo area. Regional scenic and recreation value.

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EASTERN CORRIDOR

Corridor	Feature Class	GIS Visual I	Feature Name / Type	V. high sensitivity buffer	High sensitivity buffer	Moderate sensitivity buffer	Attributes, significance, observations
		Er2	Great Fish River	500 m	1 000 m	2 000 m	Major river of the E. Cape with estuary NE of Port Alfred. Regional scenic, recreation value.
		Er3	Kei River	500 m	1 000 m	2 000 m	SE of Queenstown. Includes Swart Kei and Wit Kei Rivers. Local scenic value.
		Er4	Mzimvubu River	500 m	1 000 m	2 000 m	NW of Port St Johns. Local scenic value.
		Er5	Msikaba River	500 m	1 000 m	2 000 m	SE of Flagstaff. Local scenic value.
		Er6	Mtentu River	500 m	1 000 m	2 000 m	E of Flagstaff. Local scenic value.
		Er7	Mtamvuna River	500 m	1 000 m	2 000 m	NW of Port Edward. Local scenic value.
		Er8	Mzimkhulu River	500 m	1 000 m	2 000 m	E of Harding. Local scenic value.
		Er9	Mzumbe River	500 m	1 000 m	2 000 m	NW of Port Shepstone. Local scenic value.
		Er10	Mkomazi River	500 m	1 000 m	2 000 m	NW of Umkomaas. Local scenic value.
		Er11	Mgeni River (Umgeni)	500 m	1 000 m	2 000 m	N of Durban. Local scenic value.
		Er12	Mvoti River	500 m	1 000 m	2 000 m	W of KwaDukuza. Local scenic value.
	Water Bodies / Dams / Wetlands	Ew1	Vanryneveldspas Dam	500 m	1 000 m	2 000 m	N. of Graff-Reinet. Local scenic value.
		Ew2	Darlington Dam	500 m	1 000 m	2 000 m	On Sundays River, N of Suurberg mts. In Addo Elephant NP. Local scenic value.
		Ew3	Lake Arthur	500 m	1 000 m	2 000 m	E of Cradock. Local scenic value.
		Ew4	Kommandodrif Dam	500 m	1 000 m	2 000 m	E of cradock. Local scenic value.
		Ew5	Xonxa Dam	500 m	1 000 m	2 000 m	E of Queenstown. Local scenic value.
		Ew6	Lubisi Dam	500 m	1 000 m	2 000 m	E of Queenstown. Local scenic value.
		Ew7	Ncora Dam	500 m	1 000 m	2 000 m	E of Queenstown. Local scenic value.
		Ew8	Mthatha Dam	500 m	1 000 m	2 000 m	N of Mthatha. Local scenic value.
		Ew9	Inanda Dam	500 m	1 000 m	2 000 m	N of Durban on Mgeni River. Local scenic value.
		Ew10	Midmar Dam	500 m	1 000 m	2 000 m	SW of Howick. Local scenic value.
		Ew11	Albert Falls Dam	500 m	1 000 m	2 000 m	N of Pietermaritzburg. Local scenic value.
		Ew12	Nagle Dam	500 m	1 000 m	2 000 m	NW of Durban on Umgeni River.
	Ramsar Sites	Ez1	Ntsikeni Wildlife Reserve	1 000 m	2 000 m	3 000 m	N of Kokstad.
	Coastal zones	Ec1	South Coast	1 000 m	2 000 m	3 000 m	S of Durban.
		Ec2	North Coast	1 000 m	2 000 m	3 000 m	N of Durban.
	National Parks	Ep1	Camdeboo National Park	2 000 m	3 000 m	4 000 m	W of Graaff-Reinet. National conservation and scenic value.
		Ep2	Addo Elephant NP	2 000 m	3 000 m	4 000 m	N of Port Elizabeth. National conservation and scenic value.
	Nature Reserves / Protected areas	Ec1	Aberdeen Nature Reserve	1 000 m	2 000 m	4 000 m	
		Ec2	Albert Falls Nature Reserve	1 000 m	2 000 m	4 000 m	N of Pietermaritzburg. Local conservation and scenic value.
		Ec3	Beachwood Mangroves NR.	1 000 m	2 000 m	4 000 m	
		Ec4	Bizana Nature Reserve	1 000 m	2 000 m	4 000 m	
		Ec5	Bluff Nature Reserve	1 000 m	2 000 m	4 000 m	
		Ec6	Commando Drift Nature R	1 000 m	2 000 m	4 000 m	SW of Tarkastad
		Ec7	Craigie Burn Nature Reserve	1 000 m	2 000 m	4 000 m	SW of Greytown. Local conservation and scenic value.
		Ec8	Doreen Clark Nature R.	1 000 m	2 000 m	4 000 m	
		Ec9	Groendal Wilderness Area	1 000 m	2 000 m	4 000 m	W of Uitenhage. Local conservation and scenic value.
		Ec10	Hilton College Nature R.	1 000 m	2 000 m	4 000 m	
		Ec11	Impendle Nature Reserve	1 000 m	2 000 m	4 000 m	

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EASTERN CORRIDOR

Corridor	Feature Class	GIS Visual ID	Feature Name / Type	V. high sensitivity buffer	High sensitivity buffer	Moderate sensitivity buffer	Attributes, significance, observations
		Ec12	Karkloof Nature Reserve	1 000 m	2 000 m	4 000 m	N of Howick. Local conservation and scenic value.
		Ec13	Karoo Nature Reserve	1 000 m	2 000 m	4 000 m	
		Ec14	Kenneth Stainbank Nature R	1 000 m	2 000 m	4 000 m	
		Ec15	Koos Ras Nature Reserve	1 000 m	2 000 m	4 000 m	
		Ec16	Krantzkloof Nature Reserve	1 000 m	2 000 m	4 000 m	
		Ec17	Lawrence de Lange NR	1 000 m	2 000 m	4 000 m	N of Queenstown. Local conservation and scenic value.
		Ec18	Loerie Nature Reserve	1 000 m	2 000 m	4 000 m	
		Ec19	Longhill Nature Reserve	1 000 m	2 000 m	4 000 m	
		Ec20	Midmar Nature Reserve	1 000 m	2 000 m	4 000 m	SW of Howick. Local conservation and scenic value.
		Ec21	Mount Currie NR	1 000 m	2 000 m	4 000 m	N of Kokstad. Local conservation and scenic value.
		Ec22	Mpushini Protected Environ.	1 000 m	2 000 m	4 000 m	
		Ec23	Mt Gilboa Nature Reserve	1 000 m	2 000 m	4 000 m	
		Ec24	Nduli Nature Reserve	1 000 m	2 000 m	4 000 m	
		Ec25	Ngele Nature Reserve	1 000 m	2 000 m	4 000 m	
		Ec26	North Park Nature Reserve	1 000 m	2 000 m	4 000 m	
		Ec27	Oribi Gorge Nature Reserve	1 000 m	2 000 m	4 000 m	W of Port Shepstone. Local conservation and scenic value.
		Ec28	Palmiet Nature Reserve	1 000 m	2 000 m	4 000 m	
		Ec29	Queen Elizabeth Park NR.	1 000 m	2 000 m	4 000 m	
		Ec30	Roselands Nature Reserve	1 000 m	2 000 m	4 000 m	
		Ec31	Soada Forest NR	1 000 m	2 000 m	4 000 m	W of Richmond. Local conservation and scenic value.
		Ec32	Somerset East Bosberg NR.	1 000 m	2 000 m	4 000 m	
		Ec33	Tsolwana Game Reserve	1 000 m	2 000 m	4 000 m	
		Ec34	Uitenhage Nature Reserve	1 000 m	2 000 m	4 000 m	
		Ec35	Umhlanga Lagoon Nature R.	1 000 m	2 000 m	4 000 m	
		Ec36	Umvoti Vlei NR	1 000 m	2 000 m	4 000 m	S of Greytown. Local conservation and scenic value.
		Ec37	Van Stadens R. Wild Flwr R	1 000 m	2 000 m	4 000 m	
		Ec38	Vernon Crookes NR	1 000 m	2 000 m	4 000 m	NW of uMzinto. Local conservation and scenic value.
		Ec39	Zwartkops Valley Nature R.	1 000 m	2 000 m	4 000 m	
		Ec40	Cape Floral Region Protected Areas: Baviaanskloof	1 000 m	2 000 m	4 000 m	
	Private Reserves / Game Farms	Eg1	Amakhala Private Game Reserve	-	1 000 m	2 000 m	
		Eg2	Andriesbergen Private Nature Reserve	-	1 000 m	2 000 m	
		Eg3	Aylesbury Nature Reserve	-	1 000 m	2 000 m	
		Eg4	Bayethe Private Game Reserve	-	1 000 m	2 000 m	
		Eg5	Blaauwbosch Game Farm	-	1 000 m	2 000 m	
		Eg6	Black Eagle Private NR	-	1 000 m	2 000 m	SE of Sterkstroom. Local scenic and tourism value.
		Eg7	Brakkefontein Game Farm	-	1 000 m	2 000 m	
		Eg8	Burchells Safaris	-	1 000 m	2 000 m	
		Eg9	Bushman Sands Game Reserve	-	1 000 m	2 000 m	
		Eg10	Citruslandgoed Game Farm	-	1 000 m	2 000 m	

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EASTERN CORRIDOR

Corridor	Feature Class	GIS Visual I	Feature Name / Type	V. high sensitivity buffer	High sensitivity buffer	Moderate sensitivity buffer	Attributes, significance, observations
		Eg11	Duma Manzi	-	1 000 m	2 000 m	
		Eg12	Ezulu Game Farm	-	1 000 m	2 000 m	
		Eg13	Goodhope Game Farm	-	1 000 m	2 000 m	
		Eg14	Grassridge Private Nature Reserve	-	1 000 m	2 000 m	
		Eg15	Gwahumbe Game & Spa	-	1 000 m	2 000 m	
		Eg16	Highover Nature Reserve	-	1 000 m	2 000 m	
		Eg17	Highthorn Private Game Reserve	-	1 000 m	2 000 m	
		Eg18	Inhlanze Commercial Game Ranch	-	1 000 m	2 000 m	
		Eg19	Inthaba Lodge Game Farm	-	1 000 m	2 000 m	
		Eg20	Kaapse Grysbok Private Nature Reserve	-	1 000 m	2 000 m	
		Eg21	Killarney Isle	-	1 000 m	2 000 m	
		Eg22	Kingsdale Game Farm	-	1 000 m	2 000 m	
		Eg23	Koedoeskop Game Ranch	-	1 000 m	2 000 m	
		Eg24	Kwandwe Private Game Reserve	-	1 000 m	2 000 m	
		Eg25	Kwantu Game Farm	-	1 000 m	2 000 m	
		Eg26	Lalibela Game Reserve	-	1 000 m	2 000 m	NE of Ncanara. Local scenic and tourism value.
		Eg27	Mbona Private Nature R.	-	1 000 m	2 000 m	
		Eg28	Minnawill Game Farm	-	1 000 m	2 000 m	
		Eg29	Monteaux Game Ranch	-	1 000 m	2 000 m	
		Eg30	Montello Safari Lodge	-	1 000 m	2 000 m	
		Eg31	Msinsi Albert Falls	-	1 000 m	2 000 m	
		Eg32	Msinsi Nagle Dam & Game Reserve	-	1 000 m	2 000 m	
		Eg33	Msinsi Shongweni Dam & Game Reserve	-	1 000 m	2 000 m	
		Eg34	no name, see farm_ID	-	1 000 m	2 000 m	
		Eg35	no name, see farm_ID	-	1 000 m	2 000 m	
		Eg36	no name, see farm_ID	-	1 000 m	2 000 m	
		Eg37	no name, see farm_ID	-	1 000 m	2 000 m	
		Eg38	no name, see farm_ID	-	1 000 m	2 000 m	
		Eg39	no name, see farm_ID	-	1 000 m	2 000 m	
		Eg40	no name, see farm_ID	-	1 000 m	2 000 m	
		Eg41	no name, see farm_ID	-	1 000 m	2 000 m	
		Eg42	no name, see farm_ID	-	1 000 m	2 000 m	
		Eg43	no name, see farm_ID	-	1 000 m	2 000 m	
		Eg44	no name, see farm_ID	-	1 000 m	2 000 m	
		Eg45	no name, see farm_ID	-	1 000 m	2 000 m	
		Eg46	no name, see farm_ID	-	1 000 m	2 000 m	
		Eg47	Oribi Game Ranch	-	1 000 m	2 000 m	
		Eg48	Oribi Gorge Game Reserve	-	1 000 m	2 000 m	
		Eg49	Oudekraal Game Farm	-	1 000 m	2 000 m	
		Eg50	Paardekop Game Farm	-	1 000 m	2 000 m	

EASTERN CORRIDOR

Corridor	Feature Class	GIS Visual ID	Feature Name / Type	V. high sensitivity buffer	High sensitivity buffer	Moderate sensitivity buffer	Attributes, significance, observations
		Eg51	Pumba Private Game Reserve	-	1 000 m	2 000 m	
		Eg52	Rockdale Game Farm	-	1 000 m	2 000 m	
		Eg53	Rupert Game Farm	-	1 000 m	2 000 m	
		Eg54	Samara Private Game Reserve	-	1 000 m	2 000 m	
		Eg55	Schuilpatdop Game Farm	-	1 000 m	2 000 m	
		Eg56	Scotia Safaris Game Farm	-	1 000 m	2 000 m	
		Eg57	Shambala Conservancy	-	1 000 m	2 000 m	
		Eg58	Shamwari Game Reserve	-	1 000 m	2 000 m	NE of Ncanara. Local scenic and tourism value.
		Eg59	Tala Game Ranch	-	1 000 m	2 000 m	
		Eg60	Tregathlyn Game Farm	-	1 000 m	2 000 m	
		Eg61	Unknown Game Farm	-	1 000 m	2 000 m	
		Eg62	Unknown Game Farm	-	1 000 m	2 000 m	
		Eg63	Unknown Game Farm	-	1 000 m	2 000 m	
		Eg64	Unknown Game Farm	-	1 000 m	2 000 m	
		Eg65	Voetpadskloof Game Farm	-	1 000 m	2 000 m	
		Eg66	Witteklip Private Nature Reserve	-	1 000 m	2 000 m	
		Eg67	Woodlands Game Farm	-	1 000 m	2 000 m	
		Eg68	Zinti Valley	-	1 000 m	2 000 m	
		Eg69	Zulu Falls	-	1 000 m	2 000 m	
	Cultural Landscapes	El	To be determined at project scale by heritage specialists.	-	500 m	1 000 m	
	Heritage and Archaeological Sites	Eh	See heritage study				
	Historical Towns and Villages	Et1	Aberdeen	500 m	1 000 m	2 000 m	E. Cape town in the Karoo's Camdeboo plains, (1855). Wool farming centre.
		Et2	Addo	500 m	1 000 m	2 000 m	E. Cape village near the Addo Elephant national Park.
		Et3	Adelaide	500 m	1 000 m	2 000 m	E. Cape town, (1834). Agricultural centre/
		Et4	Adendorp	500 m	1 000 m	2 000 m	E. Cape village, (1855).
		Et5	Alicedale	500 m	1 000 m	2 000 m	E. Cape town. Railway junction.
		Et6	Amanzimtoti	500 m	1 000 m	2 000 m	
		Et7	Amaotana	500 m	1 000 m	2 000 m	
		Et8	Ashburton	500 m	1 000 m	2 000 m	KwaZulu-Natal town.
		Et9	Bedford	500 m	1 000 m	2 000 m	E. Cape town, (1854). Cattle and sheep farming centre.
		Et10	Berea	500 m	1 000 m	2 000 m	
		Et11	Bethelsdorp	500 m	1 000 m	2 000 m	
		Et12	Bizana	500 m	1 000 m	2 000 m	
		Et13	Bloemendal	500 m	1 000 m	2 000 m	
		Et14	Bluff	500 m	1 000 m	2 000 m	
		Et15	Cala	500 m	1 000 m	2 000 m	E. Cape town.
		Et16	Camperdown	500 m	1 000 m	2 000 m	KwaZulu-Natal village. Beginning of wattle industry.
		Et17	Cato Ridge	500 m	1 000 m	2 000 m	
		Et18	Chatsworth	500 m	1 000 m	2 000 m	

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EASTERN CORRIDOR

Corridor	Feature Class	GIS Visual ID	Feature Name / Type	V. high sensitivity buffer	High sensitivity buffer	Moderate sensitivity buffer	Attributes, significance, observations
		Et19	Clermont	500 m	1 000 m	2 000 m	
		Et20	Clifton Canyon	500 m	1 000 m	2 000 m	
		Et21	Cofimvaba	500 m	1 000 m	2 000 m	
		Et22	Colchester	500 m	1 000 m	2 000 m	
		Et23	Cookhouse	500 m	1 000 m	2 000 m	E. Cape village. Railway junction.
		Et24	Cool Air	500 m	1 000 m	2 000 m	KwaZulu-Natal village.
		Et25	Craigieburn	500 m	1 000 m	2 000 m	
		Et26	Creighton	500 m	1 000 m	2 000 m	KwaZulu-Natal village.
		Et27	Dalton	500 m	1 000 m	2 000 m	KwaZulu-Natal village.
		Et28	Despatch	500 m	1 000 m	2 000 m	E. Cape town. Originally a railway centre, now a residential area.
		Et29	Dordrecht	500 m	1 000 m	2 000 m	E. Cape town, (1856). Cattle and sheep farming centre.
		Et30	Durban	500 m	1 000 m	2 000 m	
		Et31	Durban North	500 m	1 000 m	2 000 m	
		Et32	Durban South	500 m	1 000 m	2 000 m	
		Et33	Elliot	500 m	1 000 m	2 000 m	E. Cape town, (1911). Farming and railway centre at the foot of the Drakensberg.
		Et34	Encobo	500 m	1 000 m	2 000 m	E. Cape town, (1875). Administrative centre.
		Et35	Everton	500 m	1 000 m	2 000 m	
		Et36	Ezembeni	500 m	1 000 m	2 000 m	
		Et37	Flagstaff	500 m	1 000 m	2 000 m	E. Cape town, (1875). Trading centre.
		Et38	Folweni	500 m	1 000 m	2 000 m	
		Et39	Fort Beaufort	500 m	1 000 m	2 000 m	E. Cape town on the Kat River, (1837). Agricultural and citrus farming centre.
		Et40	Gillitts	500 m	1 000 m	2 000 m	
		Et41	Graaff-Reinet	500 m	1 000 m	2 000 m	E. Cape town, (1786). Historic town of the Cape Colony. Agricultural and educational centre.
		Et42	Greytown	500 m	1 000 m	2 000 m	KwaZulu-Natal town on the Mvoti River, (1850). Kiwi and other fruit farming.
		Et43	Hambanathi	500 m	1 000 m	2 000 m	
		Et44	Harding	500 m	1 000 m	2 000 m	KwaZulu-Natal town, (1813). Timber area.
		Et45	Hillcrest	500 m	1 000 m	2 000 m	
		Et46	Hilton	500 m	1 000 m	2 000 m	KwaZulu-Natal town, (1872). Hilton College and Steam Museum.
		Et47	Howick	500 m	1 000 m	2 000 m	KwaZulu-Natal town, (1850). Howick Falls.
		Et48	Ilanga	500 m	1 000 m	2 000 m	
		Et49	Illovo North	500 m	1 000 m	2 000 m	
		Et50	Inanda	500 m	1 000 m	2 000 m	
		Et51	Inchanga	500 m	1 000 m	2 000 m	
		Et52	Indwe	500 m	1 000 m	2 000 m	E. Cape town, (1896). Agricultural centre. Previously a coal mining town.
		Et53	Isipingo	500 m	1 000 m	2 000 m	
		Et54	Isipingo Beach	500 m	1 000 m	2 000 m	
		Et55	Ixopo	500 m	1 000 m	2 000 m	KwaZulu-Natal town, (1878). Agricultural centre.
		Et56	Jansenville	500 m	1 000 m	2 000 m	E. Cape town on the Sundays River, (1854). Sheep and Angora goat farming centre.
		Et57	Kendrew	500 m	1 000 m	2 000 m	E. Cape village near Graff-Reinet.
		Et58	Kingsburgh	500 m	1 000 m	2 000 m	

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EASTERN CORRIDOR

Corridor	Feature Class	GIS Visual ID	Feature Name / Type	V. high sensitivity buffer	High sensitivity buffer	Moderate sensitivity buffer	Attributes, significance, observations
		Et59	Kirkwood	500 m	1 000 m	2 000 m	E. Cape town, (1913). Citrus fruit-packing centre.
		Et60	Klaarwater	500 m	1 000 m	2 000 m	
		Et61	Klipplaat	500 m	1 000 m	2 000 m	E. Cape town.
		Et62	Kloof	500 m	1 000 m	2 000 m	
		Et63	Kokstad	500 m	1 000 m	2 000 m	KwaZulu-Natal town, (1862). Important agricultural centre.
		Et64	Kwa Nobuhle	500 m	1 000 m	2 000 m	
		Et65	KwaDabeka	500 m	1 000 m	2 000 m	
		Et66	KwaMashu	500 m	1 000 m	2 000 m	
		Et67	KwaNdengezi	500 m	1 000 m	2 000 m	
		Et68	La Mercy	500 m	1 000 m	2 000 m	
		Et69	Lady Frere	500 m	1 000 m	2 000 m	E. Cape town.
		Et70	Libode	500 m	1 000 m	2 000 m	E. Cape Magisterial village.
		Et71	Lotus Park	500 m	1 000 m	2 000 m	
		Et72	Maclear	500 m	1 000 m	2 000 m	E. Cape town in the Mooi River Valley, (1875). Agricultural centre.
		Et73	Malagazi	500 m	1 000 m	2 000 m	
		Et74	Molweni	500 m	1 000 m	2 000 m	
		Et75	Motherwell	500 m	1 000 m	2 000 m	
		Et76	Mount Ayliff	500 m	1 000 m	2 000 m	E. Cape village, (1878).
		Et77	Mount Edgecombe	500 m	1 000 m	2 000 m	
		Et78	Mount Frere	500 m	1 000 m	2 000 m	E. Cape village, (1876).
		Et79	Mount Moreland	500 m	1 000 m	2 000 m	
		Et80	Mpumalanga	500 m	1 000 m	2 000 m	
		Et81	Mqanduli	500 m	1 000 m	2 000 m	E. Cape Magisterial village on the Wild Coast.
		Et82	Mthatha (Umtata)	500 m	1 000 m	2 000 m	E. Cape town, (1879). Former capital of the Transkei. University town.
		Et83	Murraysburg	500 m	1 000 m	2 000 m	W. Cape Karoo town, (1856). Wool farming centre.
		Et84	New Germany	500 m	1 000 m	2 000 m	
		Et85	New Hanover	500 m	1 000 m	2 000 m	KwaZulu-Natal village. Timber country.
		Et86	Newlands East	500 m	1 000 m	2 000 m	
		Et87	Newlands West	500 m	1 000 m	2 000 m	
		Et88	Ngqeleni	500 m	1 000 m	2 000 m	E. Cape Magisterial village.
		Et89	Ngqungqulu	500 m	1 000 m	2 000 m	
		Et90	Ntuzuma	500 m	1 000 m	2 000 m	
		Et91	Outer West Durban	500 m	1 000 m	2 000 m	
		Et92	Patensie	500 m	1 000 m	2 000 m	E. Cape town. Agricultural centre.
		Et93	Paterson	500 m	1 000 m	2 000 m	E. Cape town, (1879).
		Et94	Pennington	500 m	1 000 m	2 000 m	KwaZulu-Natal town. Site of Umdoni Park and Botha House.
		Et95	Phoenix	500 m	1 000 m	2 000 m	
		Et96	Pietermaritzburg	500 m	1 000 m	2 000 m	KwaZulu-Natal city, (1838). Administrative, judicial, educational and industrial centre.
		Et97	Pinetown	500 m	1 000 m	2 000 m	
		Et98	Port Elizabeth	500 m	1 000 m	2 000 m	E. Cape city (1799). Important port city and university town.

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EASTERN CORRIDOR

Corridor	Feature Class	GIS Visual I	Feature Name / Type	V. high sensitivity buffer	High sensitivity buffer	Moderate sensitivity buffer	Attributes, significance, observations
		Et99	Prospecton	500 m	1 000 m	2 000 m	
		Et100	Queensburgh	500 m	1 000 m	2 000 m	
		Et101	Queenstown	500 m	1 000 m	2 000 m	E. Cape town on the Komani River, (1853). Commercial, administrative, educational centre.
		Et102	Qumbu	500 m	1 000 m	2 000 m	E. Cape village.
		Et103	Redcliffe	500 m	1 000 m	2 000 m	
		Et104	Richmond	500 m	1 000 m	2 000 m	KwaZulu-Natal town on the Lovu River, ((1850).
		Et105	Riebeek East	500 m	1 000 m	2 000 m	E. Cape town.
		Et106	Rossouw	500 m	1 000 m	2 000 m	
		Et107	Sada	500 m	1 000 m	2 000 m	
		Et108	Scottburgh	500 m	1 000 m	2 000 m	KwaZulu-Natal town, (1860). Seaside resort.
		Et109	Sidbury	500 m	1 000 m	2 000 m	E. Cape 1820s settlers' village.
		Et110	Somerset East	500 m	1 000 m	2 000 m	E. Cape town, (1825). Sheep farming centre.
		Et111	Sterkstroom	500 m	1 000 m	2 000 m	E. Cape town on the Hex River, (1875).
		Et112	Steytlerville	500 m	1 000 m	2 000 m	E. Cape town on the Grootrivier, (1875).
		Et113	Tabankulu	500 m	1 000 m	2 000 m	E. Cape village, (1894). Trading centre.
		Et114	Tarkastad	500 m	1 000 m	2 000 m	E. Cape town, (1862). Agricultural and hunting centre.
		Et115	Thornhill	500 m	1 000 m	2 000 m	E. Cape village near Hankey.
		Et116	Tongaat	500 m	1 000 m	2 000 m	
		Et117	Tsolo	500 m	1 000 m	2 000 m	E. Cape village, (1879).
		Et118	Tsomo	500 m	1 000 m	2 000 m	
		Et119	Ugie	500 m	1 000 m	2 000 m	E. Cape village on the Nxu River, (1863).
		Et120	Uitenhage	500 m	1 000 m	2 000 m	E. Cape town, (1804). Historical buildings. Car and tyre manufacturing centre.
		Et121	Umbumbulu	500 m	1 000 m	2 000 m	
		Et122	Umhlanga	500 m	1 000 m	2 000 m	
		Et123	Umkomaas	500 m	1 000 m	2 000 m	KwaZulu-Natal coastal town, (1902). SAPPI cellulose pulp industry.
		Et124	Umlazi	500 m	1 000 m	2 000 m	
		Et125	Umzimkulu	500 m	1 000 m	2 000 m	KwaZulu-Natal village.
		Et126	Verulam	500 m	1 000 m	2 000 m	
		Et127	Wartburg	500 m	1 000 m	2 000 m	KwaZulu-Natal village near Pietermaritzburg.
		Et128	Waterfall	500 m	1 000 m	2 000 m	
		Et129	Waterford	500 m	1 000 m	2 000 m	E. Cape town.
		Et130	Westbrook	500 m	1 000 m	2 000 m	
		Et131	Westville	500 m	1 000 m	2 000 m	
		Et132	Whittlesea	500 m	1 000 m	2 000 m	E. Cape village. Sheep and cattle farming area.
	National Roads	Ea1	N2 National Road	500 m	1 000 m	2 000 m	
		Ea2	N3 National Road	500 m	1 000 m	2 000 m	
		Ea3	N6 National Road	500 m	1 000 m	2 000 m	
		Ea4	N9 National Road	500 m	1 000 m	2 000 m	
		Ea5	N10 National Road	500 m	1 000 m	2 000 m	
	Arterial / Provincial Roads	Eb1	R61	250 m	500 m	1 000 m	Beaufort West – Aberdeen, Cradock – Queenstown – Mthatha – Flagstaff – Port Edward

8

EASTERN CORRIDOR

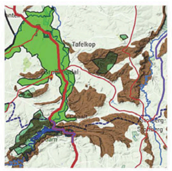
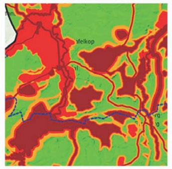
Corridor	Feature Class	GIS Visual I	Feature Name / Type	V. high sensitivity buffer	High sensitivity buffer	Moderate sensitivity buffer	Attributes, significance, observations
		Eb2	R63	250 m	500 m	1 000 m	Graaff-Reinet - Fort Beaufort
		Eb3	R75	250 m	500 m	1 000 m	Graaff – Reinet - Jansenville
		Eb4	R336	250 m	500 m	1 000 m	Kirkwood – Addo – P.E.
		Eb5	R335	250 m	500 m	1 000 m	P.E. - Paterson
		Eb6	R56	250 m	500 m	1 000 m	Dordrecht – Elliot – Maclear – Kokstad – Ixopo - Richmond
		Eb7	R612	250 m	500 m	1 000 m	Himeville – Ixopo - uMzinto
		Eb8	R617	250 m	500 m	1 000 m	Underberg - Howick
		Eb9	R33	250 m	500 m	1 000 m	Pietermaritzburg - Greytown
	Scenic Routes / Passes / Poorts	Es1	R63 and Oudeberg Pass	1 000 m	2 000 m	3 000 m	East of Murraysburg. Local scenic value.
		Es2	R329 Noorspoort, Waaipoort	1 000 m	2 000 m	3 000 m	NE of Steytlerville. Local scenic value.
		Es3	R335 Suurberg Pass	1 000 m	2 000 m	3 000 m	N of Addo. Local scenic value. Traverses Addo Elephant NP. Regional scenic value.
		Es4	R350 Helspoort Pass	1 000 m	2 000 m	3 000 m	NW Grahamstown. Local scenic value.
		Es5	N10 Daggaboersnek	1 000 m	2 000 m	3 000 m	N of Cookhouse. Local scenic value.
		Es6	R344 Volstruis Nek	1 000 m	2 000 m	3 000 m	N of Adelaide. Includes Skaapkraal Poort N of Tarkastad. Local scenic value.
		Es7	R67 Nico Malan's Pass	1 000 m	2 000 m	3 000 m	N of Fort Beaufort. Local scenic value.
		Es8	R392 Bongolo Nek	1 000 m	2 000 m	3 000 m	N of Queenstown. Local scenic value.
		Es9	R397 Boesmanshoek	1 000 m	2 000 m	3 000 m	SE of Molteno. Local scenic value.
		Es10	N6 Penhoek Pass	1 000 m	2 000 m	3 000 m	SE of Molteno. Local scenic value.
		Es11	R396 Indwe Poort	1 000 m	2 000 m	3 000 m	SE of Indwe. Local scenic value.
		Es12	R396 Killian's Pass	1 000 m	2 000 m	3 000 m	N of Indwe. Local scenic value.
		Es13	R393 Cala Pass	1 000 m	2 000 m	3 000 m	SW of Elliot. Local scenic value.
		Es14	R58 Barkly Pass	1 000 m	2 000 m	3 000 m	N of Elliot. Drakensberg area. Regional scenic value.
		Es15	R396	1 000 m	2 000 m	3 000 m	SE of Maclear. Local scenic value.
		Es16	R61	1 000 m	2 000 m	3 000 m	N and S of Flagstaff. Local scenic value.
		Es 17	R56	1 000 m	2 000 m	3 000 m	W of Kokstad. Local scenic value.
		Es18	R617	1 000 m	2 000 m	3 000 m	N of Kokstad. Local scenic value.
		Es19	R61	1 000 m	2 000 m	3 000 m	NW of Port Edward. Local scenic value.
		Es20	R56	1 000 m	2 000 m	3 000 m	N and S of Ixopo. Local scenic value.
		Es21	R612	1 000 m	2 000 m	3 000 m	SE of Ixopo. Local scenic value.
		Es22	R102 South Coast	1 000 m	2 000 m	3 000 m	SW of aManzimtoti. Regional scenic value.
		Es23	R603	1 000 m	2 000 m	3 000 m	W of aManzimtoti. Local scenic value.
		Es24	R614	1 000 m	2 000 m	3 000 m	E of Wartburg. Part of Valley of a Thousand Hills. Regional scenic value.
	Passenger Rail Lines	Ev1	Noupoort – Port Elizabeth	250 m	500 m	1 000 m	
		Ev2	Springfontein – East London	250 m	500 m	1 000 m	
		Ev3	Ladysmith - Durban	250 m	500 m	1 000 m	

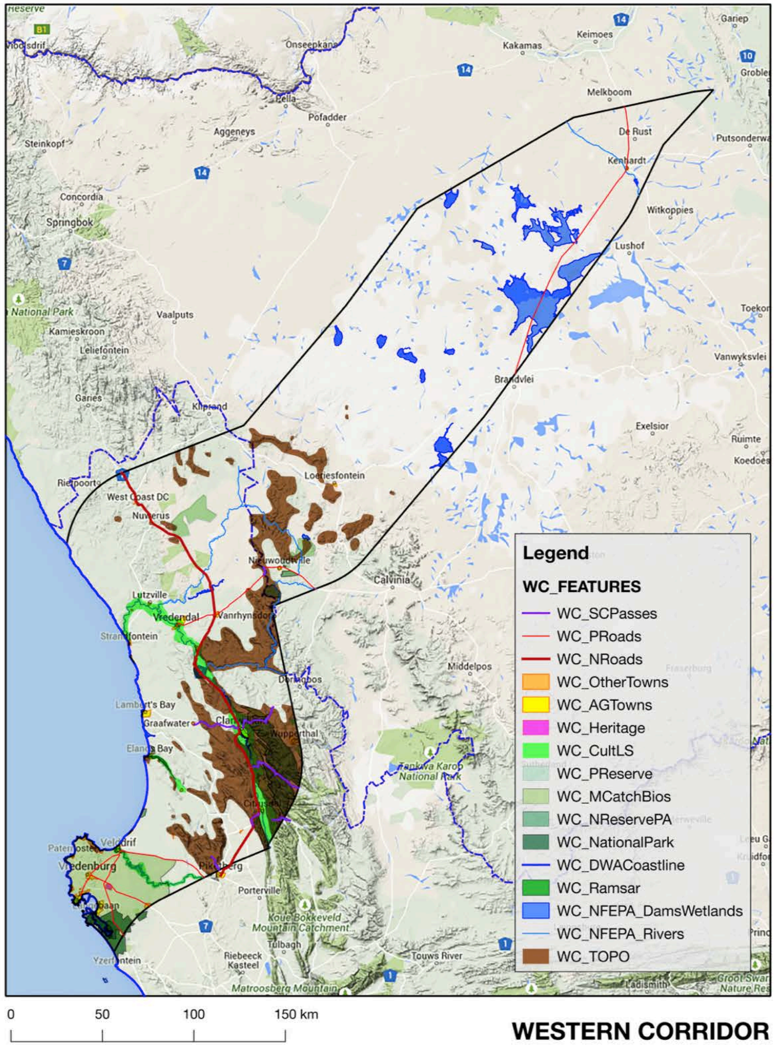
13 APPENDIX 2: FEATURE MAPS & SENSITIVITY MAPS

National Electricity Grid Infrastructure SEA

Visual Specialist Report
Appendix 2: Feature Maps and Sensitivity maps



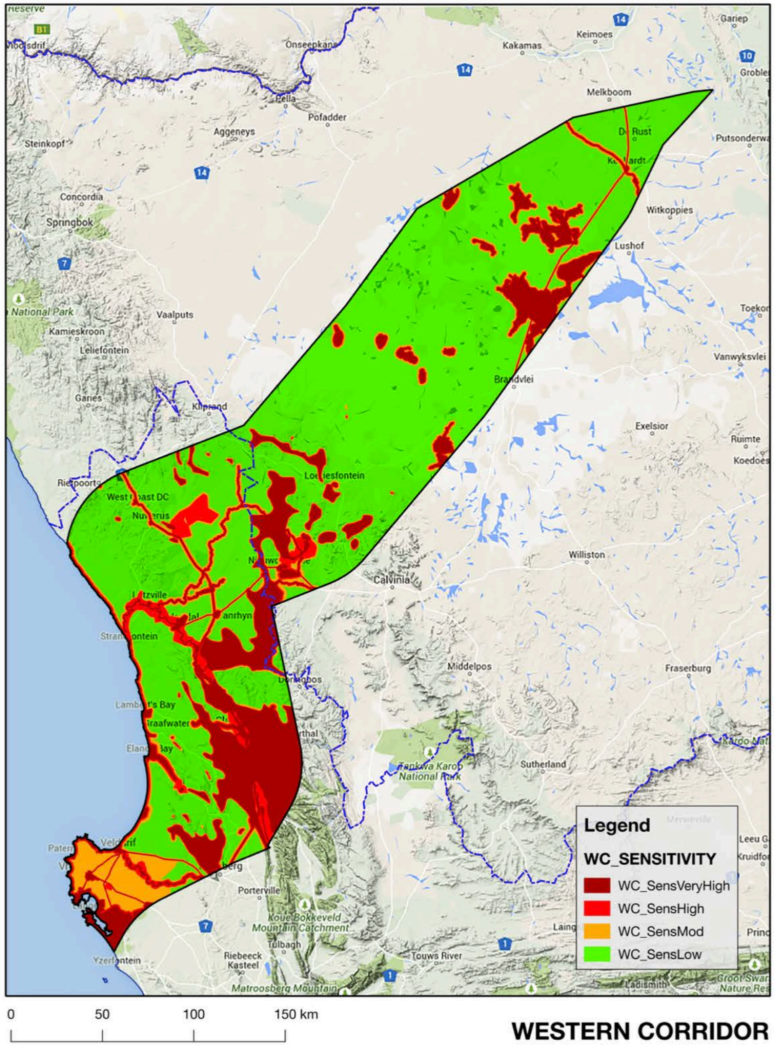





WESTERN CORRIDOR

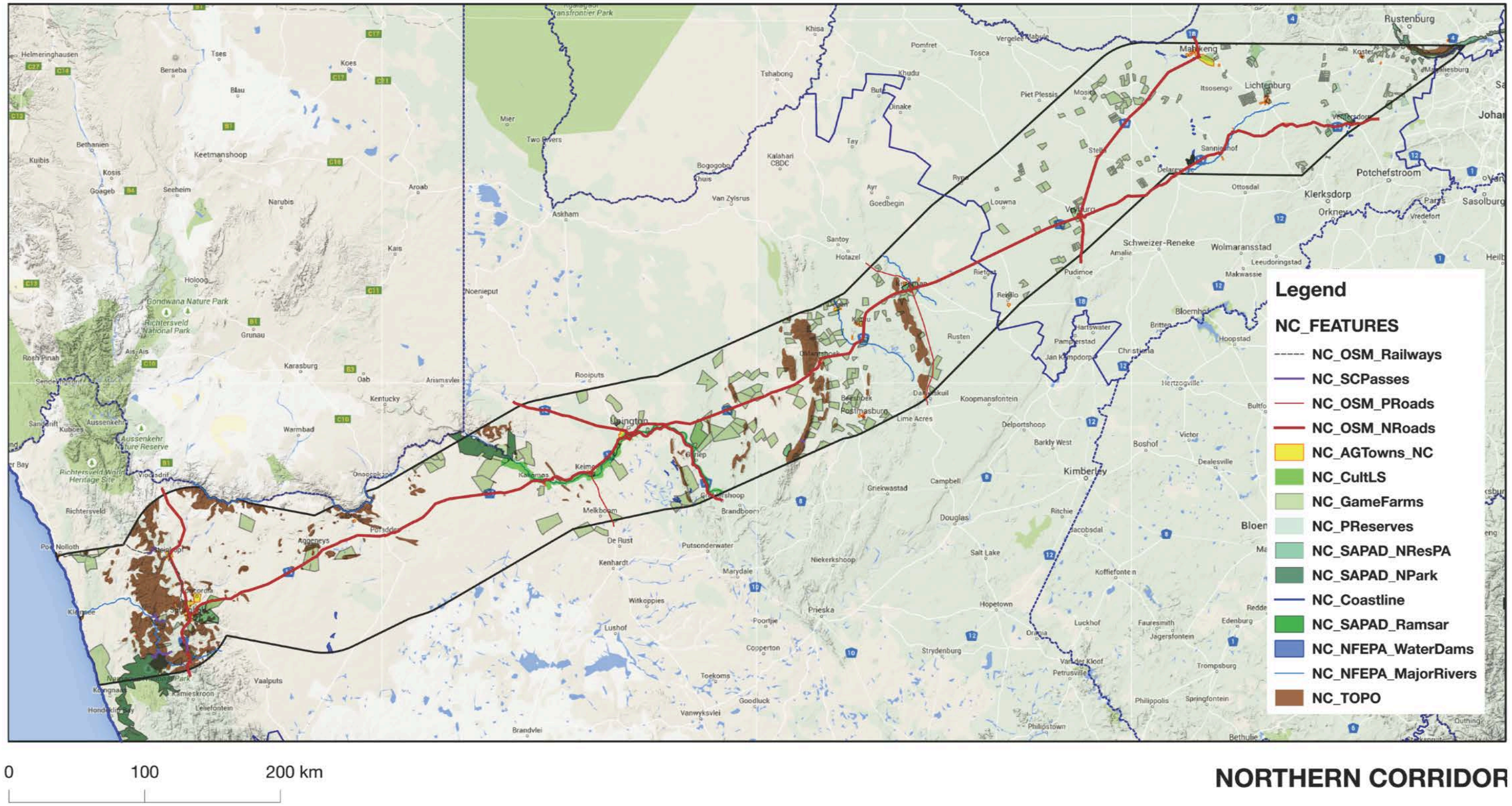
Base Map Source : Google Maps 2015

Figure 1 • Western Corridor • Features



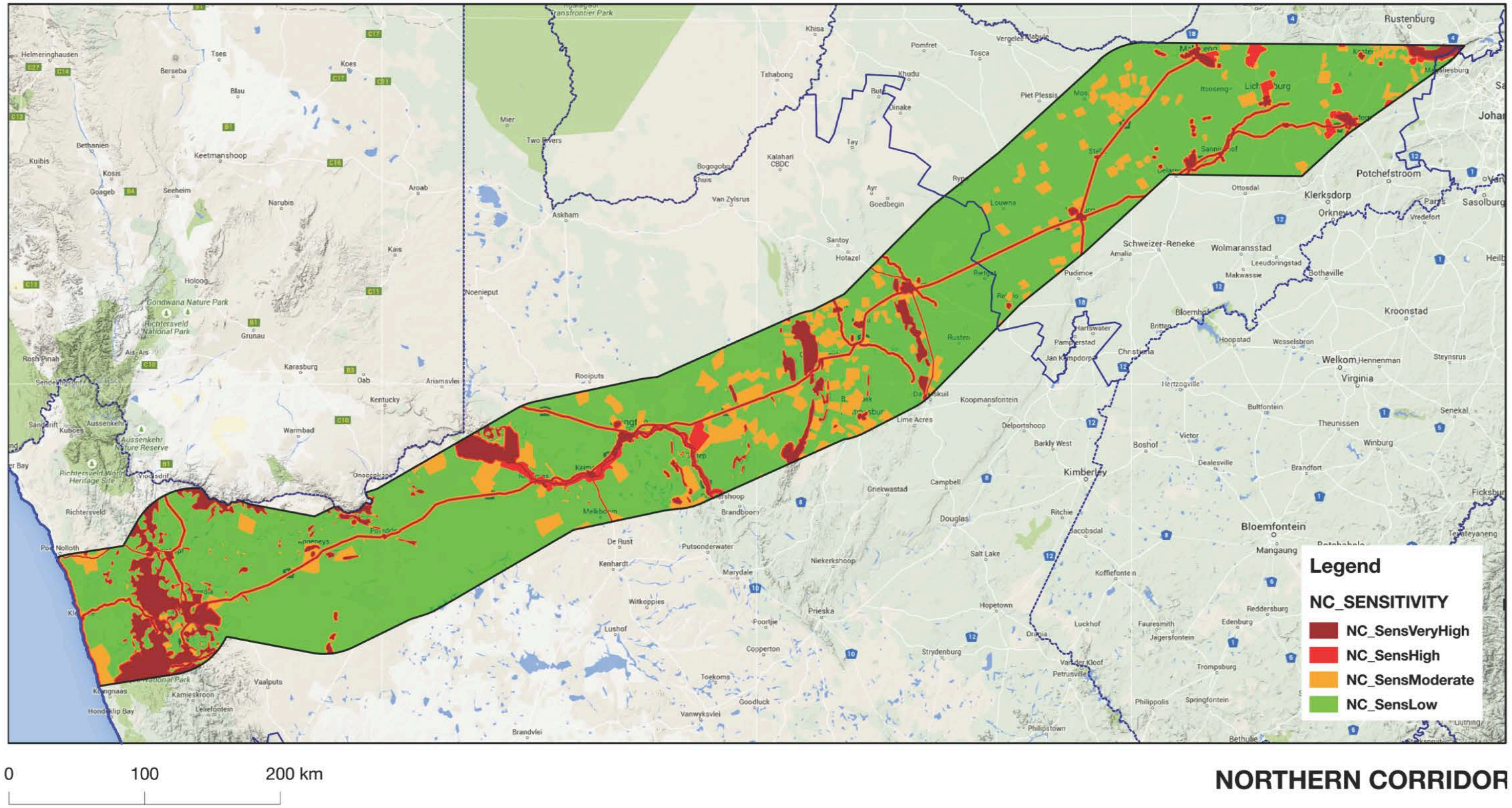
Base Map Source : Google Maps 2015

Figure 2 • Western Corridor • Sensitivity



Base Map Source : Google Maps 2015

Figure 3 • Northern Corridor • Features



Base Map Source : Google Maps 2015

Figure 4 • Northern Corridor • Sensitivity

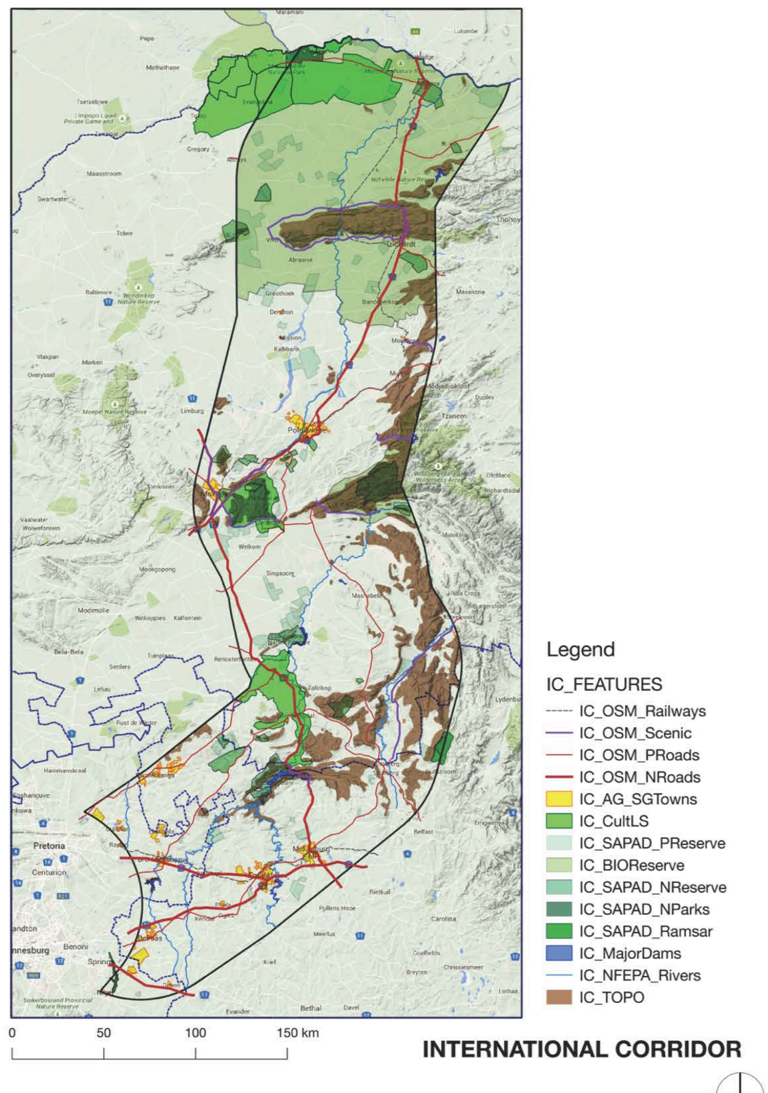
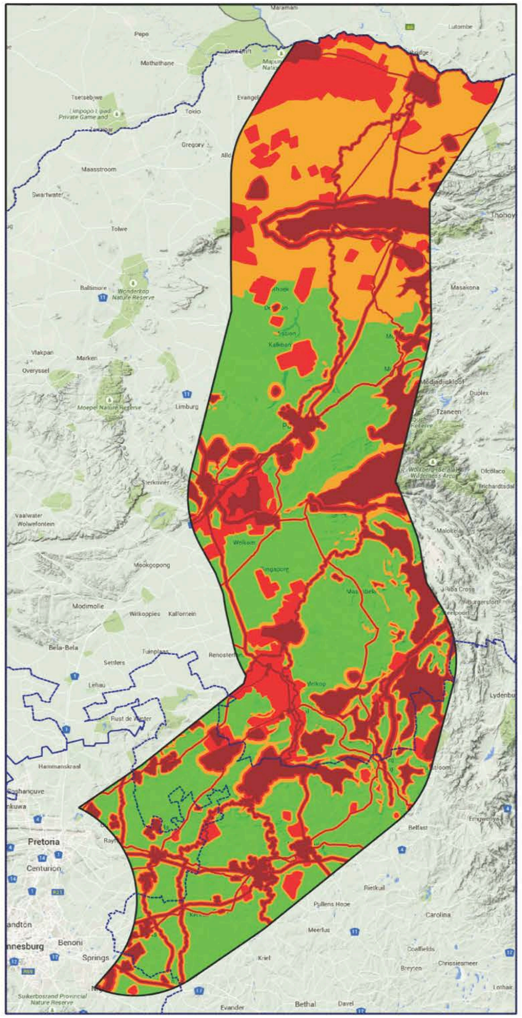


Figure 5 • International Corridor • Features



Legend

IC_SENSITIVITY

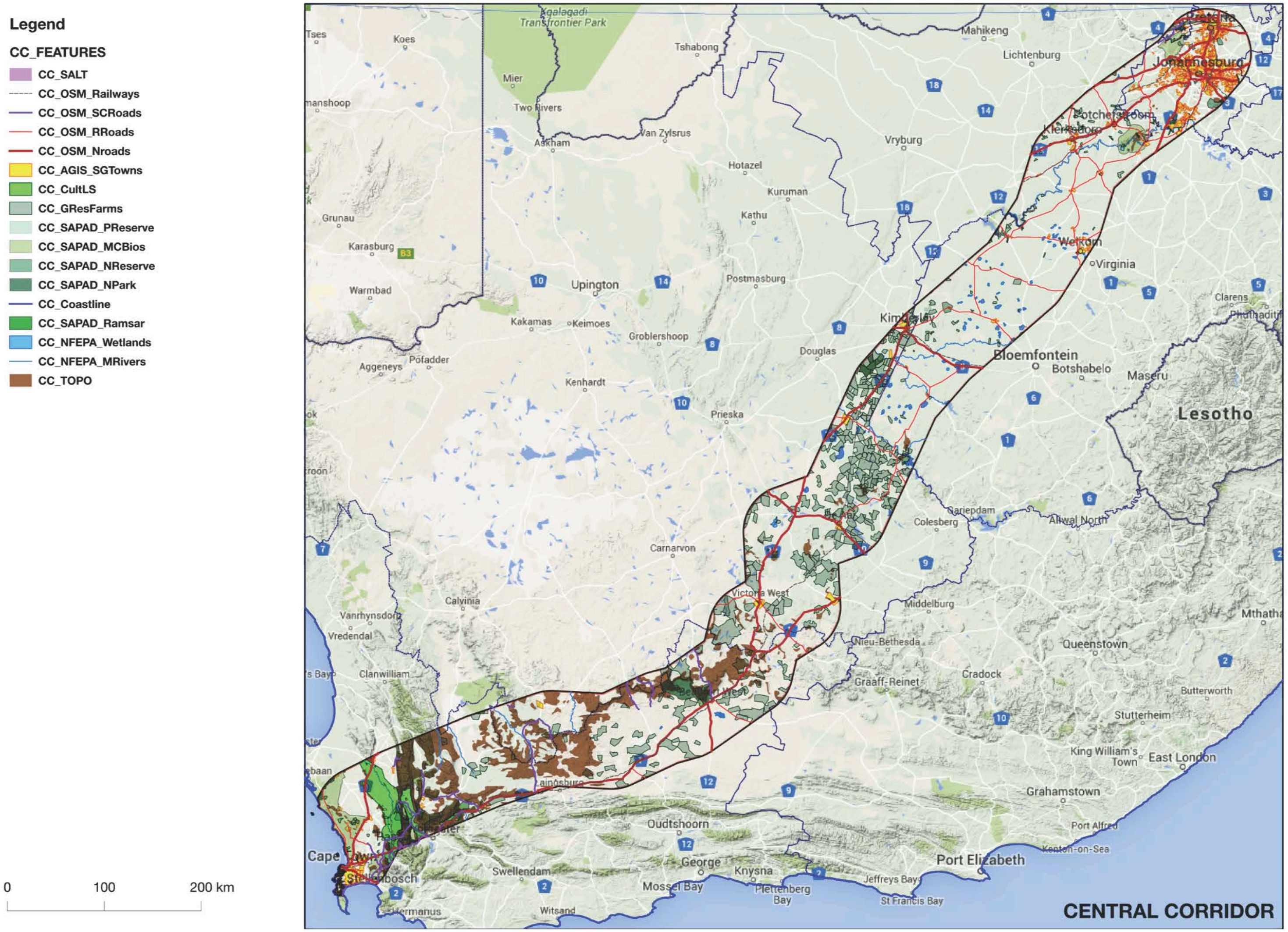
- IC_SensVH
- IC_SensH
- IC_SensM
- IC_SensL

0 50 100 150 km

INTERNATIONAL CORRIDOR

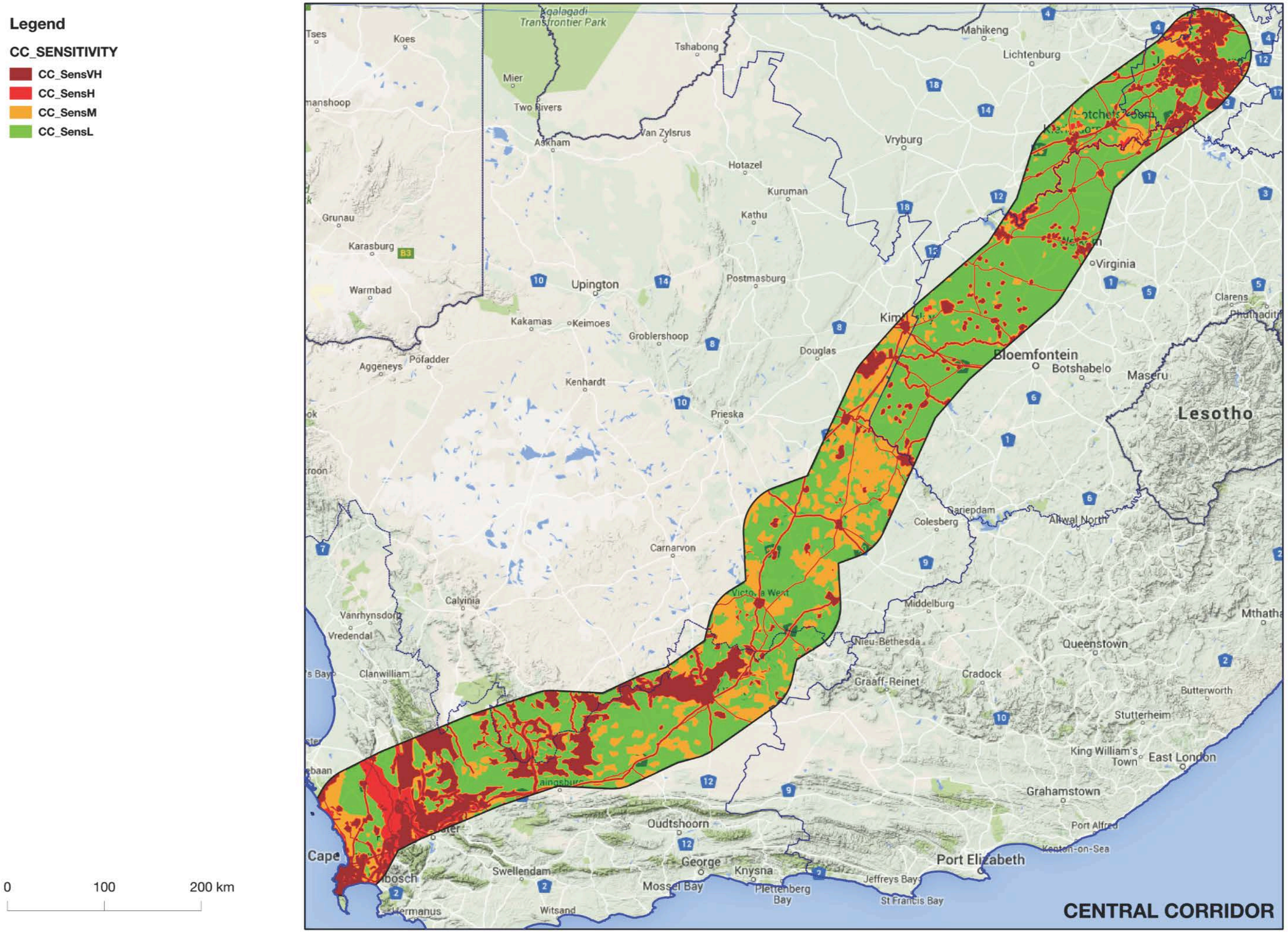
Base Map Source : Google Maps 2015

Figure 6 • International Corridor • Sensitivity



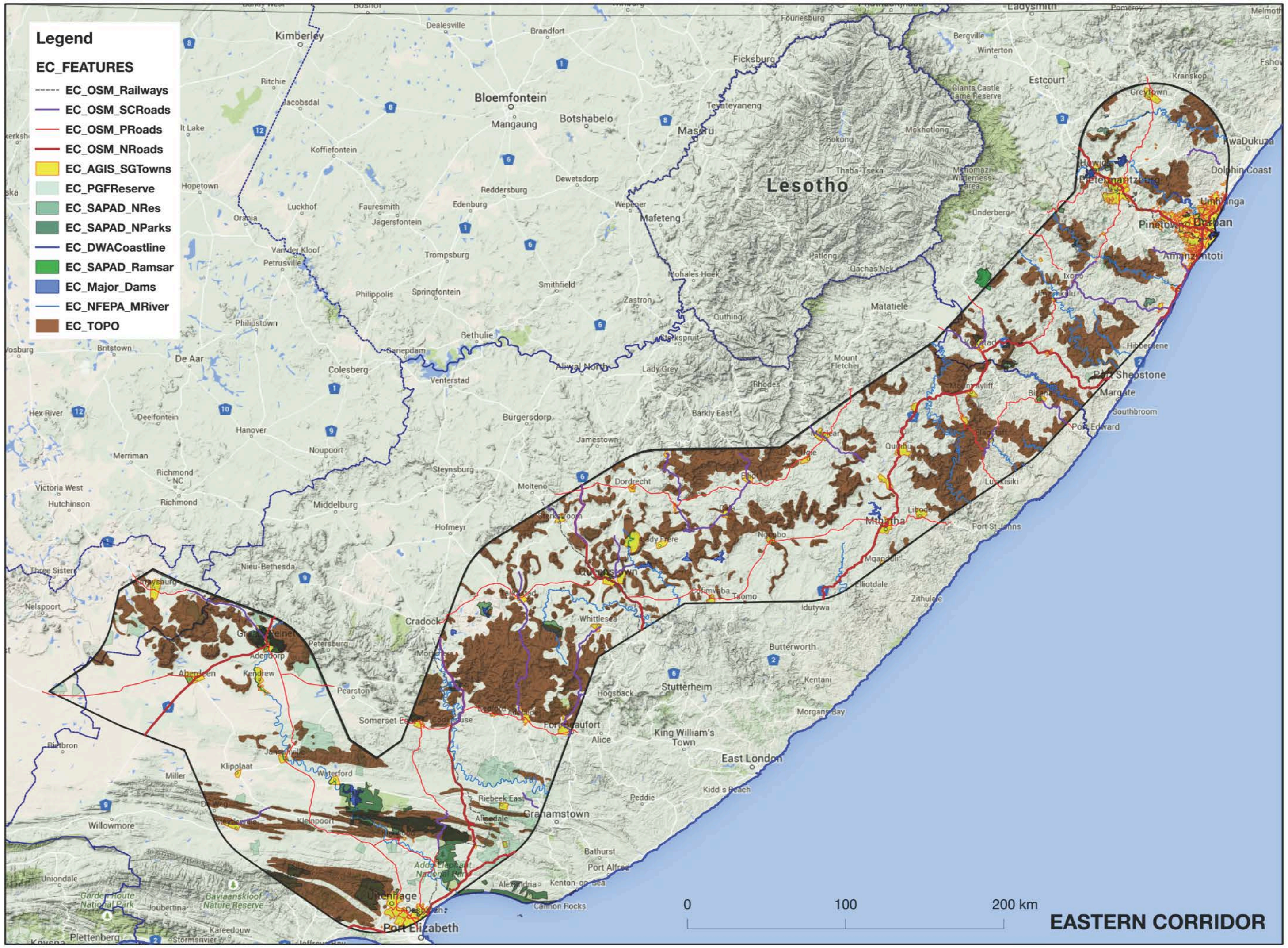
Base Map Source : Google Maps 2015

Figure 7 • Central Corridor • Features



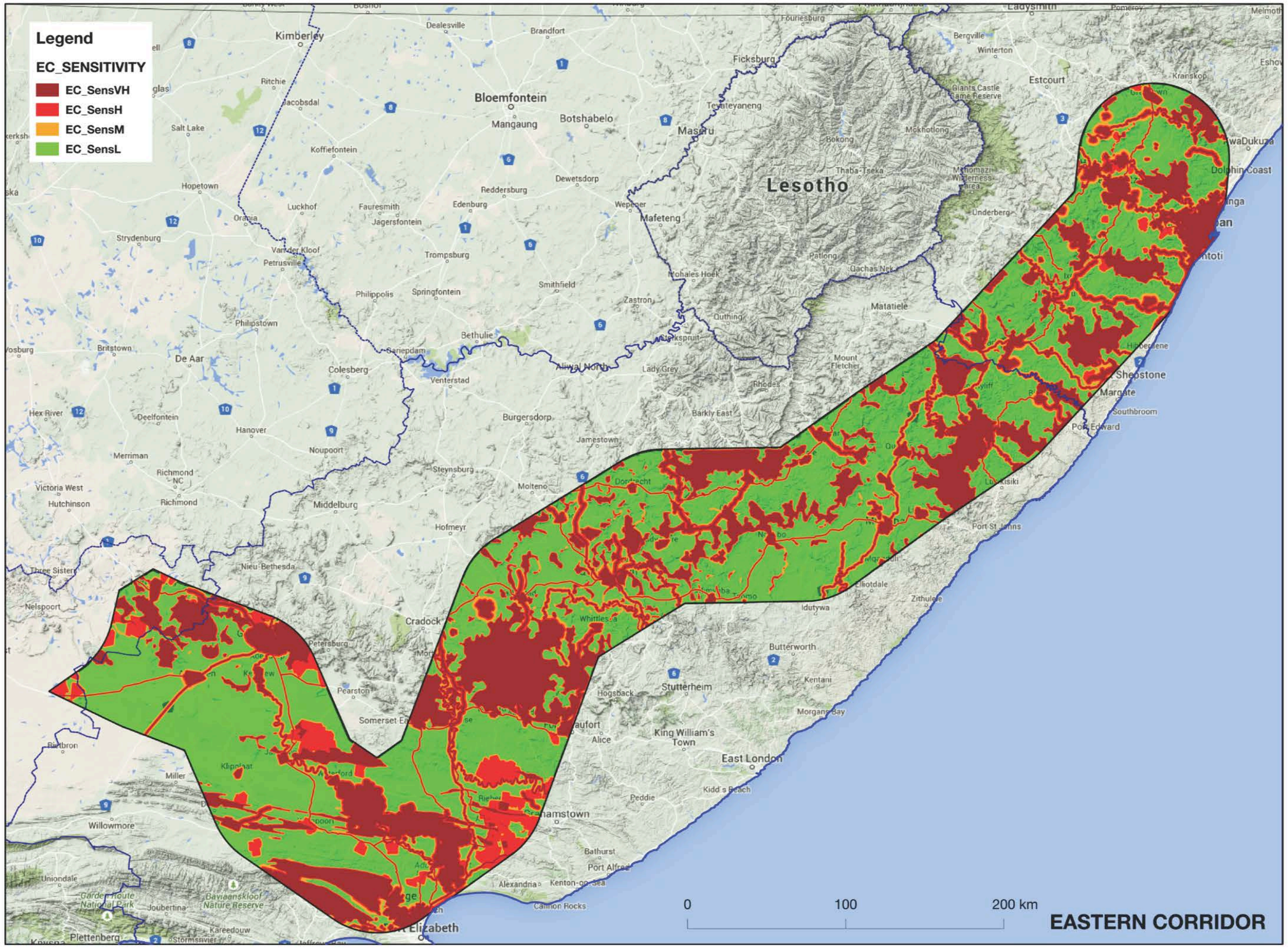
Base Map Source : Google Maps 2015

Figure 8 • Central Corridor • Sensitivity



Base Map Source : Google Maps 2015

Figure 9 • Eastern Corridor • Features



Base Map Source : Google Maps 2015

Figure 10 • Eastern Corridor • Sensitivity