Eskom Holdings SOC Limited
Eskom Transmission Division



NEPTUNE-POSEIDON 400 KV POWER LINE

FINAL ENVIRONMENTAL IMPACT ASSESSMENT REPORT



DEA Ref. No: 12/12/20/1439

February 2012

NEMAI CONSULTING

ENVIRONMENTAL AND SOCIAL CONSULTANTS

P.O. BOX 1673
SUNNINGHILL
2157

147 Bram Fischer Drive
FERNDALE
2194

Tel: 011 781 1730
Fax: 011 781 1731
Email: info@nemai.co.za

EXECUTIVE SUMMARY

PROJECT BACKGROUND AND MOTIVATION

Increased demand for a reliable electricity supply in the Southern Grid has necessitated that Eskom Transmission improves the reliability and capacity of the transmission network into the area. The East London area, which is supplied from the Pembroke and Neptune Main Transmission System (MTS), is presently unfirm.

Based on the analysis of the possible Distribution and Transmission alternatives to mitigate existing and foreseen network constraints, the Neptune-Poseidon 400 kV power line project was identified as the preferred option as part of the greater East London Strengthening scheme. This project will also improve reliability in the Eastern Grid. The main project components include the following:

1. Installation of a new 400kV transmission line (including concrete foundations, towers, conductors and anchors) between the existing Neptune (near East London) and Poseidon (near Cookhouse) substations;
2. Building of turn-in lines of approximately 5km each; and
3. Upgrading of existing substations (including new 400kV feeder bays and yard extensions).

EIA PROCESS

The Neptune-Poseidon 400 kV power line project entails certain activities that require authorisation in terms of the National Environmental Management Act (No. 107 of 1998) (NEMA). The process for seeking authorisation is undertaken in accordance with the EIA Regulations (GN No. R385, R386 and R387 of 21 April 2006), promulgated in terms of Chapter 5 of NEMA. The EIA decision-making authority is the DEA, as the project proponent (i.e. Eskom Holdings Limited, Eskom Transmission Division) is a parastatal.

The EIA Report lists the various milestones reached during the Scoping phase and provides an overview of the EIA methodology, in terms of the following:

- The need and desirability of the project;
- The formal EIA process;

- Alignment with the Plan of Study that formed part of the Scoping Report;
- The route selection;
- Screening and assessment of alternatives; and
- Impact prediction.

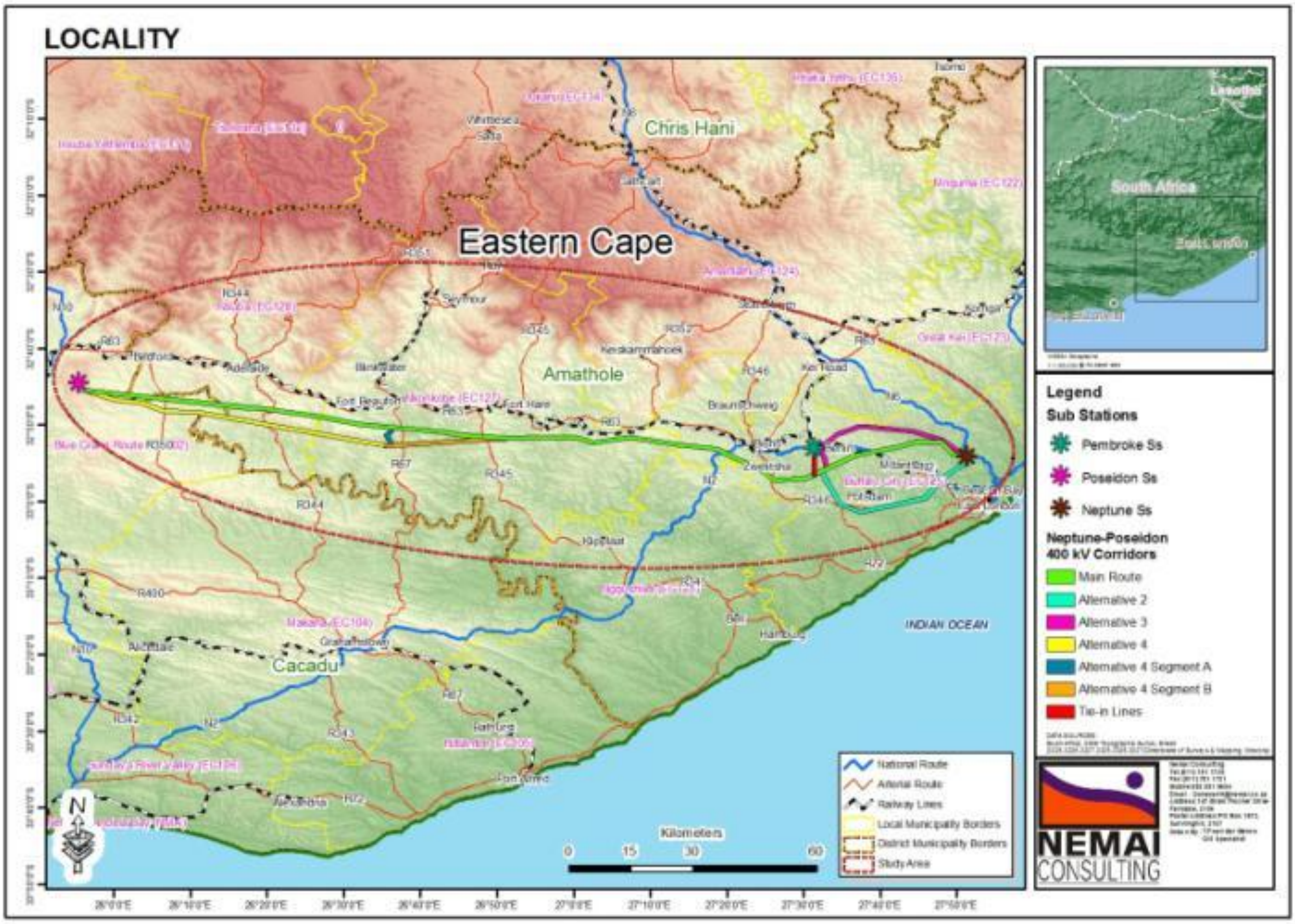
Nemai Consulting was appointed by Eskom Holdings Limited, Eskom Transmission Division as the independent Environmental Assessment Practitioner (EAP) to undertake the environmental assessment for the proposed Neptune-Poseidon 400 kV power line.

PROJECT LOCATION

A 1 km corridor (i.e. 500 m on either side of the centre line of each alternative route) was adopted as the study area. The various alternatives alignments for the Neptune-Poseidon 400kV powerline include the following (see map to follow):

- **Main Route –** Power line (approximately 191km) runs in an east to west direction from the existing Neptune substation (north-west of East London) to the Poseidon substation (± 11 km east of Cookhouse), in the Eastern Cape. The proposed alignment is situated within the existing vacant Eskom servitude between the aforementioned substations. Two turn-ins of approximately 5 km each, which pass between Ndevana and Ilitha, connect the proposed line with the Pembroke substation.
- **Alternative 2 –** Deviation from Main Route, where the power line (approximately 40km) runs in an east to west direction from the Neptune substation to the south around Mdantsane and the Bridle Drift Dam and reconnects to the Main Route to the south of Berlin, at Rini.
- **Alternative 3 –** Deviation from Main Route, where the power line (approximately 39km) runs in an east to west direction from the Neptune substation to the north around Nqonqweni, around Berlin and connects to the Main Route at Hillcrest. The last 16km of this route runs parallel to an existing Eskom line.
- **Alternative 4 –** Deviation from Main Route, where the power line (approximately 65km) runs in a west to east direction from the Poseidon substation to the south of the Main Route alongside the existing Eskom 220kV Pembroke-Poseidon 1 transmission line. Alternative 4 connects to the Main Route via the following two options -
  - Segment A is approximate 6km in length and connects to the Main Route close to Klu Klu, south of Fort Beaufort.

- Segment B continues alongside the existing Eskom 220kV Pembroke-Poseidon 1 transmission line for ± 17km and then continues in a north-easterly direction for another ± 8km to connect to the Main Route.



Locality Map

PROJECT DESCRIPTION

The EIA Report contains a detailed description of each of the alternative transmission line routes. The project components, including the servitude, design considerations, tower structures, and upgrades to the existing Neptune, Pembroke and Poseidon substations are also explained. An overview is also provided of the project life-cycle (feasibility, planning and design phase, construction, operation and decommissioning).

PROFILE OF THE RECEIVING ENVIRONMENT

The EIA Report provides a general description of the status quo of the receiving environment in the project area (1 km wide corridor for each of the alternative routes), and also provides local and site-specific discussions on those environmental features investigated by the respective specialists. This allows for an appreciation of sensitive environmental features and possible receptors of the effects of the proposed project. The following environmental features are discussed:

- Climate;
- Topography;
- Watercourses;
- Geology and Soil;
- Flora;
- Fauna;
- Conservation areas;
- Socio-Economic Aspects;
- Agriculture;
- Air Quality;
- Noise;
- Heritage Resources;
- Transportation;
- Visual Quality;
- Planning Context; and
- Tourism.

SPECIALIST STUDIES

The necessary specialist studies triggered by the findings of the Neptune-Poseidon 400kV Scoping process, aimed at addressing the identified key issues and compliance with legal obligations, include the following:

- Ecological Study (termed Faunal, Floral and Avifaunal Ecological Surveys);
- Heritage Impact Assessment;
- Agricultural Potential Assessment;
- Visual Impact Assessment;
- Economic Study; and
- Social Impact Assessment.

The information obtained from the respective specialist studies were incorporated into the EIA report in the following manner:

1. The information was used to complete the description of the receiving environment in a more detailed and site-specific manner;
2. A summary of each specialist study is contained in the report, focusing on the approach to the study, key findings and conclusions drawn;

3. The evaluations performed by the specialists on the alternative routes were included in the comparative analysis to identify the most favourable option;
4. The specialists' impacts assessment, and the identified mitigation measures, were included in the overall project impact assessment;
5. Specialist input was obtained to address comments made by I&APs that related to specific environmental features pertaining to each specialist discipline; and
6. Salient recommendations made by the specialists were taken forward to the final EIA Conclusions and Recommendations.

IMPACT ASSESSMENT

This section of the EIA Report focuses on the pertinent environmental impacts that could potentially be caused by the proposed Neptune-Poseidon 400kV transmission line during the pre-construction, construction and operation phases of the project.

The impacts to the environmental features are linked to the project activities, which in broad terms relate to the physical infrastructure (emphasis on construction and operation stages). Impacts were identified as follows:

- An appraisal of the project description and the receiving environment;
- Impacts associated with listed activities contained in GN No. R386 and R387;
- Issues highlighted by environmental authorities;
- Findings from specialist studies; and
- Comments received during public participation.

The impacts associated with the listed activities and raised by environmental authorities are discussed on a qualitative level. In order to understand the impacts related to the project's components, the activities and environmental aspects associated with the project life-cycle were identified. The following significant environmental impacts associated with the proposed Neptune-Poseidon 400kV transmission line are assessed quantitatively and concomitant mitigation measures are provided.

Significant environmental impacts associated with the project

CONSTRUCTION PHASE	
Feature	**Impact**
Topography	• Visual impact on ridges • Erosion of affected areas on steep slopes
Surface Water	• Impacts where access roads and the transmission lines cross watercourses
Geology and Soil	• Erosion on steep slopes
Flora	• Removal of vegetation for stringing, building of new access roads, tower construction and construction camp(s) establishment
Fauna	• Impacts to animals on game farms and nature reserves. • Impacts to livestock
Socio-economic	• Loss of income from hunting, game viewing, and crop production • Reduction in property value • Damage to property • Relocation of structures situated within servitude
Agricultural Potential	• Loss of agricultural land • Impacts to animals on game farms • Impacts to livestock
Archaeological and Cultural Features	• Damage to heritage resources
Transportation	• Damage to roads by heavy construction vehicles • Disruption of railway line at crossing
Aesthetics	• Clearing of vegetation. • Construction-related operations.
Tourism	• Visual and noise impacts from construction operations. • Influence to hunting practices. • Influence to ecotourism. • Reduction in tourism to areas affected by construction

OPERATIONAL PHASE	
Feature	**Impact**
Topography	• Visual impact on ridges from disturbed area and infrastructure. • Erosion along access roads on steep slopes.
Surface Water	• Inadequate stormwater management on access roads • Damage to towers from major flood events
Geology and Soil	• Erosion on steep slopes
Flora	• Encroachment by exotic species through inadequate eradication programme. • Clearing of vegetation along maintenance road.
Fauna	• Risk to birds from collision with infrastructure and from electrocution • Loss of game though improper access control • Electrocution of monkeys
Socio-economic	• Loss of land with extension of existing servitude • Reduction in property value • Threats to human and animal health from EMF
Agricultural Potential	• Loss of agricultural land
Transportation	• Use of maintenance roads
Aesthetics	• High visibility of transmission lines. • Inadequate reinstatement and rehabilitation of construction footprint.
Tourism	• High visibility of transmission lines • Loss of “sense of place”

Cumulative impacts, such as use of local road network, alien and invasive vegetation along the corridor, following existing high-voltage power lines, high erodible nature of local soils and benefits to macro-economy, are also considered.

ANALYSIS OF ALTERNATIVES

Based on the recommendations of the specialists and the comparison of the impacts associated with the various alignments, the following options are considered to be the preferred alternatives:

- **Western section:**
  The specialists were in agreement that Alternative 4 is the preferred option, which primarily stems from the route's alignment adjacent to an existing transmission line. This selection was confirmed when considering the impacts of each route.
- **Central section:**
  Consensus was reached between the specialists and the comparative impact evaluation that Alternative 4 Segment B was the favoured route, which again related to its positioning alongside the existing power line for most of its route.
- **Eastern section:**
  The Main Route emerged as the preferred option in the eastern part of the project area, due to the existing vacant servitude and the related impacts to the receiving environment that were deemed to be the least significant when compared to the other alternatives. The only deviation from this finding was the Economic Study, which favoured Alternative 2. Regardless, the overall findings were sufficiently compelling to select the Main Route as the Best Practicable Environmental Option (BPEO).

PUBLIC PARTICIPATION

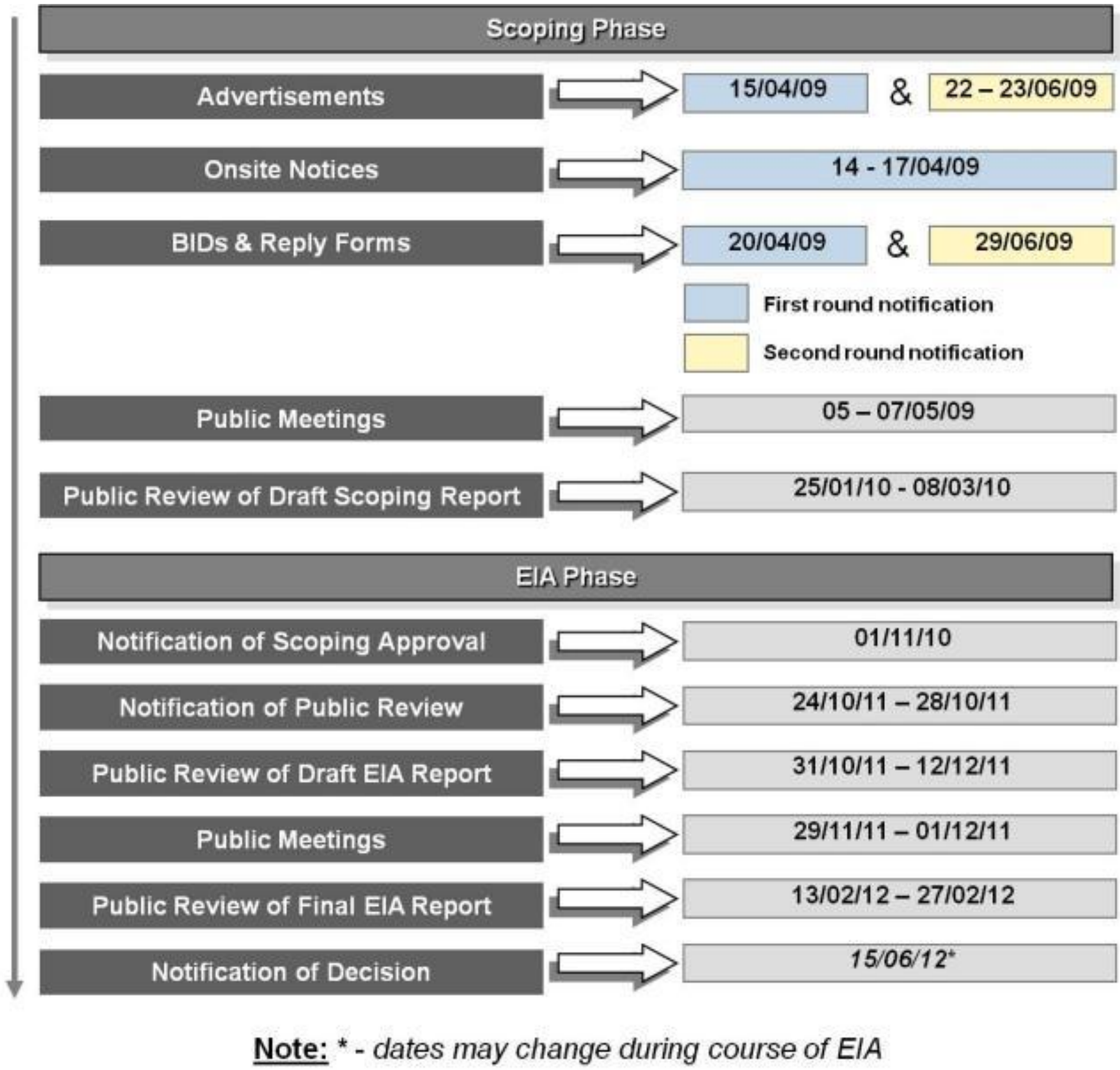
The EIA Report provides a full account of the public participation process that was followed for the EIA phase for the Neptune-Poseidon Project.

The purpose of public participation includes:

1. Providing I&APs with an opportunity to obtain information about the project;
2. Allowing I&APs to present their views, issues and concerns with regard to the project;
3. Granting I&APs an opportunity to recommend measures to avoid or reduce adverse impacts and enhance positive impacts associated with the project; and

4. Enabling Eskom and the project team to incorporate the needs, concerns and recommendations of I&APs into the project.

The figure to follow outlines the public participation process undertaken for the Neptune-Poseidon Project Scoping and Environmental Impact Assessment phases.



EIA CONCLUSIONS AND RECOMMENDATIONS

With the selection of the BPEO for the transmission line route, the adoption of the mitigation measures include in the EIA Report and the dedicated implementation of the Environmental Management Plan, it is believed that the significant environmental aspects and impact associated with this project can be suitably mitigated. With the aforementioned in mind, it can be concluded that there are no fatal flaws associated with the project and that authorisation can be issued, based on the findings of the specialists and the impact assessment, through the compliance with the identified environmental management provisions.

The EIA Report recommends various conditions that are regarded as critical mitigation measures emanating from the environmental assessment process.

TITLE AND APPROVAL PAGE

TITLE:	Neptune-Poseidon 400 kV Power Line – Final EIA Report
CLIENT :	Eskom Holdings SOC Limited Eskom Transmission Division P.O. Box 1091 Johannesburg 2001
PREPARED BY	Nemai Consulting C.C. P.O. Box 1673 Sunninghill 2157 Telephone : (011) 781 1730 Facsimile : (011) 781 1731
AUTHOR	D. Henning, S. Pienaar, N. Naidoo

Signature	**Date**

APPROVAL

Signature	**Date**

AMENDMENTS PAGE

Date	Nature of Amendment	Amendment No.	Signature
October 2011	Draft Copy for Public Review	0	
February 2012	Final Copy for Public Review	1	

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

LIST OF ACRONYMS & ABBREVIATIONS

AMSL	Above Mean Sea Level
ARC	Agricultural Research Council
BID	Background Information Document
BFD	Bird Flight Diverter
BPEO	Best Practicable Environmental Option
°C	Degrees Celsius
CBA	Critical Biodiversity Area
CE	Critically Endangered
CITES	Convention on International Trade in Endangered Species
CoPE	Centre of Plant Endemism
CLN	Customer Load Network
DAFF	Department of Agriculture, Forestry and Fisheries
DD	Data Deficient
DEA	Department of Environmental Affairs
DEA&DP	Department of Environmental Affairs and Development Planning
DEAET	Department of Economic Affairs, Environment and Tourism
DEAT	Department of Environmental Affairs and Tourism
DMR	Department of Mineral Resources
DWA	Department of Water Affairs
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EMF	Electromagnetic Field
EMP	Environmental Management Plan
EN	Endangered
GDP	Gross Domestic Product
GIS	Geographical Information System
GN	Government Notice
GVA	Gross Value Added
HIV	Human Immunodeficiency Virus
I&AP	Interested and Affected Party
IBA	Important Bird Area
IDZ	Industrial Development Zone
ISCW	Institute for Soil Climate and Water
ISEP	Integrated Strategic Electricity Planning
IDP	Integrated Development Plan
IPP	Independent Power Producer

km	Kilometre
kV	Kilovolt
LC	Least Concern
m	Metre
m/s	Metres per second
mm	Millimetre
MOSS	Municipal Open Space System
MTS	Main Transmission System
MW	Megawatt
NEMA	National Environmental Management Act (Act No. 107 of 1998)
NERP	National Electricity Response Plan
NHRA	National Heritage Resources Act (Act No. 25 of 1999)
NT	Near Threatened
OHS	Occupational Health and Safety
QDS	Quarter Degree Square
Ra	Rare
RDL	Red Data Listed
SAHRA	South African Heritage Resources Agency
SANBI	South African National Biodiversity Institute
SANRAL	South African National Roads Agency Limited
SASSO	South African Soil Surveyors Organisation
SDF	Spatial Development Framework
SMME	Small, Medium and Micro Enterprises
SSSA	Soil Science Society of America
SSSSA	Soil Science Society of South Africa
STD	Sexually Transmitted Disease
ToR	Terms of Reference
VAC	Visual Absorption Capacity
VU	Vulnerable
WMA	Water Management Area
ZVI	Zone of Visual Influence

1 DOCUMENT ROADMAP

This Environmental Impact Assessment (EIA) Report for the proposed **Neptune-Poseidon 400 kV power line** aims to satisfy the requirements stipulated in Government Notice (GN) No. R385 (21 April 2006), regulation 32(2). **Table 1** presents the document's composition, in terms of the aforementioned requirements.

Table 1: EIA Report Roadmap

Chapter	Title	Correlation with G.N. No. R385	Description
2	Project Background and Motivation	R32(2)(f)	A description of the need and desirability of the proposed activity.
3	Legislation and Guidelines Considered	–	–
4	EIA Process	–	–
5	Assumptions and Limitations	R32(2)(l)	A description of any assumptions, uncertainties and gaps in knowledge.
6	Environmental Assessment Practitioner	R32(2)(a)	Details of – (i) the EAP who compiled the report; and (ii) the expertise of the EAP to carry out an environmental impact assessment.
7	Project Location	R32(2)(c)	A description of the location of the activity.
8	Project Description	R32(2)(b)	A detailed description of the proposed activity.
		R32(2)(c)	A description of the property on which the activity is to be undertaken and the route of the linear activity.
9	Profile of the Receiving Environment	R32(2)(d)	A description of the environment that may be affected by the activity.
10	Summary of Specialist Studies	R32(2)(i)	A summary of the findings and recommendations of any specialist reports.
11	Impact Assessment	R32(2)(d)	A description of the manner in which the physical, biological, social, economic and cultural features of the environment may be affected by the proposed activity.
		R32(2)(g)	An indication of the methodology used in determining the significance of potential environmental impacts.
		R32(2)(j)	(j) a description of all environmental issues that were identified during the EIA process, an assessment of the significance of each issue and an indication of the extent to which the issue could be addressed by the adoption of mitigation measures;

Chapter	Title	Correlation with G.N. No. R385	Description
		R32(2)(k)	An assessment of each identified potentially significant impact – (i) cumulative impacts; (ii) the nature of the impact; (iii) the extent and duration of the impact; (iv) the probability of the impact occurring; (v) the degree to which the impact can be reversed; (vi) the degree to which the impact may cause irreplaceable loss of resources; and (vii) the degree to which the impact can be mitigated.
12	Analysis of Alternatives	R32(2)(f)	A description identified potential alternatives to the proposed activity, including advantages and disadvantages that the proposed activity or alternatives may have on the environment and the community that may be affected by the activity.
		R32(2)(h)	A description and comparative assessment of all alternatives identified during the environmental impact assessment process.
13	Public Participation	R32(2)(e)	Details of the public participation process.
14	EIA Conclusions and Recommendations	R32(2)(m)	An opinion as to whether the activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation.
		R32(2)(n)	An environmental impact statement
Appendix F		R32(2)(p)	Copies of any specialist reports and reports on specialised processes.
Appendix H		R32(2)(o)	A draft Environmental Management Plan.
N/A	N/A	R32(2)(q)	Any specific information that may be required by the competent authority.

2 PROJECT BACKGROUND AND MOTIVATION

2.1 Greater East London Strengthening Scheme

Increased demand for a reliable electricity supply in the Southern Grid has necessitated that Eskom Transmission improves the reliability and capacity of the transmission network into the area. The East London area, which is supplied from the Pembroke and Neptune Main Transmission System (MTS), is presently unfirm. Further, the total area load is expected to increase beyond 500MW by 2009/2010.

Distribution is experiencing low 132kV voltage levels at Zimbane, Qumbu, Ugie, Qunu, Tyalara and Idutywa 132kV busbars, which is expected to worsen by 2009 due to sustained growth in the Transkei. Hence, the need to reinforce the network to cater for network reliability under N-1 contingencies and maintain a good quality of supply to Distribution customers.

Subsequent to the network analysis based on regulatory standard the least economic cost network solution, which will mitigate existing Distribution voltage regulation problems and the Transmission network security in the East London Customer Load Network (CLN), was identified. This network solution meets the following minimum requirements:

- Improve reliability of the existing East London Transmission network;
- Improve East London network voltage regulation; and
- Create additional Transmission network capacity to supply the increasing electricity demand in the Southern Grid.

Based on the analysis of the possible Distribution and Transmission alternatives to mitigate existing and foreseen network constraints, the **Neptune-Poseidon 400 kV power line** project was identified as the preferred option as part of the greater East London Strengthening Scheme. This project will also improve reliability in the Eastern Grid. The main project components include the following:

1. Installation of a new 400kV transmission line (including concrete foundations, towers, conductors and anchors) between the existing Neptune (near East London) and Poseidon (near Cookhouse) substations;

2. Building of turn-in lines of approximately 5km each; and
3. Upgrading of existing substations (including new 400kV feeder bays and yard extensions).

The phased-in approach of the greater East London Strengthening Scheme is proposed to ensure long-term sustainability of the Cape and Eastern Grid corridor reliability.

2.2 Transmission and Distribution of Electricity

High voltage Transmission Lines (i.e. 765 kV, 400 kV and 275 kV) transmit electricity, which is predominantly generated at the power stations located within the Mpumalanga Province, to Eskom's major substations. At these major substations, the voltage is reduced and transmitted to smaller substations via Distribution Lines (e.g. 132 kV, 88 kV and 66 kV). The voltage is again reduced at substations for distribution to the various users via Reticulation Lines.

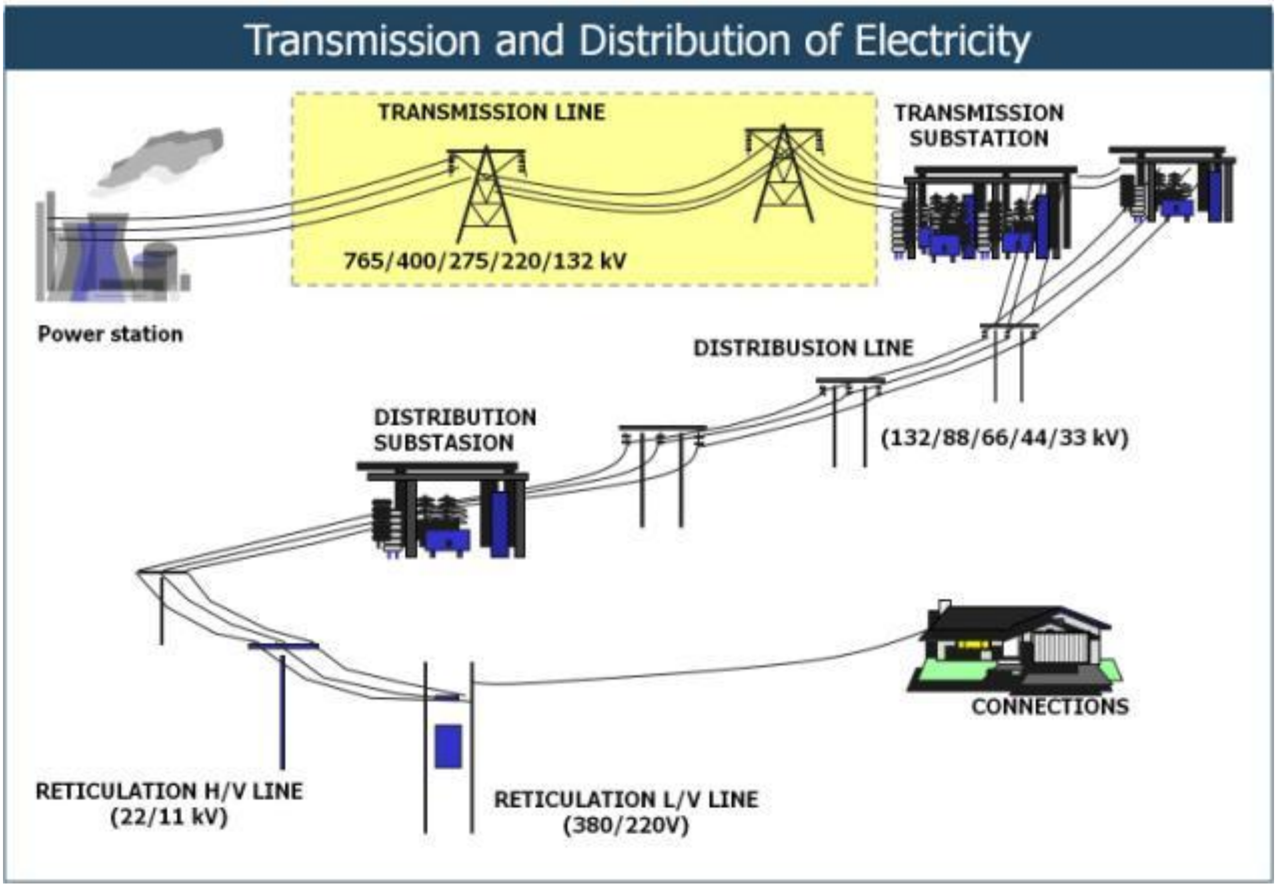


Figure 1: Illustration of the transmission and distribution of electricity

2.3 Eskom's Main Transmission System in the Region

The Cape Transmission System supplies consumers in the Southern Cape, West Coast, Peninsula, Namaqualand, Karoo, East London, Port Elizabeth, Kimberly and Bloemfontein.

Local generation in the Cape region is limited to the Koeberg Nuclear Power Station (1,840 MW), the Palmiet Pumped Storage Scheme near Grabouw (400 MW), and the Gariep (360 MW) and Van Der Kloof (240 MW) Hydro Schemes. The Cape load centres need in excess of 5,000 MW, and the difference needs to be supplied from power stations in Mpumalanga via the Cape Transmission System (ACER Environmental Management Consultants, 2006).

The substations and power lines that form part of Eskom's MTS in the area are shown in **Figure 2**.

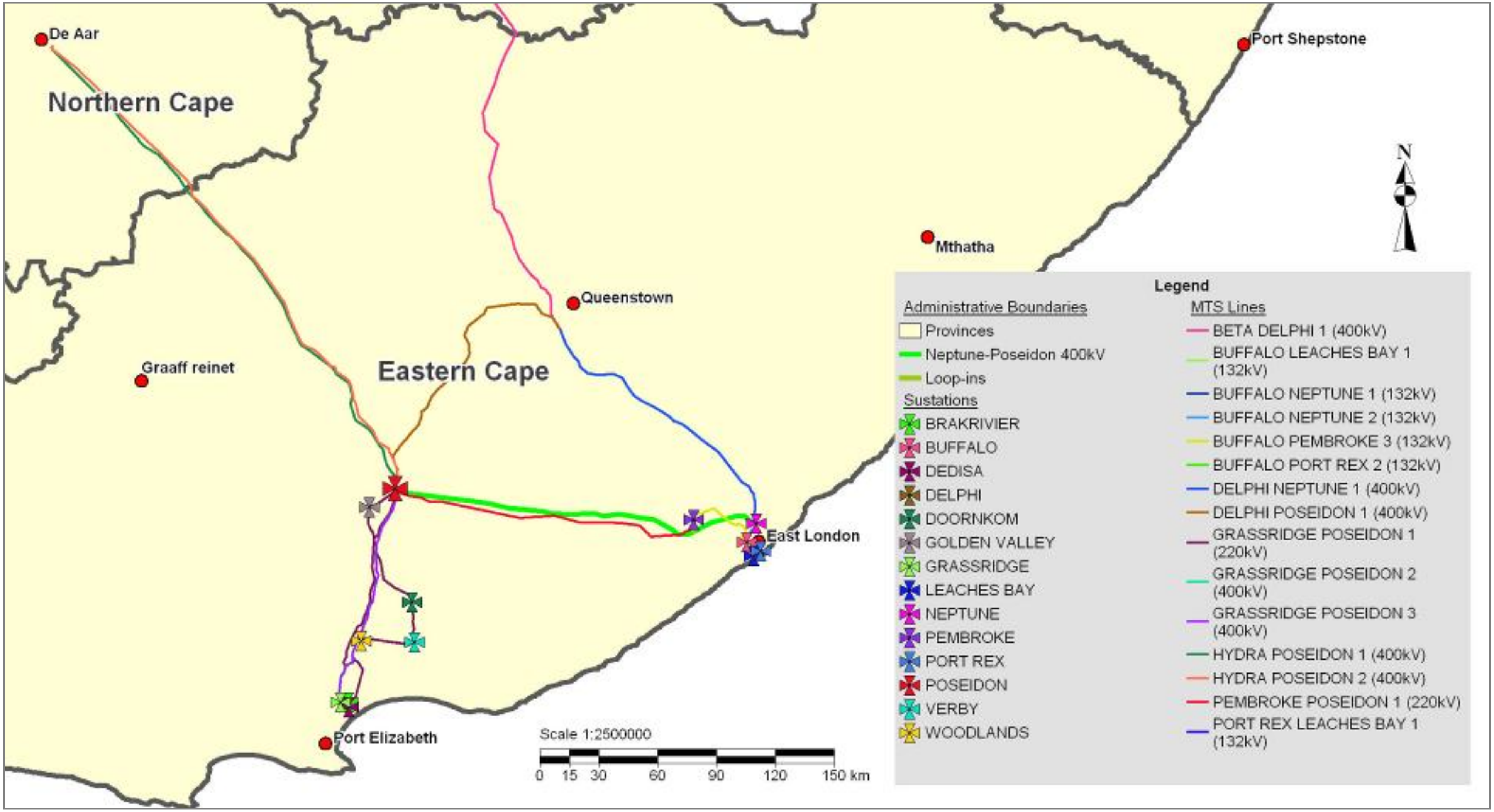


Figure 2: Eskom's Regional MTS

3 LEGISLATION AND GUIDELINES CONSIDERED

3.1 Legislation

The legislation that has possible bearing on the proposed Neptune-Poseidon 400 kV project is captured in the table to follow.

Note: this list does not attempt to provide an exhaustive explanation, but rather an identification of the most appropriate sections from pertinent pieces of legislation.

Table 2: Environmental Statutory Framework

Legislation	Relevance
Constitution of the Republic of South Africa, (Act No. 108 of 1996)	• Chapter 2 – Bill of Rights. • Section 24 – environmental rights.
National Environmental Management Act (Act No. 107 of 1998)	• Section 24 – Environmental Authorisation (control of activities which may have a detrimental effect on the environment). • Section 28 – Duty of care and remediation of environmental damage. • Environmental management principles. • Authorities – National: Department of Environmental Affairs (DEA); Provincial: Eastern Cape Province: Department of Economic Affairs, Environment and Tourism (DEAET).
GN No. R. 385 of 21 April 2006	• Process for undertaking Scoping and EIA in terms of EIA Regulations (2006).
GN No. R. 386 of 21 April 2006	1 The construction of facilities or infrastructure, including associated structures or infrastructure, for: (m) any purpose in the one in ten year flood line of a river or stream, or within 32 metres from the bank of a river or stream where the flood line is unknown, excluding purposes associated with existing residential use, but including - (i) canals; (ii) channels; (iii) bridges; (iv) dams; and (v) weirs. 4 The dredging, excavation, infilling, removal or moving of soil, sand or rock exceeding 5 cubic metres from a river, tidal lagoon, tidal river, lake, in-stream dam, floodplain or wetland. 7 The above ground storage of a dangerous good, including petrol, diesel, liquid petroleum gas or paraffin, in containers with a combined capacity of more than 30 cubic metres but less than 1 000 cubic metres at any one location or site. 12 The transformation or removal of indigenous vegetation of 3 hectares or more or of any size where the transformation or removal would occur within a critically endangered or an endangered ecosystem listed in terms of section 52 of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004).

Legislation	Relevance
	14 The construction of masts of any material or type and of any height, including those used for telecommunication broadcasting and radio transmission. 15 The construction of a road that is wider than 4 metres or that has a reserve wider than 6 metres excluding roads that fall within the ambit of another listed activity or which are access roads of less than 30 metres long. 20 The transformation of an area zoned for use as public open space or for a conservation purpose to another use.
GN No. R. 387 of 21 April 2006	1 The construction of facilities or infrastructure, including associated structures or infrastructure, for: (c) the above ground storage of a dangerous good, including petrol, diesel, liquid petroleum gas or paraffin, in containers with a combined capacity of 1 000 cubic metres or more at any one location or site including the storage of one or more dangerous goods, in a tank farm; and (l) the construction of facilities or infrastructure, including associated structures or infrastructure for the transmission and distribution of above ground electricity with a capacity of 120 kilovolts or more. 2 Any development activity, including associated structures and infrastructure, where the total area of the developed area is, or is intended to be, 20 hectares or more.
GN No. R. 543 of 18 June 2010	• Process for undertaking Scoping and EIA in terms of EIA Regulations (2010).
GN No. R. 544 of 18 June 2010*	11 The construction of: (i) canals; (ii) channels; (iii) bridges; (iv) dams; (v) weirs; (vi) bulk storm water outlet structures; (vii) marinas; (viii) jetties exceeding 50 square metres in size; (ix) slipways exceeding 50 square metres in size; (x) buildings exceeding 50 square metres in size; or (xi) infrastructure or structures covering 50 square metres or more where such construction occurs within a watercourse or within 32 metres of a watercourse, measured from the edge of a watercourse, excluding where such construction will occur behind the development setback line.
	13 The construction of facilities or infrastructure for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 but not exceeding 500 cubic metres.
	18 The infilling or depositing of any material of more than 5 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock from (i) a watercourse; (ii) the sea; (iii) the seashore; (iv) 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- but excluding where such infilling, depositing, dredging, excavation, removal or moving (i) is for maintenance purposes undertaken in accordance

Legislation	Relevance	
		with a management plan agreed to by the relevant environmental authority; or (ii) occurs behind the development setback line.
	22	The construction of a road, outside urban areas, (i) with a reserve wider than 13,5 meters or, (ii) where no reserve exists where the road is wider than 8 metres, or for which an environmental authorisation was obtained for the route determination in terms of activity 5 in Government Notice 387 of 2006 or activity 18 in Notice 545 of 2010.
	24	The transformation of land bigger than 1000 square metres in size, to residential, retail, commercial, industrial or institutional use, where, at the time of the coming into effect of this Schedule such land was zoned open space, conservation or had an equivalent zoning.
	38	The expansion of facilities for the transmission and distribution of electricity where the expanded capacity will exceed 275 kilovolts and the development footprint will increase.
	39	The expansion of (i) canals; (ii) channels; (iii) bridges; (iv) weirs; (v) bulk storm water outlet structures; (vi) marinas; within a watercourse or within 32 metres of a watercourse, measured from the edge of a watercourse, where such expansion will result in an increased development footprint but excluding where such expansion will occur behind the development setback line.
	42	The expansion of facilities for the storage, or storage and handling, of a dangerous good, where the capacity of such storage facility will be expanded by 80 cubic metres or more.
	47	The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre - (i) where the existing reserve is wider than 13,5 meters; or (ii) where no reserve exists, where the existing road is wider than 8 metres – excluding widening or lengthening occurring inside urban areas.
GN No. R. 545 of 18 June 2010*	3	The construction of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of more than 500 cubic metres.
	8	The construction 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.
GN No. R. 546 of 18 June 2010*	3	The construction of masts or towers of any material or type used for telecommunication broadcasting or radio transmission purposes where the mast: (a) is to be placed on a site not previously used for this purpose, and (b) will exceed 15 metres in height, but excluding attachments to existing buildings and masts on rooftops.
	4	The construction of a road wider than 4 metres with a reserve less than 13,5 metres.
	10	The construction of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where such storage

Legislation	Relevance
	occurs in containers with a combined capacity of 30 but not exceeding 80 cubic metres.
	14 The clearance of an area of 5 hectares or more of vegetation where 75% or more of the vegetative cover constitutes indigenous vegetation.
	19 The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre.
National Water Act (Act No. 36 of 1998)	• Chapter 3 – Protection of water resources. • Section 19 – Prevention and remedying effects of pollution. • Section 20 – Control of emergency incidents. • Chapter 4 – Water use. • Watercourse crossings. • Authority – Department of Water Affairs (DWA).
Environment Conservation Act (Act No. 73 of 1989):	• Environmental protection and conservation. • Section 25 – Noise regulation. • Section 20 – Waste management. • Authority – DEA
National Environmental Management Air Quality Act (Act No. 39 of 2004)	• Air quality management • Section 32 – dust control. • Section 34 – noise control. • Authority – DEA.
National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004)	• Management and conservation of the country's biodiversity. • Protection of species and ecosystems. • Authority – DEA.
National Environmental Management: Protected Areas Act (Act No. 57 of 2003)	• Protection and conservation of ecologically viable areas representative of South Africa's biological diversity and natural landscapes.
National Environmental Management: Waste Act (Act No. 59 of 2008)	• Chapter 5 – licensing requirements for listed waste activities (Schedule 1)
National Forests Act (Act No. 84 of 1998)	• Section 15 – authorisation required for impacts to protected trees. • Authority – Department of Agriculture, Forestry and Fisheries
Minerals and Petroleum Resources Development Act (Act No. 28 of 2002)	• Permit required for borrow pits. • Authority – Department of Mineral Resources (DMR).
Occupational Health & Safety Act (Act No. 85 of 1993)	• Provisions for Occupational Health & Safety • Authority – Department of Labour.
National Heritage Resources Act (Act No. 25 of 1999)	• Section 34 – protection of structure older than 60 years. • Section 35 – protection of heritage resources. • Section 36 – protection of graves and burial grounds. • Section 38 – Heritage Impact Assessment for linear development exceeding 300m in length; development exceeding 5 000m^2 in extent. • Authority – South African Heritage Resources Agency (SAHRA).
Conservation of Agricultural Resources Act (Act No. 43 of 1983)	• Control measures for erosion. • Control measures for alien and invasive plant species. • Authority – Department of Agriculture.
National Road Traffic Act (Act No. 93 of 1996)	• Authority – Department of Transport
Tourism Act of 1993	• Authority – South African Tourism Board

*Listings part of EIA Regulations (2010).

3.2 Guidelines

The following guidelines were considered during the preparation of the EIA Report:

- Guideline in Alternatives: NEMA Environmental Impact Assessment Regulations, prepared by the Western Cape Department of Environmental Affairs and Development Planning (DEA&DP, 2006);
- Guideline 3: General Guide to the Environmental Impact Assessment Regulations, 2005. Integrated Environmental Management Guideline Series (DEAT, 2005a); and
- Guideline 4: Public Participation, in support of the EIA Regulations. Integrated Environmental Management Guideline Series (DEAT, 2005b).

3.3 Environmental Authorisations Required

From the relevant legislation listed in **Section 3.1**, the following environmental authorisations will be required for the proposed Neptune-Poseidon 400 kV project:

1. Approval required from DEA for listed activities associated with the project. Scoping and EIA conducted under NEMA, in accordance with the EIA Regulations (GN No. R385, R386 and R387 of 21 April 2006).
2. If applicable, permit to be obtained under National Forests Act (No. 84 of 1998) if protected trees are to be cut, disturbed, damaged, destroyed or removed.
3. If applicable, permit to be obtained from SAHRA under the National Heritage Resources Act (No. 25 of 1999) if heritage resources are to be impacted on.
4. If applicable, Environmental Management Programme to be submitted for approval to DMR for burrow pits, under the Minerals and Petroleum Resources Development Act (No. 28 of 2002).
5. If applicable, authorisation from DWA, in terms of section 21(i) [and potentially 21(c)] of the National Water Act (No. 36 of 1998), for any activities (including the positioning of the towers) within the extent of a watercourse (i.e. 1:100 year floodline or the delineated riparian habitat, whichever is greatest).

3.4 Regional Plans

The following regional plans were considered during the execution of the EIA:

- Spatial Development Frameworks (SDF) (where available);
- Integrated Development Plans;
- Relevant provincial, district and local policies and strategies.

4 EIA PROCESS

4.1 Environmental Assessment Triggers

As noted in **Section 3**, the Neptune-Poseidon 400 kV power line project entails certain activities that require authorisation in terms of the National Environmental Management Act (Act No. 107 of 1998) (NEMA).

The EIA process is being undertaken in accordance with the EIA Regulations of 2006 (GN No. R385 of 21 April 2006). **Table 2** lists (amongst others) the associated relevant activities that apply to the proposed project in terms of GN No. R386 and R387 of 21 April 2006.

On 18 June 2010 the amended EIA Regulations were promulgated in terms of Chapter 5 of NEMA. From the date of effect of these amended EIA Regulations, which was 02 August 2010, these amended EIA Regulations replaced the previous EIA Regulations that had been promulgated on 21 April 2006. In terms of transitional arrangements, an application submitted in terms of the previous EIA regulations (2006) and which were pending when the amended EIA regulations (2010) took effect, must be dispensed with in terms of the former regulations (despite the repeal of these regulations). This is the case with the proposed Neptune-Poseidon 400 kV power line project, where the application form for Scoping and EIA, in terms of Regulation 27 of GN No. R. 385 of 21 April 2006, was submitted to DEA on 11 March 2009.

For the sake of completeness, the activities contained in the listing notices of the amended EIA Regulations (2010) (i.e. GN No. R544, R545 and R546 of 18 June 2010) are also included in **Table 2** and are also assessed in this report.

4.2 Environmental Assessment Authorities

The EIA decision-making authority is the National Department of Environmental Affairs (DEA), as the project proponent (i.e. Eskom Holdings Limited, Eskom Transmission

Division) is a parastatal. However, due to the geographic location of the project the Eastern Cape Province: Department of Economic Affairs, Environment and Tourism (DEAET) is regarded as a key commentary authority during the execution of the EIA, and all documentation will thus be forwarded to this Department.

4.3 Inclusion of Additional Listed Activities

Note that the initial Application Form did not include the following activities listed in term of GN No. R386 of 21 April 2006:

- 1(m) The construction of facilities or infrastructure, including associated structures or infrastructure, for any purpose in the one in ten year flood line of a river or stream, or within 32 metres from the bank of a river or stream where the flood line is unknown, excluding purposes associated with existing residential use, but including -
  (i) canals;
  (ii) channels;
  (iii) bridges;
  (iv) dams; and
  (v) weirs.
- 4 The dredging, excavation, infilling, removal or moving of soil, sand or rock exceeding 5 cubic metres from a river, tidal lagoon, tidal river, lake, in-stream dam, floodplain or wetland.
- 7 The above ground storage of a dangerous good, including petrol, diesel, liquid petroleum gas or paraffin, in containers with a combined capacity of more than 30 cubic metres but less than 1 000 cubic metres at any one location or site.

The above activities 1(c) and 4 have relevance to the proposed project in the case where construction work will take place in watercourses for access road crossings. Activity number 7 relates to the storage of a dangerous goods (e.g. fuel) onsite.

4.4 Scoping Process

The following milestones were reached during the completion of the preceding Scoping process (as contemplated in regulation 28(e) of GN No. R. 385 of 21 April 2006):

1. An application form for Scoping and EIA, in terms of Regulation 27 of GN No. R. 385 of 21 April 2006, was submitted to DEA on 11 March 2009 and the following reference number was assigned to the project: 12/12/20/1439;
2. Focus group meetings were held prior to the initiation of the EIA process, with the purpose of understanding the potential concerns associated with the project before the commencement of formal public participation;
3. Interested and Affected Parties (I&APs) were identified within a 1km corridor along the existing vacant servitude between the Neptune and Poseidon Substations and were notified (via onsite notices, Background Information Documents and newspaper advertisements) of the proposed project;
4. The following meetings were held to share information with I&APs and to identify possible concerns:
    a. Public meetings - 05 - 07 May 2009 and on 10 June 2009;
    b. Authorities meetings - 10 - 11 June 2009;
    c. Traditional Leaders - 02 July 2009;
5. A Scoping-level impact assessment was completed to identify potentially significant environmental issues for detailed assessment during the EIA phase;
6. Feasible alignment alternatives were screened and identified for further appraisal during the EIA phase;
7. A Comments and Response Report was compiled (which was updated during the execution of the Scoping process), which summarised the salient issues raised by I&APs and the project team's response to these matter;
8. A Plan of Study, which explains the approach to be adopted to conduct the EIA, was prepared in accordance with Regulation 29(1)(i) of GN No. R. 385 of 21 April 2006; which included *inter alia* the Terms of Reference for the identified specialist studies;
9. A Draft Scoping Report, which conformed to Regulation 29 of GN No. R. 385 of 21 April 2006, was compiled;
10. The Draft Scoping Report was lodged for public review from 25 January 2010 until 08 March 2010;

11. Public meetings were held on 08 - 09 February 2010 to present the Draft Scoping Report;
12. During public participation for the Main Route, several alternative routes (i.e. Alternatives 2, 3 and 4) were identified and incorporated into the Extended Draft Scoping Report;
13. A 40-day review period (from 03 May 2010 until 15 June 2010) was initially granted for the review of the Extended Draft Scoping Report, which was extended until 30 June 2010 to allow I&APs that were identified during the public meetings to peruse the report;
14. Public meetings were held on 19 - 20 May 2010 to present the alternatives and the Extended Draft Scoping Report;
15. Meetings were held with Traditional Leaders on 19 May 2010 along the alternative alignments;
16. The final Scoping Report was submitted to DEA on 23 August 2010;
17. DEA issued approval for the Scoping Report on 18 October 2010 (refer to ***Appendix B***), which allowed the commencement of the EIA phase; and
18. The I&APs on the database were notified of the approval of the Scoping Report on 01 November 2010.

There were certain delays in completing the EIA phase, primarily due to the refinement of the route alternatives and addressing concerns raised by I&APs. DEA was notified of these delays in order to extend the submission date for the EIA Report to the Department.

4.5 EIA Methodology

4.5.1 <u>Need and Desirability</u>

In terms of Regulation 32(2)(f) of GN No. R385 (21 April 2006), this section discusses the need and desirability of the project.

In order to address the need and desirability of the project, the questions raised in the Guideline on Need and Desirability (DEA&DP, 2009) are answered in the table to follow.

Table 3: Need and Desirability of the Project

No.	Question	Response
	NEED ('timing')	
1.	Is the land use (associated with the activity being applied for) considered within the timeframe intended by the existing approved Spatial Development Framework (SDF) agreed to by the relevant environmental authority? (i.e. is the proposed development in line with the projects and programmes identified as priorities within the IDP).	**Section 2.1** explains the strategic need for the proposed Neptune-Poseidon 400kV project in an endeavour to ensure long-term sustainability of the Cape and Eastern Grid corridor reliability, as part of the greater East London Strengthening Scheme. The context of the project in terms of the planning environment is discussed in **Section 9.15**. Conflict was identified for Alternative 2.
2.	Should development, or if applicable, expansion of the town/area concerned in terms of this land use (associated with the activity being applied for) occur here at this point in time?	Any future development would need to take cognisance of the servitude restrictions.
3.	Does the community/area need the activity and the associated land use concerned (is it a societal priority)? This refers to the strategic as well as local level (e.g. development is a national priority, but within a specific local context it could be inappropriate)	The greater East London Strengthening Scheme will reinforce the network to cater for network reliability and maintain a good quality of supply to Distribution customers.
4.	Are the necessary services with appropriate capacity currently available (at the time of application), or must additional capacity be created to cater for the development?	Current services are sufficient.
5.	Is this development provided for in the infrastructure planning of the municipality, and if not what will the implication be on the infrastructure planning of the municipality (priority and placement of services)?	Planning consideration to be given to upgrading of electricity distribution and reticulation infrastructure.
6.	Is this project part of a national programme to address an issue of national concern or importance?	Greater East London Strengthening Scheme holds national implications.
	DESIRABILITY ('placing')	
7.	Is the development the best practicable environmental option (BPEO) for this land/site?	Through the comparative analysis (**Section 10**), the BPEO was selected.
8.	Would the approval of this application compromise the integrity of the existing approved municipal IDP and SDF as agreed to by the relevant authorities?	Alternative 2 poses conflict in terms of the Buffalo City Municipality IDP and SDF with regards to the future Open Space System / Environmental Network. No further conflict identified for other route options.
9.	Would the approval of this application compromise the integrity of the existing environmental management priorities for the area (e.g. as defined in Environmental Management Frameworks), and if so, can it be justified in terms of sustainability considerations?	See response provided for question no. 8 above.

No.	Question	Response
10.	Do location factors favour this land use (associated with the activity applied for) at this place? (this relates to the contextualisation of the proposed land use on this site within its broader context).	• Main Route follows an existing vacant servitude. • Controlled activities (e.g. agriculture) will be permissible within the servitude. • Alternative 4 follows existing transmission line in an attempt to minimise impact in western portion of project area (particularly private game farms). • Power line will detract from the visual quality of the area.
11.	How will the activity or the land use associated with the activity applied for, impact on sensitive natural and cultural areas (built and rural/natural environment)?	• Through walk-down survey, sensitive environmental features can be avoided, as far as possible. • Special construction methods employed for crossing inaccessible and sensitive areas. • Power line will detract from the visual quality of the area.
12.	How will the development impact on people's health and wellbeing (e.g. i.t.o. noise, odours, visual character and sense of place, etc)?	• Refer to impact assessment contained in **Section 11**. • Potential impacts during construction phase to be managed through EMP. • See response provided for question no. 11 above.
13	Will the proposed activity or the land use associated with the activity applied for, result in unacceptable opportunity costs?	• Main Route follows an existing vacant servitude. • Controlled activities (e.g. agriculture) will be permissible within the servitude. • Alternative 4 follows existing transmission line in an attempt to minimise impact in western portion of project area (particularly private game farms).
14	Will the proposed land use result in unacceptable cumulative impacts?	• See **Section 11.11**. • It is believed that the cumulative impacts can be mitigated to a satisfactory level.

4.5.2 <u>Formal Process</u>

Key objectives for the EIA phase include the following:

- Carry out relevant specialist studies;
- Conduct public participation;
- Assess receiving environment;
- Undertake quantitative assessment of significant environmental impacts and identify concomitant mitigation measures;
- Evaluate alternative alignments through a comparative analysis; and

- Compile EIA Report in accordance with the requirements stipulated in GN No. R385 of 21 April 2006, regulation 32(2); for review by I&APs. Refer to **Section 1** for the document's composition, in terms of the regulatory requirements.

An outline of the Scoping and EIA process for the proposed Neptune-Poseidon 400 kV power line is provided in **Figure 3**.

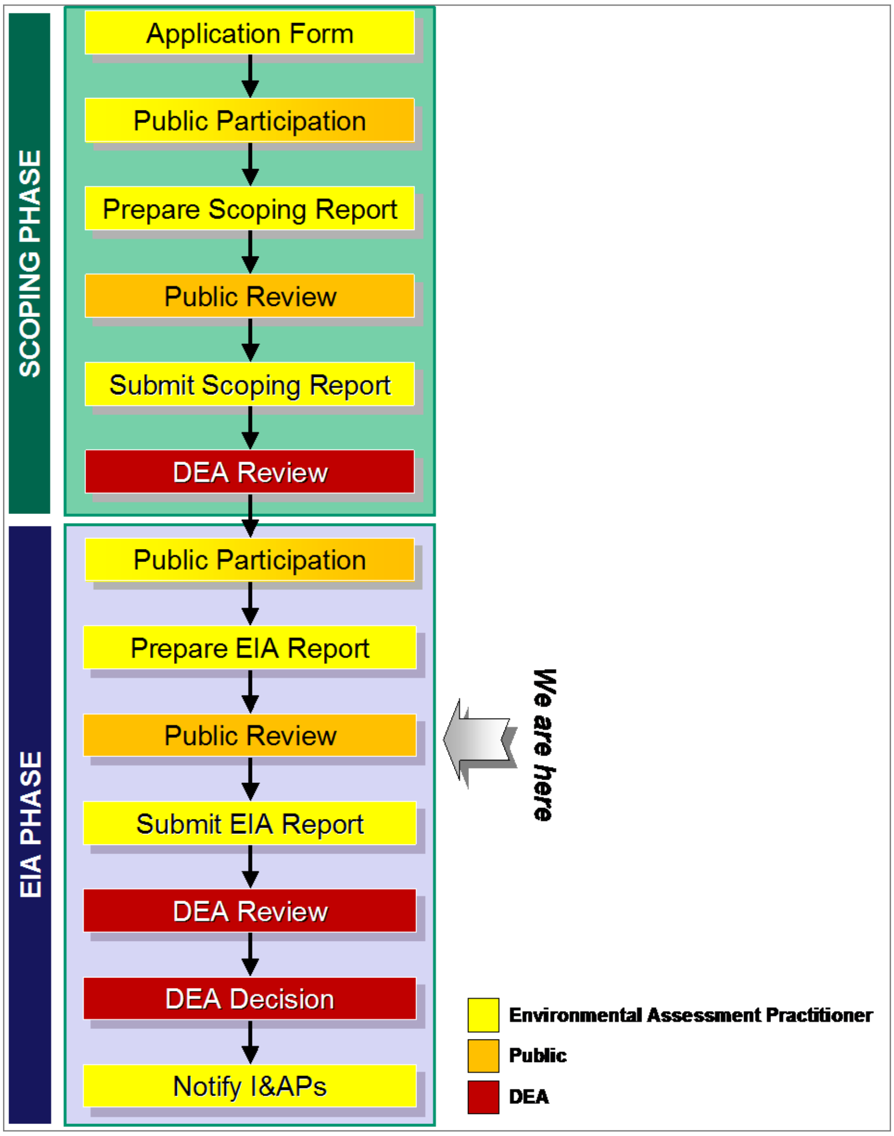


Figure 3: Outline of Scoping and EIA process

4.5.3 Alignment with the Plan of Study

The Plan of Study, which was contained in the Scoping Report and was approved by DEA, explained the approach to be adopted to conduct the EIA for the proposed

Neptune-Poseidon 400 kV transmission line. The manner in which the EIA Report addresses the requirements of the Plan of Study are tabulated below.

Table 4: Alignment of EIA Report with Plan of Study

Plan of Study Requirement	EIA Report Reference
Assess pertinent environmental issues identified during Scoping through specialist studies, technical input and suitable mitigation measures	• **Sections 10;** and • **Section 11**
Specialist studies to be completed in accordance with Terms of Reference.	• **Section 10; and** • ***Appendix F***
Public participation to include the following: • Updating of I&AP Database • Notification – Approval of Scoping Report • Public Meetings • A Comments and Response Report will be compiled • Review of Draft EIA Report • Notification of DEA Decision	**Section 13**
EIA Report to satisfy the minimum requirements stipulated in Regulation 32 of GN No. R. 385 of 21 April 2006	**Section 1**
Authority Consultation	**Section 13**

The EIA included the following deviations from the Plan of Study:

- The Plan of Study indicated that a Socio-economic Study would be undertaken for the project. However, due to the numerous concerns raised by the landowners regarding the economic impacts of the proposed transmission line, the earmarked study was changed to an Economic Study. This was done to ensure that the issues and potential impacts posed by the development to the economic environment were adequately assessed. The social issues were evaluated separately through a Social Impact Assessment.
- A geotechnical study, which was listed as a specialist study to be undertaken, is not included in the EIA and will only be conducted once the final alignment and locations of the towers within the corridor have been confirmed through the walk-down survey.

4.5.4 Route Selection

Eskom owns a registered unused servitude between Neptune and Poseidon substations, which serves as the Main Route for the proposed 400 kV power line. The registration of the servitude took place from the 1970s to the 1990s, and makes provision for a single transmission line. A brief history of the vacant servitude follows. Eskom Transmission Planning requested the strengthening of the East London area and required a line from

Poseidon to meet this need. Land and Rights then undertook an in-house route determination and environmental due diligence to find the least impacting route. An existing vacant servitude was used most of the way with certain deviations (e.g. the new dam south of Middeldrift which was built on Eskom's old vacant servitude). All landowners agreed to the new widened servitude and the Eskom property rights were registered for this use. Bush clearing was then done for the entire route. Eskom gates were installed in every fence that the servitude crossed. Transmission then decided that the demand in East London was not growing as anticipated and therefore the construction of the power line was delayed. Eskom feels strongly that their property right is protected by the constitution, with a servitude that is cleared of vegetation and has installed gates, and that this right should be respected.

Initially, the Scoping study only focused on this existing vacant servitude (i.e. Main Route), as it was identified to be a feasible environmental option. However, during the initial public participation the need for additional alternatives was highlighted by Interested and Affected Parties (I&APs) and the Scoping process was extended to identify and incorporate additional routes. Eskom Transmission identified possible routes between the start and end points, and the criteria used included the technical ability to build, cost (keeping the electricity tariff in mind), land use and obvious environmental features. The alternatives constitute deviations from the Main Route and are focused on the eastern and western portions of the overall route where particular concerns were raised by I&APs on game farms and agricultural land. The environment also tends to be in more of a natural state in these areas, with thicket and bushland (eastern and western portions) and shrubland / fynbos (western portion) constitute the primary land cover. The land cover in the central portion, where no deviations to the vacant servitude were identified, is largely degraded and scattered with thicket and bushland as well as grassland to a much lesser extent. There central portion is also interspersed with rural settlements.

Using the existing vacant servitude as a basis, these alternative alignments were identified on a desktop level and then further scrutinised based on technical, environmental and financial considerations by Eskom and the EIA team. Thereafter it was accepted as viable route alternatives / deviations from the existing vacant servitude.

Some key considerations during the route determination process included:

- Tie-points (i.e. a point through which the route must pass to achieve the overall goals and requirements of the project / an area towards which the transmission line is attracted between its terminals), which are the substations or significant demand centres along the alignment.
- There are certain areas where the route is attracted in a certain way due to extreme topography at some river crossings, or for considerations of access for maintenance. Existing infrastructure such as rail lines, road or other power lines sometimes attract new routes in an effort to create a utility corridor on an already-disturbed area.
- No-Go areas where it is impractical / impossible to build transmission lines, which could include wetlands, steep or unstable terrain, land subject to mineral rights, buffer zones around landing strips or airfields, dense human settlements or highly corrosive zones along the coastline.

Except for small sections, Alternatives 2 and 3 do not follow existing servitudes / services. Alternative 4 runs alongside the existing Eskom 220kV Pembroke-Poseidon 1 transmission line, apart from the section where it links up to the Main Route.

During the environmental assessment a 1 km corridor (i.e. 500 m on either side of the route centre line for each alternative) was adopted as the study area. This is to allow for any possible deviations within this corridor, deemed necessary by the following factors:

- Findings of the impact assessment and specialist studies;
- Outcome of Eskom negotiations with landowners; and
- Technical requirements.

Further recommendations on the routing of the power line received from I&APs was also duly considered during the EIA phase (refer to **Section 12.5**).

4.5.5 Screening and Assessment of Alternatives

Various alternatives to meeting the project’s objectives were considered during Scoping, which included options for the alignment route, tower structures, upgrading existing transmission lines, placing the transmission line underground and the “no go” option.

The alignment and tower structure alternatives are taken forward in the impact prediction, where the potential adverse effects to the environmental features and attributes are examined further in **Section 11**.

A comparative analysis of the route options (**Section 12**) was also conducted from environmental (including specialist input) and technical perspectives, which included a systematic comparison of the implications of the alternative routes to enable the selection of a Best Practicable Environmental Option (BPEO).

4.5.6 Impact Prediction

Refer to **Section 11** for the impact assessment of the Neptune-Poseidon transmission line.

The potential environmental impacts associated with the project were identified through an appraisal of the following:

- Proposed routes of the power line corridors, which included a desktop evaluation with a Geographical Information System (GIS) and aerial photography, as well as site investigations;
- Project infrastructure and design considerations;
- Activities and associated environmental aspects (i.e. causes of potential impacts) associated with the project life-cycle (i.e. pre-construction, construction, operation and decommissioning);
- Nature and profile of the receiving environment and potential sensitive environmental features and attributes;
- Input received during public participation from I&APs;
- Findings of specialist studies;
- Legal and policy context; and
- Cumulative impacts.

The Scoping exercise aimed to identify significant environmental impacts for further consideration and prioritisation during the EIA stage. Note that “significant impacts” relate to whether the effect (i.e. change to the environmental feature / attribute) is of sufficient importance that it ought to be considered and have an influence on decision-making.

During Scoping, the impact prediction was executed on a qualitative level, where the main impacts where distilled by considering factors such as the nature, extent, magnitude, duration, probability and significance of the impacts.

During the EIA stage a detailed assessment is conducted to identify all impacts, which are evaluated via contributions from I&APs, the project team and requisite specialist studies, and through the application of the impact assessment methodology contained in **Section 11.1.6**. Suitable mitigation measures are proposed to manage (i.e. prevent, reduce, rehabilitate and/or compensate) the environmental impacts, and are included in the Environmental Management Plan (EMP) (see ***Appendix H***).

4.6 Servitude Negotiation and the EIA Process

Transmission lines are constructed and operated within a servitude (55 m wide for 400 kV lines) that is established along the entire length of the line. Within this servitude, Eskom Transmission have certain rights and controls that support the safe and effective operation of the line. The process of achieving the servitude agreement is referred to as the Servitude Negotiation Process (refer to ***Appendix C***).

The EIA process has become important in the initial planning and route selection of new Transmission lines. For this reason, it is usually preferable that the negotiation process begins after the EIA has been completed. At this stage there is greater confidence in the route to be adopted, and it would be supported by environmental authorisation. However, it may be required that the negotiation process begins earlier, and may begin before, or run in parallel with the EIA process. This may be due to tight timeframes for the commissioning of the new line, knowledge of local conditions and constraints, etc. Eskom Transmission has a right to engage with any landowner at any time, though they do so at risk if environmental authorisation has not been awarded.

5 ASSUMPTIONS AND LIMITATIONS

The following assumptions and limitations accompany the EIA for the proposed Neptune-Poseidon 400 kV power line:

- The exact locations of the towers and the route can only be determined following detailed design, and the environmental assessment is thus conducted for a 1 km corridor for each alternative alignment.
- Although specialist studies were conducted, the identification of sensitive environmental features and attributes (e.g. protected flora, sensitive habitat, heritage resources) will be facilitated by a detailed walk-down survey of the final approved route. This will allow for a more detailed site appraisal of the entire route through on-ground inspections by a surveyor and a team of appropriate environmental specialists.
- The EIA process does not make provision for borrow pits. The necessary approval of borrow pits will be required from the Department of Mineral Resources (DMR) in terms of the Minerals and Petroleum Resources Development Act (Act No. 28 of 2002).
- It is assumed that the baseline information scrutinised and used to explain the environmental profile is accurate.
- The locations of camp sites are not known at this stage, and the associated impacts will need to be addressed through suitable mitigation measures in the Environmental Management Plan (EMP).
- Although existing access roads will be utilised as far as possible, it is not known which access roads will be used and where river crossings (if applicable) will take place. Following the walk-down survey and final alignment of the transmission line, the access roads will be confirmed. The EMP will also need to make provision for managing the related aspects and impacts.
- The type of tower structure is unknown at this stage, and is dependent on several factors, including terrain, expense and recommendations that emanated from the Visual Impact Study, as well as the final route of the power line. The final engineering design will include the selection of the most appropriate tower type.
- The alignment of a transmission line alongside existing linear infrastructure (e.g. roads, pipelines, existing power lines, etc.) to create a utility corridor is often a preferred approach, due to the impacts associated with traversing greenfield land with

no substantial prior disturbance. In the case of this project, Alternative 4 and Alternative 4 Segment B follow an existing transmission line. The cumulative impact on the electromagnetic field (EMF) associated with the corridor sharing of these two high-voltage power lines is not quantified within the EIA.

- The Heritage Impact Assessment noted the following limitations:
  - In some sections dense vegetation limited archaeological visibility.
  - In many cases the proposed power lines will have a visual impact, i.e. indirect impact, on heritage sites. This is not addressed in this report as a separate report will be dealing with visual impacts.
  - As the corridors are a kilometre wide, they were surveyed only in a general sense.
  - The additional section (Alternative 4B) added to the alternative in the western section (Alternative 4) was not investigated during the field survey as it was only included after the site visit had taken place.
- The Social Impact Assessment listed the following assumptions and limitations:
  - The data currently available from Statistics South Africa carries with it certain limitations that will be reflected in this study. Although updated demographic data is available from Stats SA in the form of the Community Survey 2007 and the Mid-year population estimates, this data does not reach down to the ward level and at that level the only data available from Stats SA was that gathered during Census 2001, being the most recent Census undertaken in South Africa.
- The assumptions and limitations of the Visual Impact Assessment includes:
  - This assessment was undertaken during the conceptual stage of the project and is based on information available at the time.
  - An exact commencement date for the construction phase is unknown.
  - The exact location, size and number of construction camps and material lay-down yards are not yet specified at this stage of the project. It is anticipated that construction camps will be set up on farms at central locations along the preferred alignment.
  - The exact positions of the pylons are not yet determined. The visibility results have been generated from the anticipated alignment and may deviate from the route for the final approved alignment. The differences are considered omissible.

6 ENVIRONMENTAL ASSESSMENT PRACTITIONER

Nemai Consulting was appointed by Eskom Holdings Limited, Eskom Transmission Division as the independent Environmental Assessment Practitioner (EAP) to undertake the environmental assessment for the proposed Neptune-Poseidon 400 kV power line.

In accordance with Regulation 29(2) of GN No. R. 385 of 21 April 2006, this section provides an overview of Nemai Consulting and the company's experience with EIAs, as well as the details and experience of the EAPs that form part of the Scoping and EIA team.

Nemai Consulting is an independent, specialist environmental, social development and Occupational Health and Safety (OHS) consultancy, which was founded in December 1999. The company is directed by a team of experienced and capable environmental engineers, scientists, ecologists, sociologists, economists and analysts. The company has offices in Randburg (Gauteng), Rustenburg (North West Province), and Durban (KwaZulu Natal).

The members of Nemai Consulting that are involved with the Scoping and EIA process for the Neptune-Poseidon 400 kV power line are captured in **Table 5** below, and their respective Curricula Vitae are contained in to ***Appendix D***.

Table 5: Scoping and EIA Team Members

Name	Qualifications	Experience	Duties
Ms D. Naidoo	B.Sc Eng (Chem)	17 years	Project Director
Mr D. Henning	• B.Sc (Hons) Aquatic Health • M.Sc River Ecology	10 years	• Project Manager • Compiling Scoping and EIA Reports
Mr S. Pienaar	• B.Sc (Hons) Env Management	4 years	Public Participation Coordinators
Mr C. Chidley	• B.Sc Eng (Civil); • BA (Economics, Philosophy) • MBA	20 years	Quality Reviewer

7 PROJECT LOCATION

The study area is situated in the Eastern Cape Province, which was formed in 1994 by the amalgamation of the former homelands of the Transkei and the Ciskei, as well as an eastern portion of the former Cape Province. The Eastern Cape today consists of 16 958 000 hectares and comprises 13.9% of the total land area of South Africa.

The Neptune-Poseidon routes for the alternative alignments traverse the following municipalities (see **Figure 4**):

- Amatole District Municipality –
  - Buffalo City Local Municipality;
  - Amahlathi Local Municipality (Alternative 2 only);
  - Ngqushwa Local Municipality;
  - Nkonkobe Local Municipality;
  - Nxuba Local Municipality;
- Cacadu District Municipality –
  - Blue Crane Route Local Municipality.

The area affected by the project is primarily owned by private landowners (notably in the eastern and western parts of the study area) and Traditional Authorities.

As mentioned, 1 km corridor (i.e. 500 m on either side of the centre line of each alternative route) was adopted as the study area. The various alternatives alignments for the Neptune-Poseidon 400kV powerline include the following (see **Figure 5** and enlarged locality map contained in ***Appendix A***):

- **Main Route –** Power line (approximately 191km) runs in an east to west direction from the existing Neptune substation (north-west of East London) to the Poseidon substation (± 11 km east of Cookhouse), in the Eastern Cape. The proposed alignment is situated within the existing vacant Eskom servitude between the aforementioned substations. Two turn-ins of approximately 5 km each, which pass between Ndevana and Ilitha, connect the proposed line with the Pembroke substation.

From approximately King William's Town the line runs between the R63 road (to the north) and the existing Pembroke-Poseidon 220 kV transmission line (to the south).

- **Alternative 2 –** Deviation from Main Route, where the power line (approximately 40km) runs in an east to west direction from the Neptune substation to the south around Mdantsane and the Bridle Drift Dam and reconnects to the Main Route to the south of Berlin, at Rini.
- **Alternative 3 –** Deviation from Main Route, where the power line (approximately 39km) runs in an east to west direction from the Neptune substation to the north around Nqonqweni, around Berlin and connects to the Main Route at Hillcrest. The last 16km of this route runs parallel to an existing Eskom line.
- **Alternative 4 –** Deviation from Main Route, where the power line (approximately 65km) runs in a west to east direction from the Poseidon substation to the south of the Main Route alongside the existing Eskom 220kV Pembroke-Poseidon 1 transmission line. Alternative 4 connects to the Main Route via the following two options -
  - Segment A is approximate 6km in length and connects to the Main Route close to Klu Klu, south of Fort Beaufort.
  - Segment B continues alongside the existing Eskom 220kV Pembroke-Poseidon 1 transmission line for ± 17km and then continues in a north-easterly direction for another ± 8km to connect to the Main Route.

A detailed route description of each alternative alignment is provided in **Section 8.1**.

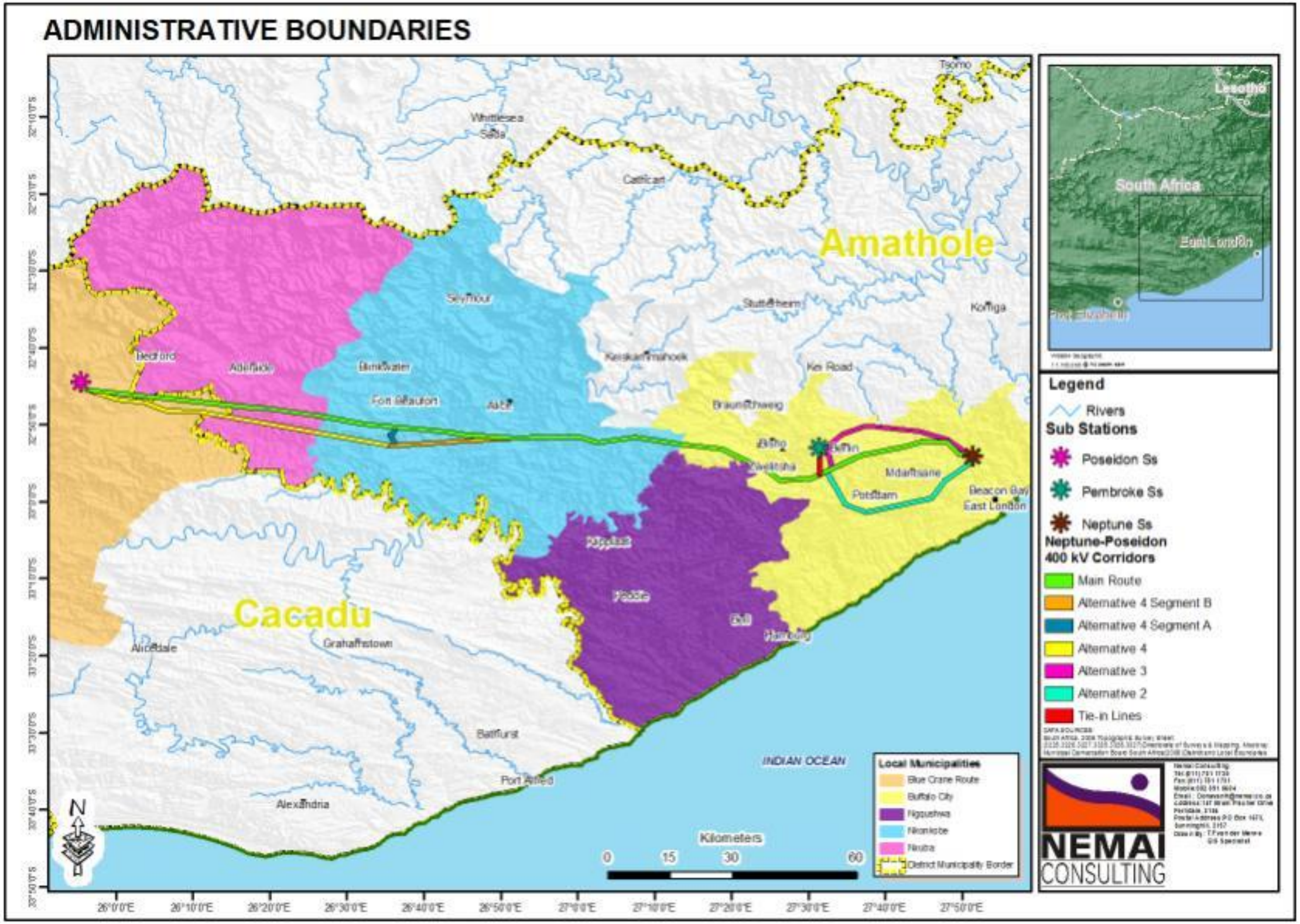


Figure 4: **Municipal areas traversed by proposed corridors**

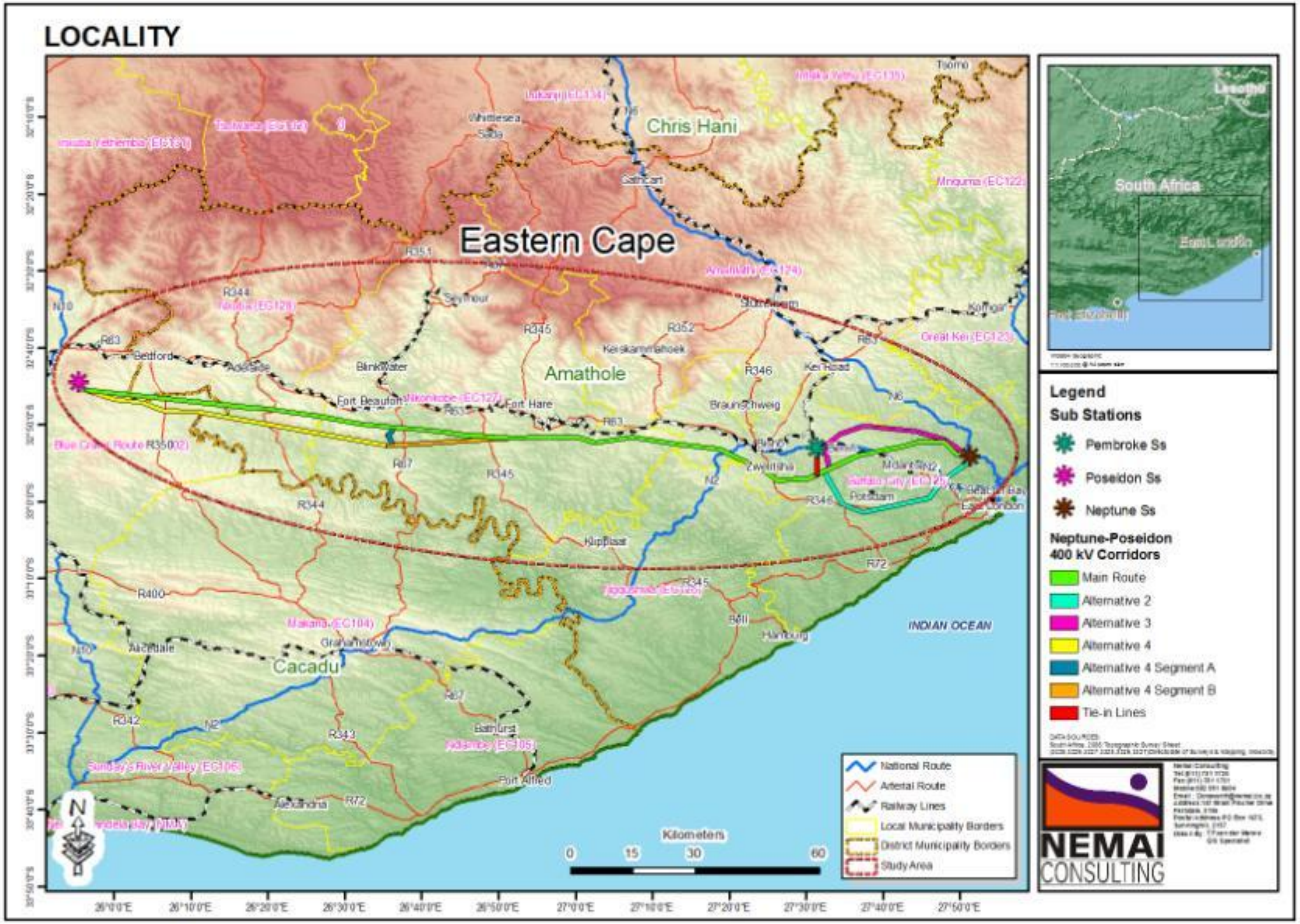


Figure 5: Locality Map

8 PROJECT DESCRIPTION

8.1 Power Line Routes

Refer to ***Appendix E*** for cadastral maps of the route alternatives.

An overview of the alternative transmission line routes follows below. All distances provided should be regarded as approximates, as they are based on a desktop estimate from a GIS. Note that a 1 km corridor was investigated during the EIA to allow for any possible deviations of the final route within this corridor, and the route description to follow is only for the centreline of each alternative corridor.

8.1.1 Main Route

Eskom owns a registered unused servitude between Neptune and Poseidon substations, which constitutes the Main Route for the proposed 400 kV power line, as the other alternative alignments are deviations from this alignment (refer to **Section 4.5.4**).

From the Neptune Substation (situated on Portion 15 of Farm 601) at the Main Route's eastern point, the alignment crosses the following private properties in a north-westerly direction:

- Portion 14 of Farm 601 for ± 370m;
- Portion 13 of Farm 601 for ± 30m;
- Portion 11 of Farm 600 for ± 430m;
- Portion 12 of Farm 600 for ± 520m;
- Portion 4 of Farm 600 for ± 600m;
- Portion 2 of Farm 600 for ± 280m;
- Portion 8 of Farm 600 for ± 40m;
- Portion 9 of Farm 600 for ± 590m; and
- Farm 305 for ± 2km.

Thereafter the Main Route continues north-westerly for ± 1.8km and then westerly for ± 2.9km over tribal land, past the north of Nqonqweni village. It then crosses over the Nahoon River and traverses Farm 96 (St Luke's Mission Land) for ± 1.6km.

The transmission line route then continues further westerly through KwaMpundu village for ± 500m before turning south-westwards for ± 1.5km over the Farm Newlands 271. From there the route crosses over the following properties:

- Portion 2 of Farm 280 for ± 580m;
- Remainder of Farm 280 for ± 1.5km;
- Portion 4 of Farm 280 for ± 800m;
- Remainder of Farm 281 for ± 220m;
- Portion 2 of Farm 282 for ± 300m;
- Portion 3 of Farm 282 for ± 720m
- Remainder of Farm 282 for ± 1.3km;
- Remainder of Farm 289 for ± 1.2km; and
- Farm South Biggar 1220 for ± 800m.

The Main Route then traverses the N2 national road before continuing for a further ± 1.2km on the Farm South Biggar 1220. Hereafter the line crosses Portion 5 of the Farm Mistley 1219 for ± 480m, followed by a railway line and the R102.

The alignment then passes over tribal land to the north of Nqonqweni village for ± 2.3km, followed by Farms 2238 (± 840m), 2236 (± 1.1km), 2235 (± 1km) and 2234 (± 1.6km), located to the south of Berlin. Thereafter the route continues for ± 7km passing to the south of Hillcrest and Rini. The route then crosses Laing Dam and Portion 10 of Farm 1936 for ± 1.9km, to the south of Fort Murray. The Main Route then crosses Portion 1 of Farm 1935 for ± 390m. For the next ± 3.5km, the alignment runs to the north of the Village KwaQongqotha and south of Phakamisa.

The route then turns in a north-western direction, and runs to the south of KwaMlakalaka (crossing the R346 road) and Zwelitsha for ± 3.7km. For the next ± 8.7km the Main Route passes north of Godidi and Dubu, south of Kwabhonke, south of Kwalini and north of Ngxwalane. The alignment then crosses the N2, south-west of KwaRayi, and continues for ± 1.8km before bending more westwards and travelling for ± 39km past the following places on interest over tribal land:

- North of Bisho Airport;
- South of Bolembu;
- North of Mabefu;
- North of Anders Mission;
- South of Mamata;
- South of Maipase;
- North of Ntonga;
- South of Zihlahleni;
- North of Lolini;
- North of Tafeni;
- North of Debe Valley
- South of Mxumbu;
- South of Debe Dam;
- Over the Keiskamma River;
- North of Gqadushe;
- Norht of Capo; and
- South of Gaqa.

The Main Route then crosses over the Tyume River and traverses the following farms in a westerly direction until the Poseidon Substation:

- Farm 190 for ± 2.6km;
- Farm 191 for ± 1.4km;
- Farm 192 for ± 1.7km;
- Farm 193 for ± 2.4km (followed by the R345 road);
- Portion 1 of Farm 193 for ± 350m;
- Farm RozenDal 187 for ± 3km;
- Farm Vogelzang 186 for ± 2.3km;
- Farm Aberdeen 176 for ± 3.2km;
- Farm 177 for ± 580m;
- Farm 178 for ± 760m;

- Farm 172 for ± 1.6km;
- Farm Highlands 179 for ± 2.1km;
- Farm The Bath 145 for ± 3km;
- Farm 203 for ± 5.7km (including the R67 road);
- Farm 202 for ± 590m;
- Farm Papkuilsfontein 147 for ± 3.2km;
- Farm Hammonds 148 for ± 3.5km;
- Portion 6 of Farm Brakfontein 149 for ± 2.8km;
- Portion 1 of Farm Brakfontein 149 for ± 1.2km;
- Portion 1 of Farm Waterfall 150 for ± 1.1km;
- Remainder of Farm Waterfall 150 for ± 1km;
- Farm Cottesbrook 151 for ± 4.2km;
- Portion 1 of Farm Mount Prospect 152 for ± 2.9km;
- Farm Windsor 153 for ± 2.7km (including the R344 road);
- Farm 209 for ± 2km;
- Portion 1 of Farm Kaffirs Hoek 192 for ± 2.5km;
- Remainder of Farm Kaffirs Hoek 192 for ± 3.4km;
- Farm Mantjes Fonteyn 135 for ± 1km;
- Portion 3 of Farm Commando Fonteyn 191 for ± 410m;
- Remainder of Farm Commando Fonteyn 191 for ± 1.9km;
- Portion 4 of Farm Commando Fonteyn 191 for ± 2km;
- Portion 2 of Farm Commando Fonteyn 191 for ± 600m;
- Farm 287 for ± 3.4km;
- Portion 1 of Farm Gideons Hoek 190 for ± 3km;
- Farm Herberts Hope 263 for ± 2.9km (including the R350 road);
- Farm Goba’s Wagon Drift 248 for ± 4.3km;
- Farm 260 for ± 650m;
- Farm Kleine Knoffel Fontein 187 for ± 2.6km;
- Farm Roberts Kraal 281 for ± 4.3km;
- Farm 242 for ± 1.7km;
- Farm 248 for ± 2km;

Figure 6: Views along the vacant servitude (Main Route)

The coordinates for the bend points along the Main Route are provided in **Table 6**.

Table 6: Main Route bend points (start and end points from west to east)

No.	Latitude	Longitude	
1.	32°44'38.231958"S	25°55'33.142517"E	Start point
2.	32°44'42.451743"S	25°55'33.760934"E	
3.	32°44'58.028572"S	25°55'29.936987"E	
4.	32°45'07.302537"S	25°55'32.047503"E	
5.	32°45'29.809272"S	25°56'21.860562"E	
6.	32°47'44.210786"S	26°17'33.742112"E	
7.	32°47'53.36798"S	26°19'43.812006"E	
8.	32°48'45.593592"S	26°26'12.02124"E	
9.	32°49'55.563349"S	26°32'10.245677"E	
10.	32°50'23.612138"S	26°37'20.129407"E	
11.	32°50'28.996677"S	26°38'46.765705"E	
12.	32°50'53.691828"S	26°42'53.614729"E	
13.	32°51'20.720281"S	26°45'33.235956"E	
14.	32°51'40.483063"S	26°52'00.927123"E	
15.	32°51'36.393925"S	26°54'55.037285"E	
16.	32°51'34.916428"S	27°00'19.493774"E	
17.	32°52'17.462414"S	27°02'31.378851"E	
18.	32°51'34.048774"S	27°07'23.857889"E	
19.	32°52'34.578425"S	27°13'56.728011"E	
20.	32°53'08.305475"S	27°18'35.559474"E	
21.	32°55'52.898098"S	27°24'26.766803"E	
22.	32°57'11.573137"S	27°26'12.925585"E	
23.	32°57'00.560173"S	27°30'07.154073"E	
24.	32°53'52.754105"S	27°36'56.47034"E	
25.	32°52'48.159014"S	27°42'35.76218"E	
26.	32°52'09.238977"S	27°44'40.721353"E	
27.	32°52'13.302651"S	27°46'28.846337"E	
28.	32°52'12.927288"S	27°47'56.377729"E	
29.	32°53'45.837087"S	27°49'31.298214"E	
30.	32°54'00.30248"S	27°51'14.876067"E	
31.	32°54'05.020325"S	27°51'23.988517"E	End point

8.1.2 Alternative 2

Alternative 2 is situated in the eastern part of the study area and deviates from the Main Route by following an arch of approximately 40km to the south of this alignment.

From the Neptune Substation (situated on Portion 15 of Farm 601) at the eastern point of the Alternative 2 route, the alignment runs in a southern direction and crosses Portion 16 of Farm 601 (± 320m) followed by Portion 17 of Farm 601 (± 210m). Following a distance of ± 160m on Portion 18 of Farm 601 the route turns in a south-western direction and travels for another ± 450m on this property. Thereafter, the route crosses Portion 19 (± 520m), Portion 10 (± 840m) and Portion 5 (± 730m) of Farm 601.

After traversing the Nahoon River the route continues south-westerly over the following properties:

- Portion 1 of Farm 602 for ± 1.9km;
- Portion 28 of Farm 648 for ± 380m;
- Portion 52 of Farm 648 for ± 250m;
- Portion 15 of Farm 640 for ± 480m;
- Portion 16 of Farm 640 for ± 200m;
- Portion 6 of Farm 640 for ± 780m;
- Portion 30 of Farm 640 for ± 230m;
- Portion 1 of Farm 640 for ± 1.3km (including the crossing of the N2 national road);
- Cyril Lord 1212 for ± 440m (including the crossing of the R102 road);
- Portion 12 of Farm 832 for ± 20m;
- Portion 31 of Farm 832 for ± 5m; and
- Portion 12 of Farm 832 for ± 50m.

The route then crosses over a railway line and continues over Portion 11 of Farm 832 (± 320m), which includes the crossing of the M3 road. Thereafter, the alignment crosses Portion 16 of Farm 832 (± 690m) to the west of Reeston. It then continues over the Farm 1281 (± 240m) and Portion 8 of Farm 832 (± 2.2km). After traversing the Buffalo River, the route crosses Portion 2 of Farm 853 (± 250m).

After ± 60m on the Farm 853, the route bends more westwards and crosses the following properties to the south of the Bridle Drift Dam:

- Farm 853 for ± 210m;
- Farm 836 for ± 2km (including the crossing of the Buffalo River);
- Farm 852 for ± 880m;
- Farm 851 for ± 130m;
- Portion 8 of Farm 850 for ± 1.3km;
- Portion 12 of Farm 850 for ± 690m;
- Portion 19 of Farm 850 for ± 1km;
- Portion 6 of Farm 850 for ± 750m; and
- Farm 848 for ± 550m.

Alternative 2 then crosses over Farm Pato Bush 847 ± 550m, which is the Fort Pato Nature Reserve, including the crossing of the R346 road. The route then passes over Portion 1 of Farm 862 (± 300m) through Silverdale and continues south of Ezigodweni over the Farm 863 (± 3.6km). Thereafter, the alignment shifts north-westwards to cross Portion 2 of Farm 863 (± 320m), followed by Portion 1 of Farm 1948 (± 2.2km) south of Msundulo. The route continues north-westwards over the Farm 1949 (± 640m) and Portion 7 of Farm 1951 (± 320m), to the north of Needs Camp. From here, Alternative 2 runs through the Lovedale area, crossing over Farm 1944 (± 1.5km), which includes a crossing of the R346, Portion 4 of Farm 1944 (± 850m), Farm 1943 (± 1.7km), Portion 4 of Farm 1943 (± 260m) and Portion 14 of Farm 1941 (± 760m).

The route then passes through the Entunja area, crossing over Portion 12 of Farm 1941 (± 1.2km) and Portion 1 of Farm 1939 (± 730m). After crossing the Buffalo River, the last ± 3km of Alternative 2 runs to the south-west of Dongwe before joining with the Main Route to the south of Berlin, at Rini.

Figure 7: **Views along the Alternative 2 – Crossing of N2 (top), Mdantsane Access Road (M3) (middle) and R346 (bottom) (Google, 2009)**

The coordinates for the bend points along the Alternative 2 route are provided in **Table 7**.

Table 7: **Alternative 2 bend points (start and end points from west to east)**

No.	Latitude	Longitude	
1.	32°56'1.746722"S	27°32'18.057149"E	Start point
2.	33°00'22.203976"S	27°34'49.32506"E	
3.	33°01'22.878155"S	27°37'27.569957"E	
4.	32°59'28.913607"S	27°46'01.795646"E	
5.	32°57'10.225877"S	27°47'45.082918"E	
6.	32°54'40.628556"S	27°51'23.533963"E	
7.	32°54'15.190911"S	27°51'22.934138"E	End point

8.1.3 Alternative 3

Alternative 3 is situated in the eastern part of the study area and deviates from the Main Route by following an arch of approximately 39km to the north of this alignment.

From the Neptune Substation (situated on Portion 15 of Farm 601) at the eastern point of the Alternative 3 route, the alignment runs north-westerly and crosses Portion 13 of Farm 601 (± 380m), followed by Portion 11 (± 380m), Portion 12 (± 240m) and Portion 3 (± 880m) of Farm 600. Thereafter, the route crosses Farm 306 (± 1.7km) followed by Farm Newslands 271 (± 6.2km), to the north of Nqonqweni village and south of Kwetyana and through Zikwaba. Hereafter, Alternative 3 traverses Portion 3 (± 1.3km) and Portion 1 (± 1km) and Remainder (± 910m) of Farm 272.

Figure 8: South-eastern view along Alternative 3 – crossing of secondary road adjacent to Farm 272 (Google, 2009)

The route then bends more westwards to traverse the following properties:

- Farm 1318 (± 990m);
- Farm 273 (± 1.5km);
- Farm 1443 (± 318m);
- Portion 3 of Farm 276 (± 1.4km);
- Portion 1 of Farm 276 (± 110m);
- Farm Dabadaba Outspan 275 (± 700m);
- Portion 1 of Farm 276 (± 1.4km);
- Farm 1863 (± 650m);
- Portion 1 of Farm 1862 (± 1.2km); and
- Remainder of Farm 1862 (± 960m).

The alignment of Alternative 3 then bends in a south-western direction and crosses the following properties:

- Remainder of Farm 1864 (± 960m);
- Portion 3 of Farm 1864 (± 650m);
- Portion 2 of Farm 1864 (± 840m); and
- Portion 1 of Farm 1864 (± 2km).

At Portion 1 of Farm 1865 (± 130m) the route bends more southwards and travels for ± 3.7km to the north-west of Berlin. At the end of the last-mentioned property the route crosses over railway lines before traversing Portion 3 (± 220m) and the Remainder of Farm 1877 (± 100m). The route continues for ± 180m over Farm 1916 before turning south-eastwards and crossing over a further ± 130m of this property (see **Figure 9**).

After traversing the N2 national road, the alignment runs over Portion 3 of Farm 1916 (± 410m). The final ± 4.8km of the route passes to the east of Ilitha, through Mntla and on to the Farm Hillcrest 2036 where it joins up with the Main Route.

Figure 9: North-eastern view of Alternative 3 – crossing of secondary road adjacent to Farm 1916 (Google, 2009)

The coordinates for the bend points along the Alternative 3 route are provided in **Table 8**.

Table 8: **Alternative 3 bend points (start and end points from west to east)**

No.	Latitude	Longitude	
1.	32°55'40.802894"S	27°33'00.570281"E	Start point
2.	32°52'48.532157"S	27°32'23.758013"E	
3.	32°51'12.587415"S	27°34'22.679145"E	
4.	32°50'09.840599"S	27°37'16.29363"E	
5.	32°50'11.660229"S	27°38'14.209539"E	
6.	32°50'47.85642"S	27°44'07.910017"E	
7.	32°51'56.127511"S	27°48'02.680592"E	
8.	32°54'14.490353"S	27°51'22.233983"E	End point

8.1.4 Alternative 4

Alternative 4 is situated in the western part of the study area and deviates from the Main Route by running alongside the existing Eskom 220kV Pembroke-Poseidon 1 transmission line, to the south of the Main Route.

From the Poseidon Substation (situated on Portion 5 of the Farm 73) at the western point of the Alternative 4 route, the alignment runs in a south-eastern direction over the following farms:

- Farm 248 (± 2km) (including crossing of secondary road) (see **Figure 10**);
- Farm 242 (± 1.9km);
- Farm 281 (± 3.7km);
- Portion 5 of the Farm 149 (± 900m);
- Portion 1 of the Farm 187 (± 1.8km);
- Farm 260 (± 2.4km);
- Farm 245 (± 880m);
- Farm 248 (± 820m);
- Farm 263 (± 1.8km);
- Farm 204 (± 1.1km); and
- Farm 263 (± 1.5km);

The route then crosses the R350 road and follows a eastern direction over the Farm 287 (± 4.4km) and Farm 199 (± 2km). At Portion 1 of the Farm 191 the power line route turns south-easterly and traverses the following properties:

- Portion 1 of the Farm 191 (± 210m);
- Farm 191 (± 5.4km);
- Farm 194 (± 980m);
- Portion 2 of the Farm 193 (± 1.3m) (including a secondary road);
- Portion 1 of the Farm 155 (± 670m);
- Portion 1 of the Farm 155 (± 1.2km);
- Farm 155 (± 3.6km) (including a secondary road);
- Portion 1 of the Farm 158 (± 1.2km) (including the R344 road);
- Farm 159 (± 850m);
- Farm 160 (± 2.3km);
- Portion 2 of the Farm 161 (± 1.3km);
- Portion 1 of the Farm 161 (± 1.2km);
- Portion 1 of the Farm 162 (± 500m);
- Farm 162 (± 2.2km);
- Farm 168 (± 870m);
- Farm 166 (± 2.5km) (including a secondary road);
- Portion 6 of the Farm 164 (± 2.9km);
- Farm 169 (± 3.7km) (including a secondary road);
- Portion 1 of the Farm 169 (± 2.7km);
- Portion 9 of the Farm 170 (± 1.1km); and
- Portion 8 of the Farm 170 (± 2.7km).

Figure 10: North-western view towards Poseidon Substation (background), along Alternative 4, on secondary road adjacent to Farm 248

The coordinates for the bend points along the Alternative 4 route are provided in **Table 9**.

Table 9: Alternative 4 bend points (start and end points from west to east)

No.	Latitude	Longitude	
1.	32°44'45.354509"S	25°55'25.673393"E	Start point
2.	32°45'08.049575"S	25°55'30.848814"E	
3.	32°45'30.436315"S	25°56'20.405152"E	
4.	32°46'40.208075"S	26°00'07.382572"E	
5.	32°47'04.322538"S	26°03'40.089843"E	
6.	32°47'38.700172"S	26°05'14.441489"E	
7.	32°48'11.760164"S	26°06'41.051907"E	
8.	32°48'15.709405"S	26°10'48.760998"E	
9.	32°52'42.410907"S	26°35'41.865105"E	End point

Alternative 4 connects to the Main Route via the following two options.

8.1.4.1 Alternative 4 Segment A

From the end point of Alternative 4, Segment A turns away from the existing 220kV line and travels along the boundaries of the following farms:

- North-easterly between Portion 8 and Portion 2 of the Farm 170 for ± 840m;

- North-westerly between Portion 8 and Portion 7 of the Farm 170 for ± 2.4km; and
- North-easterly between Portion 7 of the Farm 170 and Farm 203 for ± 1.3km

The final stretch of Segment A crosses over the Farm 203 for a distance of ± 1.3km where after it connects to the Main Route close to Klu Klu, south of Fort Beaufort.

The coordinates for the bend points along the Alternative 4 Segment A route are provided in **Table 10**.

Table 10: Alternative 4 Segment A bend points (start and end points from west to east)

No.	Latitude	Longitude	
1.	32°52'42.410907"S	26°35'41.865105"E	Start point
2.	32°52'28.405763"S	26°36'09.734009"E	
3.	32°51'17.993272"S	26°35'37.452802"E	
4.	32°50'56.705694"S	26°36'01.812989"E	
5.	32°50'18.459913"S	26°36'22.280852"E	End point

8.1.4.2 Alternative 4 Segment B

From the end point of Alternative 4, Segment B follows the existing 220kV line over the following properties in a north-eastern direction:

- Portion 2 of the Farm 170 (± 850m);
- Portion 7 of the Farm 170 (± 1.3km);
- Farm 170 (± 900m);
- Farm 173 (± 2.9km) (including the R67 road);
- Farm 181 (± 2.5km);
- Farm 182 (± 1km);
- Farm 183 (± 2.4km);
- Farm 178 (± 240m) (south of Calderwood);
- Portion 1 of the Farm 176 (± 780m);
- Portion 1 of the Farm 185 (± 1.5km);
- Farm 186 (± 2.5km) (south of Garfield); and

- Farm 187 (± 430m).

At Portion 1 of the Farm 194 the existing 220kV line turns south-easterly while Segment B continues north-eastwards over the following properties:

- Portion 1 of the Farm 194 (± 1.5km);
- Farm 193 (± 2.5km) (including the R345 road) (north of Llangollen);
- Farm 192 (± 1.8km); and
- Farm 191 (± 950m) – where the alignment meets up with the Main Route.

The coordinates for the start and end points along the Alternative 4 Segment B route are provided in **Table 11** (note there are no bend points along this route).

Table 11: Alternative 4 Segment B start and end points from west to east

No.	Latitude	Longitude	
1.	32°52'42.410907"S	26°35'41.865105"E	Start point
2.	32°51'40.483063"S	26°52'00.927123"E	End point

8.1.5 Tie-in lines

It is intended for the proposed Neptune-Poseidon line to link with the Pembroke substation through two tie-in lines of approximately 5km each. The tie-in lines commence from the Main Route, ± 130m south of the rural village of Rini. From here, the lines run in a northern direction over the following erven numbers in Rini for a distance of ± 1km:

- Western tie-in line - 504, 503, 497,592, 590, 589, 586, 575, 576, 513, 512, 511, 534, 535, 509, 545, 537, 6, 5, 3, and 2.
- Eastern tie-in line - 502, 498, 499, 591, 583, 584, 585, 578, 577, 571, 572, 563, 554, 547, 548, 543, 542, 539, 540, 4, 3, and 2.

The lines then continue north over agricultural land for ± 1.6km and then pass over rural land to the east of Ndevana for a further ± 1.2km. After crossing a secondary road (see **Figures 11** and **12**) the lines run in the middle of existing power lines for ± 2.2km to the west of Ilitha rural village, until the Pembroke substation.

Figure 11: South-eastern view of Tie-in Lines route at crossing of secondary road east of Ndevana (Google, 2009)

Figure 12: North-western view of Tie-in Lines route at crossing of secondary road east of Ndevana (Google, 2009)

8.2 Power Line Servitude

Following a contractual agreement with a landowner, an application for registration of the servitude (55m for a 400 kV transmission line) is lodged with the Provincial Deeds Office against the property deed. A registered servitude grants Eskom certain defined rights for the use of the specific area of land, which include:

- Access to erect a transmission line along a specific agreed route;
- Reasonable access to operate and maintain the line inside the servitude area; and
- The removal of trees and vegetation that will interfere with the operation of the line.

The landowner is prevented from erecting any structures or carrying out activities under the line that would interfere with the safe operation of the line. However, certain standard farming practices such as some crop cultivation, grazing and the use of farm roads may continue as normal.

For the Main Route, the development footprint is situated within the servitude, however the anchors of some tower designs (e.g. cross rope suspension tower) are situated outside of the servitude. In instances where a new servitude needs to be registered or the existing servitude width needs to be widened (e.g. where the width is only 19.5 m on either side of the centre line), the necessary negotiations will be undertaken with the affected landowners.

Refer to ***Appendix C*** for an overview of the servitude negotiation process.

8.3 Design Considerations

Certain standard design considerations for a 400 kV transmission line include:

- Standard servitude width is 55 m (i.e. 27.5 m on either side of centre line);
- Minimum spacing between pylons is ± 300 m and the maximum spacing is ± 500 m (depending on the topography of the area);
- Line may be no closer than 95 m from the centre line of a national road, unless a relaxation on this is granted by the roads department;

- Minimum clearance between the midspan point of the line and the ground is 8.1 m,
- Minimum distance between any part of a tree or shrub and any bare phase conductor must be 5.6 m;
- Minimum safe distance required from the centre of the power line to the beginning of a domestic house is 27.5m; and
- It is cost-prohibitive to place the transmission line within 10 km of the coast due to the cost of cleaning the conductors of salt build-up once the line is operational, by using a helicopter. In some situations, allowances can be made and the transmission line can run within this 10 km coastal corridor for a short distance.

8.4 Tower Structures

The selection of a tower types depends on several factors, including terrain, expense and recommendations that emanate from the visual impact study.

The towers type has not been finalised as yet, as the type of structure is dependent on the abovementioned factors as well as the final route of the power line. Below are several examples of towers that could be considered for a 400 kV transmission line.

- Cross-rope suspension tower (**Figure 13**);

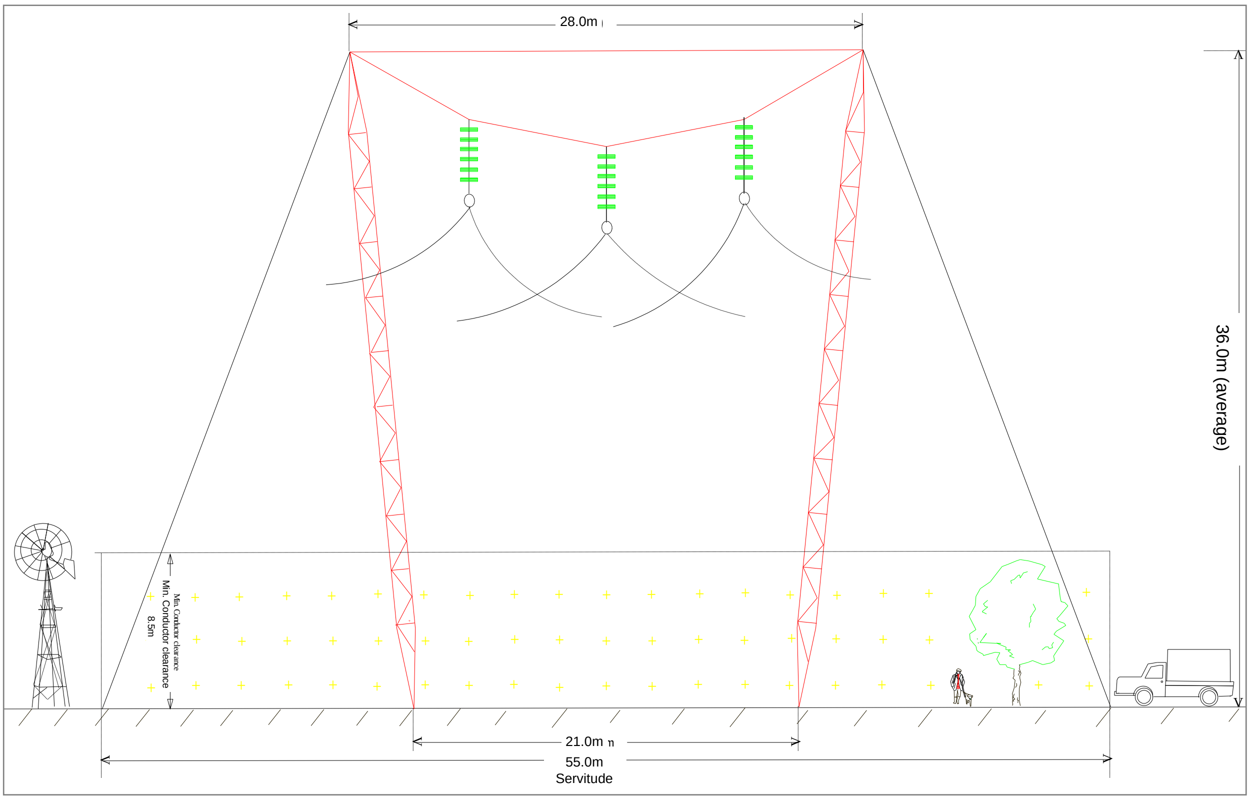


Figure 13: Cross-rope suspension tower

- Self-supporting tower (**Figure 14**);

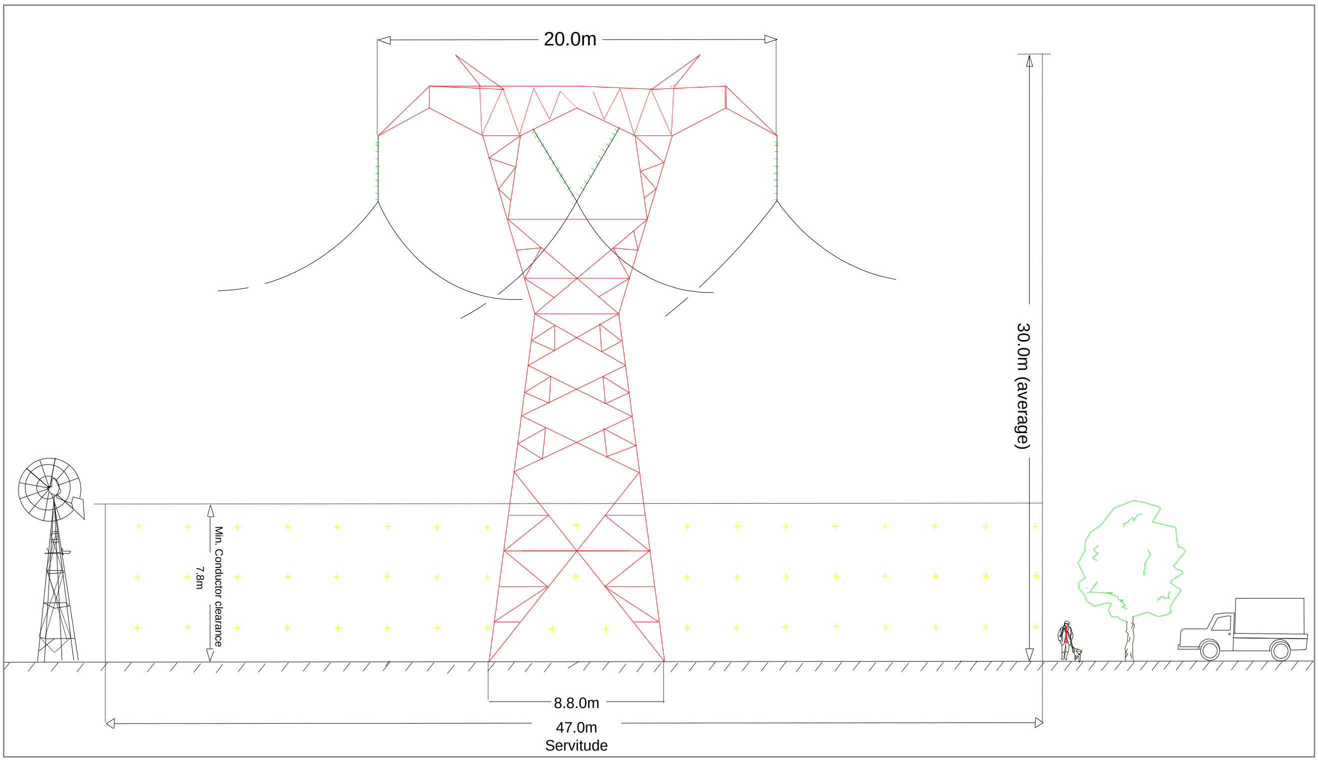


Figure 14: Self-supporting tower

- Guyed suspension tower (**Figure 15**); and

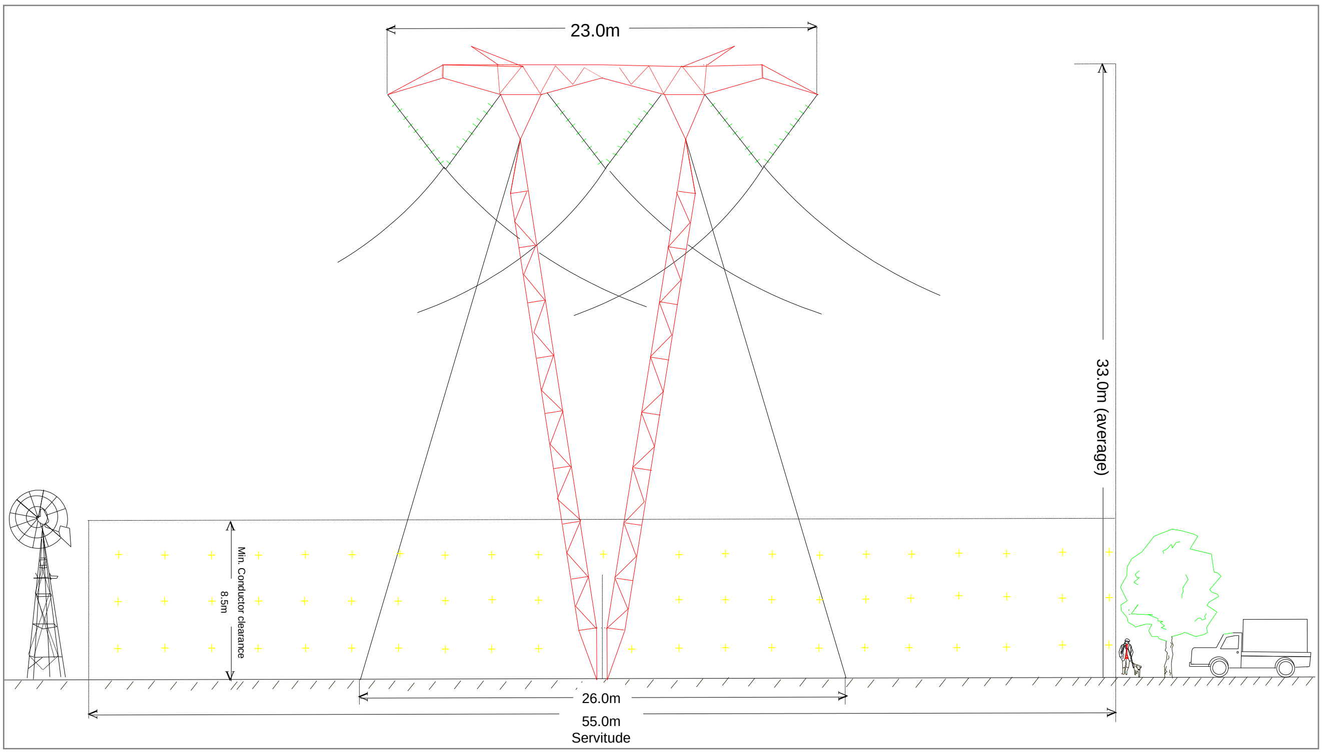


Figure 15: Guyed suspension tower

- Strain or bend towers, which will be required at points where the line deviates at an angle of greater than 3 degrees or on difficult terrain.

8.5 Substations

An electrical substation is a subsidiary station of an electrical generation, transmission and distribution system where voltage is transformed from high to low (or the reverse) for distribution to users (e.g. domestic, commercial).

8.5.1 Neptune Substation

The Neptune Substation (see **Figures 16**) is situated north-west of East London in the Thorn Valley area, on Portion 15 of Farm 601. The substation is surrounded by privately-owned land, and it is accessed from a main road running past the north-eastern boundary of the site (alongside the N6).

Figure 16: Neptune Substation

In order to accommodate the new Neptune-Poseidon 400kV power line, two 400kV feeder bays need to be constructed at the Neptune Substation. The proposed civil works will be undertaken within the existing terrace and no earthworks are anticipated. The safety fences will be modified to enclose the new 400kV yard extension. Existing roads will be utilised. The storm water drainage system will be extended to accommodate the expansion. Operational lighting will be provided for the new 400kV yard extension.

8.5.2 <u>Poseidon Substation</u>

The Poseidon Substation (see **Figures 17**) lies ± 11 km east of Cookhouse on Portion 5 of the Farm 73, and it is surrounded by privately-owned land. Access is gained from a secondary road that runs to the south of the site.

It is proposed to expand the Poseidon Substation to cater for the new Neptune-Poseidon 400kV power line, which includes constructing one fully equipped feeder bay. The proposed expansion would entail an extension of the terrace. Additional work for the new feeder bay will also include a new safety fence, off-loading platform, gravel road to the new line reactor bay, storm water and oil drainage and possibly new operational lighting.

Figure 17: Poseidon Substation

8.5.3 Pembroke Substation

The Pembroke Substation (see **Figure 18**) is located north of Ilitha and it is accessed from the R102 to the east or the N2 from the immediate north.

Two turn-in lines of approximately 5 km each will be constructed from the proposed Neptune-Poseidon line to the existing Pembroke substation.

Figure 18: Pembroke Substation

8.6 Project Life-cycle

The entire life cycle for a new transmission line includes the following primary phases:

- Feasibility phase - This includes selecting a suitable corridor for the route of the proposed transmission line following the execution of an EIA process. Servitude negotiations are also initiated during this phase.

- Planning and design phase - This phase, which is only undertaken should environmental authorisation be obtained, includes the following –
  - Aerial survey of the route;
  - Selection of the most appropriate structures;
  - Eskom and environmental specialists (e.g. ecologist, heritage) conduct a walk-down survey to determine the exact locations of the towers, based on sensitive environmental features and technical criteria.
  - Preparation of relevant planning documentation, including technical and design documentation.
- Construction phase – During the implementation of the project, the construction activities related to the installation of the necessary infrastructure and equipment is undertaken.
- Operational phase - This includes operational activities associated with the maintenance and control of the transmission line.
- Decommissioning - This phase will include measures for complying with regulatory requirements, rehabilitation and managing environmental impacts in order to render the affected area suitable for future desirable use.

The sub-sections to follow provide an overview of key activities during selected phases of the project life-cycle.

8.6.1 Construction

The construction period of the Neptune-Poseidon transmission line will take approximately 24 months. It involves the following activities, which are most often undertaken sequentially and by different crews.

8.6.1.1 Vegetation Clearance

An 8 m-wide strip is generally required to be cleared of all trees and shrubs down the centre of a transmission power line servitude for stringing purposes only (see example in **Figure 19**). Any tree or shrub in other areas that will interfere with the operation and/or reliability of the transmission power line must be trimmed or completely cleared.

Figure 19: Vegetation clearance for stringing

It is expected that vegetation clearance for the proposed Neptune-Poseidon 400 kV line will be minimal, as the area is generally characterised by low-growing tree species. The clearing of vegetation will take place in accordance with Eskom's minimum standards for the construction of new Transmission power lines, as listed below in **Table 12**.

Figure 20: Vegetation clearance for stringing

Table 12: Minimum standards for vegetation clearing for new Transmission power line

Item	Standard	Follow up
Centre line of the proposed Transmission power line	Clear to a maximum (depending on tower type and voltage) of a 4-8 m wide strip of all vegetation along the centre line. Vegetation to be cut flush with the ground. Treat stumps with herbicide.	Re-growth shall be cut within 100 mm of the ground and treated with herbicide, as necessary.
Inaccessible valleys (trace line)	Clear a 1 m strip for access by foot only, for the pulling of a pilot wire by hand.	Vegetation not to be disturbed after initial clearing – vegetation to be allowed to regrow.
Access/service roads	Clear a maximum (depending on tower type) 6 m wide strip for vehicle access within the maximum 8 m width, including de-stumping/cutting stumps to ground level, treating with a herbicide and re-compaction of soil.	Re-growth to be cut at ground level and treated with herbicide as necessary.
Proposed tower position and proposed support/stay wire position	Clear all vegetation within proposed tower position in an area of 20 x 20 m (self-supporting towers) and 40 x 40 m (compact cross-rope suspension towers) around the position, including de-stumping/cutting stumps to ground level, treating with a herbicide and re-compaction of soil. Allow controlled agricultural practices, where feasible.	Re-growth to be cut at ground level and treated with herbicide as necessary.
Indigenous vegetation within servitude area (outside of maximum 8 m strip)	Area outside of the maximum 8 m strip and within the servitude area, selective trimming or cutting down of those identified plants posing a threat to the integrity of the proposed Transmission power line.	Selective trimming
Alien species within servitude area (outside of maximum 8 m strip)	Area outside of the maximum 8 m strip and within the servitude area, remove all vegetation within servitude area and treat with appropriate herbicide.	Cut and treat with appropriate herbicide.

8.6.1.2 Tower pegging

Following the necessary access negotiations and arrangements with the affected landowners, a surveyor will pegs the central line and then set out the footprint of the development (i.e. transmission line and towers).

Through continual vehicular use, the surveying team will make the first basic track (access route) during their site work. If any flaws with a site are encountered (e.g. gully erosion) the site may need to be relocated.

8.6.1.3 Construction camp establishment

Suitable site(s) for construction camp(s) still need to be selected. Contractors will negotiate the siting and erection of camps with landowners. These sites must strictly adhere to Eskom Transmission's 'Generic Environmental Management Plan – Line Construction'.

See **Figure 21** for examples of construction camps for Eskom transmission lines.

Note that the locations of the construction camps were not yet known during the preparation of the EIA Report, although it is anticipated that they will be located within the transmission line corridor investigated during the EIA. The EMP will provide suitable mitigation measures to safeguard the environment from impacts associated with the construction camps.

The necessary negotiations will be undertaken with the landowners prior to the establishment of the construction camps.

Figure 21: Examples of Construction camps

8.6.1.4 Gate installation

After tower pegging, gates will be installed at the most appropriate locations to allow for future access to the servitude. An example of an access gate for a 400 kV transmission line is shown in **Figure 22**.

Figure 22: Access gate for an Eskom transmission line

8.6.1.5 Access roads

Existing access roads will be utilised as far as possible. For the use of private roads, the requisite negotiations will be conducted with the affected landowners.

Alternatively, roads will be built to gain access to the construction areas. These roads will be constructed to a Type 6 gravel road that comprises the following:

- Widening to a final gravel carriageway width of 6 m on raised earthworks;
- Drainage is to be provided in the form of meadow drains (flat terrain) and “v” drains (steeper terrain). Some new culverts may be required;
- Fencing will be erected where required;
- The total width of carriageway and drainage ranges between about 14 m (flat terrain) and 16 m (rolling terrain); and
- Gravel will be obtained from the nearest existing borrow pit.

Suitable erosion control measures will be implemented at watercourse crossings. Examples include the construction of gabion structures to protect the watercourse (see **Figure 23**). Stormwater management measures will also be considered on steep gradients.

Figure 23: Access roads

At this stage it is not possible to identify which access roads will be affected by the project. However, the walk-down survey will identify sensitive environmental features that need to be avoided when creating these new roads and the final site-specific EMP will address the associated impacts.

8.6.1.6 Excavation for foundations

Excavations will be made for the foundations and anchors of the towers by a team of 10 to 15 people with equipment (i.e. drilling rig, generator) (see **Figure 24**). Foundation sizes are dependent on *inter alia* the tower type and soil conditions. The foundations are ultimately filled with concrete.

Contractors are required to safeguard excavations, which may include erecting a temporary wire fence around the excavations to protect the safety of people and animals.

Figure 24: Drilling rig and generator (top) and excavation activities (bottom)

8.6.1.7 Foundation of steelwork

Following the preparation of the excavations, a separate team will position the premade foundation structures into the holes. Thereafter these structures will be tied together for support (see **Figure 25**).

Figure 25: Foundation work

8.6.1.8 Concrete works

A new team will then undertake the concrete filling of the foundation. Concrete is sourced via a 'Ready-mix' truck which accesses the site. If the access roads do not permit use by such a heavy vehicle, concrete will be mixed on site. Once the excavations have been filled, the concrete requires approximately 28 days for curing.

8.6.1.9 Erection of steel structures

Approximately 1 month after the foundation has been poured the steelwork is usually delivered to the site via trucks. The tower will then be assembled on site by a team of approximately 50 people. See examples of steel delivery and assembly shown in **Figure 26**.

Figure 26: **Delivery of steel (top) and assembly of tower (bottom)**

A new team will then be responsible for the erection of the towers, with the use of a mobile 70-ton crane (see **Figure 27**).

Figure 27: **Erection of towers**

8.6.1.10 Stringing of transmission cables

Cable drums (see **Figure 28**), which carry approximately 2.5 km of cable, will then be delivered to the site. The conductors are made of aluminium with a steel core for strength. Power transfer is determined by the area of aluminium in the conductors. Conductors are used singularly, in pairs, or in bundles of three, four or six. The choice is determined by factors such as audible noise, corona, and electromagnetic field (EMF) mitigation. Many sizes of conductor are available, the choice being based on the initial and life-cycle costs of different combinations of size and bundles, as well as the required load to be transmitted.

Figure 28: Cable drums

Two cable drums, with a winch in the middle, are placed approximately 5 km apart along the route. A pilot cable, which is laid with a pilot tractor that drives along the route, is pulled up on to the pylons with the use of pulleys (see **Figure 29**). The line is generally strung in sections (from bend to bend). Once the tension has been exacted, the conductor cables are strung.

In mountainous regions, the pilot cables are flown in by helicopter or shot across valleys, to create the correct tension to pull through the conductor.

Tension is created, the conductors clamped at the tower and the excess cable cut off.

Figure 29: Stringing with pilot tractor (top) and pulleys (bottom)

8.6.1.11 Rehabilitation

Site reinstatement and rehabilitation are undertaken for each component of the construction phase, which include the following activities (amongst others):

- Removal of excess building material, spoil material and waste;
- Repairing any damage caused as part of the construction activities;
- Rehabilitating the areas affected by temporary access roads;
- Reinstating existing access roads; and
- Replacing topsoil and planting indigenous grass (where necessary).

8.6.1.12 Inaccessible Sites or Sensitive Areas

For a site that cannot be accessed by vehicle (e.g. kloofs) or where environmental sensitive features are encountered, the following approach is followed:

- Excavations for foundations are done by hand;
- Foundation structures, concrete filling and steel towers (pre-fabricated) are transported and delivered by helicopter; and
- Stringing is performed by helicopter.

This abovementioned approach is an expensive operation and not the preferred method of construction.

8.6.2 *Operation and Maintenance*

During operations, Eskom Transmission needs to reach the servitude via access roads to perform maintenance of the transmission line. Line inspections are undertaken on an average of 1 – 2 times per year, depending on the area.

Figure 30: Example of an access road used for maintenance

The servitude will need to be cleared occasionally to ensure that vegetation does not interfere with the operation of the line. This will be conducted in terms of Eskom's Transmission Vegetation Management Guideline, which will be included in the Environmental Management Plan (EMP).

8.6.3 *Decommissioning*

GN No. R544 defines "decommissioning" as taking out of active service permanently or dismantling partly or wholly, or closure of a facility to the extent that it cannot be readily re-commissioned. Note that under the aforementioned notice, which represents Listing Notice 1 of the EIA Regulations (2010), the decommissioning of existing facilities or infrastructure for electricity transmission and distribution with a threshold of more than

132kV (which applies to this project) would need to undergo a Basic Assessment to seek authorisation in terms of NEMA.

Decommissioning of the Neptune-Poseidon transmission line is not anticipated. However, should this be required in the future a decommissioning plan with suitable mitigation measures will need to be developed, including provision for the dismantling of the towers and the disposal or recycling of the material. This plan will also require a site-specific rehabilitation plan for the footprint of the project. All regulatory requirements will need to be complied with for the decommissioning phase.

8.7 Resources Required for Construction and Operation

This section briefly outlines the resources that will be required to execute the project.

8.7.1 Water

During the construction stage, the Contractor(s) will require water for potable use by construction workers and water will also be used in the construction of the foundations for the towers. The necessary negotiations will be undertaken with the landowners / local authorities that are traversed by the transmission line to obtain water from approved sources.

8.7.2 Sanitation

Sanitation services will be required for construction workers in the form of chemical toilets, which will be serviced at regular intervals by the supplier.

8.7.3 Roads

Refer to **Section 8.6.1.5** for a discussion on access roads.

8.7.4 Waste

Solid waste generated during the construction phase will be temporarily stored at suitable locations (e.g. at construction camps) and will be removed at regular intervals and disposed of at approved waste disposal sites within each of the local municipalities that are affected by the project. All the waste disposed of will be recorded.

Wastewater, which refers to any water adversely affected in quality through construction-related activities and human influence, will include the following:

- Sewage;
- Water used for washing purposes (e.g. equipment, staff); and
- Drainage over contaminated areas (e.g. cement batching / mixing areas, workshop, equipment storage areas).

Suitable measures will be implemented to manage all wastewater generated during the construction period.

8.7.5 Electricity

Electricity will be obtained from diesel generators or temporary electricity connections during the construction phase.

8.7.6 Construction Workers

The appointed Contractor will mostly make use of skilled labour to install the power line. In those instances where casual labour is required, Eskom will request that such persons are sourced from local communities as far as possible.

9 PROFILE OF THE RECEIVING ENVIRONMENT

The sub-sections below provide a general description of the status quo of the receiving environment in the project area. This serves to provide the context within which the EIA was conducted. The study area included a 1 km wide corridor for each of the alternative routes.

The profile of the receiving environment to follow also provides local and site-specific discussions on those environmental features investigated by the respective specialists. The reader is referred to **Section 10** for more elaborate explanations of the specialist studies and their findings.

This section allows for an appreciation of sensitive environmental features and possible receptors of the effects of the proposed project. The potential impacts to the receiving environment are discussed further in **Section 11**.

9.1 Climate

The information below was obtained from the South African Weather Service for the weather stations in East London, Fort Beaufort and Somerset East.

9.1.1 Temperature

Average daily maximum and minimum temperatures for the last ten years at the three weather stations are tabulated below.

Table 13: Average Daily Maximum Temperature (°C) for station [0059572B8] - EAST LONDON

Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1999	26.9	25.7	26.1	24.5	23.1	23.5	22.9	22.7	22.1	22.9	24.2	26.6
2000	25.7	26.5	25.1	23.6	21.4	22.5	22.5	22.9	21.7	22.2	23.6	24.5
2001	25.4	26	25.3	22.8	25.2	22.7	21.2	21.6	21.6	22.7	24.1	25.2
2002	25.8	26.1	27.5	24.9	23.2	21.7	21.4	21.7	21.8	22.9	23.6	25
2003	26.4	28	26.6	25.3	23	20.2	21.4	20.9	20.6	22.6	23.9	24.5
2004	25.5	26	24.7	25.2	23.2	23.1	19.9	21.7	20.4	22.6	24.9	26.1
2005	25	26	25.3	24.2	23.7	21.1	22.2	22	21.5	23.2	23.3	24.1
2006	25.6	26.5	24.6	23.8	21.3	21.9	21.8	20.4	21.4	21.2	23.1	23.6
2007	26.4	26.3	24.6	23.6	24.1	22.4	21.5	22.5	22.2	22.3	23.5	24.8
2008	25.6	26.2	26.2	23.3	24.3	21.4	22.4	21.3	22.2	21.7	22.7	24.8
2009	24.9	25.9	25.6	24.8	23.6	22.1	22.6=	*	*	*	*	*

Note: = indicates that the average is unreliable due to missing daily values
** No date available at time of request*

Table 14: Average Daily Minimum Temperature (°C) for station [0059572B8] - EAST LONDON

Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1999	19.4	18.9	18.7	15.8	12.6	11.3	12	11	11.8	14.6	16.4	19.4
2000	18.2	19.7	18.9	15.2	11.7	10.6	10.5	11.7	11.7	14.5	16.2	17
2001	17.6	18.4	17.7	15.7	13.6	11.6	10	11.1	13	15.7	16.6	17.7
2002	18.3	17.5	18.1	16.3	12.5	10	9.9	12.3	13.2	13.7	14	18.4
2003	18.6	20.2	18.1	16.9	13.1	10.1	9.6	9.6	11.7	13.8	14.8	16.4
2004	18	19	16.5	14.7	12.9	11	8.9	11.2	11.3	14.1	17.3	19
2005	18	19	17.1	14.9	12.9	9.8	10.2	10.7	12.7	13.7	15.7	15.8
2006	18.7	19.5	16	14.6	10.9	10.5	10.4	11.5	12.6	14.5	15.5	17
2007	18.1	18.8	16.8	15.3	12.6	10.8	9.1	11.1	13.5	13.9	15	17
2008	18.3	18.8	17	13.9	13.9	11.3	10	11.2	10.4	13.8	15.6	17.2
2009	18.2	18.5	17.2	15.7	12.8	11.6	11.2=	*	*	*	*	*

Note: = indicates that the average is unreliable due to missing daily values
** No date available at time of request*

Table 15: Average Daily Maximum Temperature (°C) for station [0078227A3] - FORT BEAUFORT

Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1999	31.2	30.3	29.8	27.2	24.5	23.7	23.1	24.4	25.2	27.1	29.6	30.9
2000	27.9	28.9	26	24.1	21.1	23	22.8	25.1	24	25.5	25.5	28.9
2001	29.2	30.7	29.9	23	25.4	22.5	20.9	22.8	23.2	26.7	26.7	28.3
2002	30.3	31.1	31.3	28.4	24.3	20.6	21.2	22.2	22.5	26.3	27.7	29.4
2003	31.6	32.6	28	27	22.9	20.2	21.4	21.3	24.3	27	26.9	29.5
2004	30.3	29.8	27.5	26.4	25	22.7	20	23.6	22.5	26.8	30.4	30.3
2005	28.2	29.7	28.8	25.5	24.1	21.4	23.9	22.3	25.5	27.7	25.4	26.9
2006	30	29.9	28.8	25.6	20.9	21.7	22.1	20.6	23.4	23.3	25.7	26.3
2007	30	30.5	26.8	26.5	25.7	21.6	21.6	23.2	25.8	24.9	27.3	28.5
2008	28.5	29	27.9	24.9	25.1	21	23.2	22.6	24.6	26.5	27.4	29.2
2009	30	28.9	29.4	27.7	24.1	20.8	22.0=	*	*	*	*	*

Note: = indicates that the average is unreliable due to missing daily values
** No date available at time of request*

Table 16: Average Daily Minimum Temperature (°C) for station [0078227A3] - FORT BEAUFORT

Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1999	18.1	17.3	17.6	13.6	8.9	8.4	9.5	7.3	9.2	13.4	14.9	18.4
2000	16.2	17.2	16.2	12.6	7.7	6.7	6.9	8.8	8.2	11.7	14	15.1
2001	15.1	15.7	16.4	13.4	10.3	7.7	5.3	8.1	9.9	13.5	14.9	15.7
2002	16.3	16	16.1	13.9	8.9	6.4	7	9.1	11.2	11.1	11.9	17
2003	16.8	18.8	15.2	14.7	10.1	6	4.9	5.8	8.1	11.4	13.7	14.4
2004	17.1	17.5	14.6	11.8	9.5	7.1	4.6	7.6	7.7	12.3	16.1	17.6
2005	17	17.5	15.4	11.7	10.3	4.5	6.2	6	9.6	10.8	13	12.9
2006	17.8	18.4	13.7	12.8	7.9	8	6.7	7.6	10.1	12.5	13.2	14.9
2007	16.7	17.2	14.1	12.2	9.3	6.8	5.1	6.6	10.1	11.3	12.5	15.5
2008	16.8	17.6	15.1	10.6	10.4	7	6.1	6.6	6.5	10.8	13.7	15.8
2009	16.7	16.8	14.9	12.2	9.4	6.9	7.4=	*	*	*	*	*

Note: = indicates that the average is unreliable due to missing daily values
** No date available at time of request*

Table 17: Average Daily Maximum Temperature (°C) for station [0055363 1] - SOMERSET EAST

Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1999	30.8	30.5	30	26.4	22.4	22.2	21.5	22.5	23.8	26	28.7	30.4
2000	28.6	29.7	25.2	23	20.1	21.4	21.1	23.9	22.4	25.7	25.6	28.4
2001	28.7	30.6	29.7	22.6	23	21	19.6	21.2	22	26.2	25.8	28.6
2002	30.5	31	30.7	27	22.1	18.1	18.5	20.1	21.8	26.2	27.3	29.6
2003	30.7	33	28.7	26.2	21.4	18.9	20.1	19.7	23.8	25.9	27.9	30.4=
2004	30.7	30.3	27.3	26.7	24.9	21	19	22.8	23.2	26.4	30.7	30.6
2005	29.4	30.3	29	24.8	23	20	22.6	21.9	25.6	27	25.5	28.5
2006	30.2	30.9	28.9	26.1	21.1	20.2	20.8	19.9	23.1	24	27	27.5
2007	30.7	30.5	26.6	25.9	24.5	20.7	20.5	22.6	25.1	25.3	27.7	29.5
2008	28.9	29.4	27.6	25.2	25.2	20.7	22.4	21.9	24.5	26.3	28.1	30.4
2009	30.5	29.7	30.3	27.8	24.1	20.5	21.6	*	*	*	*	*

*Note: * No date available at time of request*

Table 18: Average Daily Minimum Temperature (°C) for station [0055363 1] - SOMERSET EAST

Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1999	16.2	15.6	16.4	12	5.4	2.2	5.2	4.1	6.4	11.2	13	17.3
2000	15	17.2	16.1	11.6	4.8	2.1	1.8	6	6.3	10.5	13	13.3
2001	13.9	14.9	14.6	12.5	7.1	3	1.9	4.6	7.7	11.6	12.7	13.5
2002	14.3	14.2	13.4	10.8	5.1	1.7	2.1	6.1	8.5	8.5	9	15.5
2003	14.6	17.3	13.3	11.8	6.2	2.2	0.9	2.8	6.6	10.4	13.3	13.7=
2004	17.1	17.4	13	9.9	6.8	3	0.7	5	5.7	10.4	14.1	16.3
2005	15.6	16.1	13.8	10.3	7.1	2.9	1.6	2.6	8	9.1	11.9	10.8
2006	16.2	16.9	11.6	10	4.6	1.1	2.4	4.4	6.3	9.9	11.3	12.7
2007	14.7	15.5	11.9	9.3	4.5	2.2	0.1	2.6	7.3	9.4	10.2	14
2008	15	14.7	13	7.9	6.8	3	1.7	3.6	2.8	8.7	12.1	13.7
2009	14.7	15.7	12.8	10.4	6.8	4.1	1.5	*	*	*	*	*

Note: = indicates that the average is unreliable due to missing daily values
** No date available at time of request*

9.1.2 Precipitation

The monthly daily rainfall for the three weather stations for the last ten years is tabulated below. Rainfall occurs throughout the year in the project area. In terms of rainfall distribution for the general area of the routes, the rainfall increases from around 400 mm per year in the west to around 700 mm per year in the east. The rainfall is somewhat erratic but falls mainly in the summer months (November to April).

Table 19: Monthly Daily Rain (mm) for station [0059572B8] - EAST LONDON

Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1999	110.7	93.1	84.8	132.4	18.1	0.6	139.9	10.4	43.3	58.1	85.7	77.6
2000	164.3	76.8	343	80.8	61.4	17.1	12.4	4.9	112.5	68.5	69.6	77.7
2001	148.9	78.4	109.5	101.8	2.6	1.5	51.6	66	75.3	83	182.2	82
2002	138.8	25.4	44	104.2	11.1	18.3	80.9	493.8	143.4	26.5	58.6	62.6
2003	25.5	39.7	142.6	67.1	84.1	17	6.9	20.1	48.4	89.9	40.3	77
2004	178.2	25.5	78.2	22.2	40.6	2	63.6	19.4	205.3	39.2	40	134.3
2005	133	126.9	54.3	116	50.5	16.1	3.5	48.7	4.8	23.6	267.1	7.6
2006	104.3	126	52.5	135.5	126.7	10	6.6	170.7	79.9	246.5	71.4	87
2007	69.4	82	99.4	56.2	43.8	22	7.2	25	32.8	41.2	96.2	81.8
2008	164.2	76.4	48.6	86.2	8.6	54.3	4.2	39.6	15.4	41.6	138.4	25.4=
2009	86.6	44.8	27.6	16.2	21.4	13.8	0.8=	*	*	*	*	*

Note: = indicates that the average is unreliable due to missing daily values
** No date available at time of request*

Table 20: Monthly Daily Rain (mm) for station [0078227A3] - FORT BEAUFORT

Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1999	37.2	53.6	63.4	34	4.8	4.8	36.4	4.6	4.4	31.4	19.6	106.8
2000	133.4	33.4	123.4=	114.8	2	8.8	1.4	0.8	75.2	28	87.4	32
2001	113.2	16.4	104.4	94	4.6	3.2	9.6	21.6	43.6	31.3	29.2	45.5
2002	68	14	47.4	19	2.8	20.6	34.2	84.8	71.2	10.2	24.2	80.6
2003	7.4	86.6	50.0=	28.2	56	2.2	4.2	12.8	4.6	39	26.1	17.6
2004	45	69.4	31.2	65.4	5.4	9	6.6	8.8	85.6	9.8	18.6	114.2
2005	41.4	41.4	42	49	21.8=	2	4	45	2.8	26.8=	127.2	29.6=
2006	14.0=	57.6	23.8	50.0=	33.2	6	3.8	99.6=	31.2	86.4	26.6	47.8
2007	45.4	26.4	98.8	17	5.2	21.2	7.4=	13.6	3.2	34.8	27.8	81.2
2008	56.2	70.6	46.8	30.2	3.8	8.2=	0.4	29.6	3.8	6.8=	45.2=	41
2009	19.0=	62.8=	58.4	19	4.2	10.8=	3.8=	*	*	*	*	*

Note: = indicates that the average is unreliable due to missing daily values

** No date available at time of request*

Table 21: Monthly Daily Rain (mm) for station [0055363 1] - SOMERSET EAST

Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1999	64.4	6.8	47.1	24.1	5	1.1	57.4	3.5	4.6	20.5	17.1	88.1
2000	74.7	13.8	92.1	79	0.5	7.7	0.6	0.2	36.7	21.1	162.4	21.5
2001	66.2	2.7	50.3	75.1	11	3.5	17.2	16	62.3	8	81.4	33.4
2002	37.6	29.3	27.4	26.7	8.4	17.9	52.5	87.8	58.4	10.5	11.9	53.2
2003	18.1	31.9	57	44.6	44.1	8.5	0.4	13.3	1.6	65.1	12.3	7.5
2004	45.2	90.3	21.3	39.1	0.3	33	6.5	6.1	49.5	8.4	11.9	47.5
2005	38.6	114.7	32.3	58.7	12.7	9.8	4	10.1	4	18.3	104	23.4
2006	51	55.4	21.4	28.2	15.4	9.4	15.6	77.4	40.2	35.3	15.8	31.2
2007	30.2	46	69.8	20.2	17.4	32	7.2	24.4	1.4	25	34.4	102
2008	62.8	55	11.8	7.4	5.4	19	0.4	28.2	3.6	11.8	41.2	1.4
2009	0.4	79.2	5.4	20.8	5.4	*	*	*	*	*	*	*

*Note: * No date available at time of request*

9.1.3 Wind

The wind roses shown in **Figures 31 – 33** for a 10-year period (1999 – 2009) are interpreted as follows:

- **East London** –
  - Prevailing wind direction is west;
  - Highest percentage of winds blow with speeds of 3.5 – 5.6 m/s;
  - 1.2% of all winds are calm.
- **Fort Beaufort** –
  - Prevailing wind direction is south;
  - Highest percentage of winds blow with speeds of 0.5 – 2.5 m/s;
  - 10.8% of all winds are calm.
- **Somerset East** –
  - Prevailing wind direction is east-southeast;
  - Highest percentage of winds blow with speeds of 0.5 – 2.5 m/s;
  - 21.8% of all winds are calm.

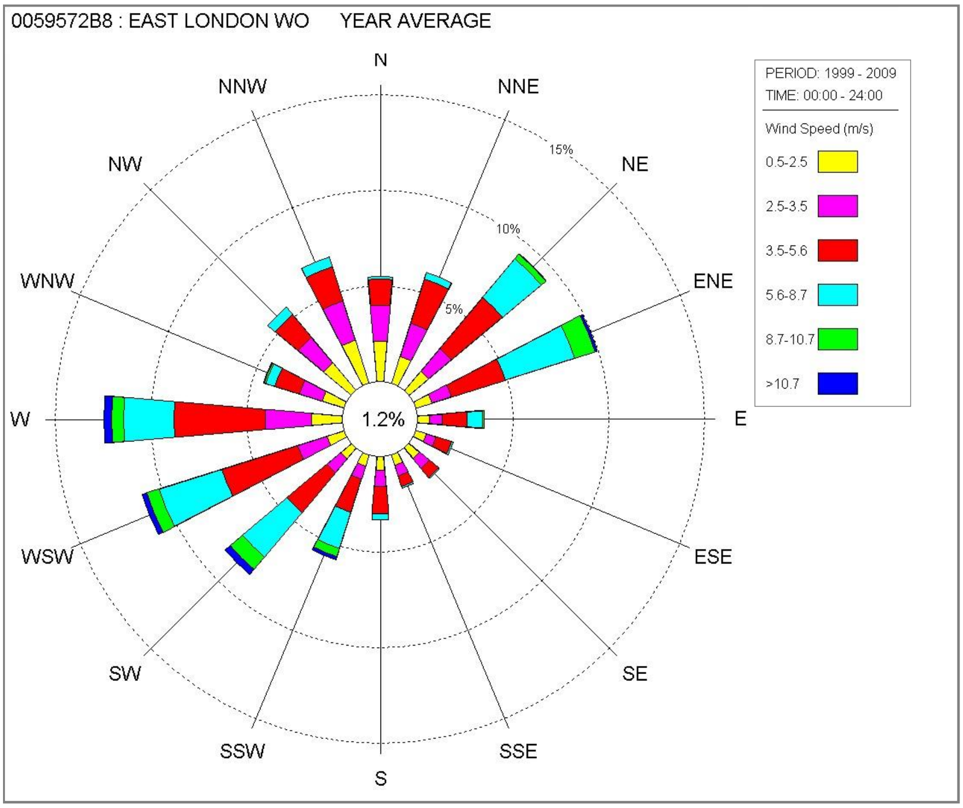


Figure 31: Wind rose for the East London weather station

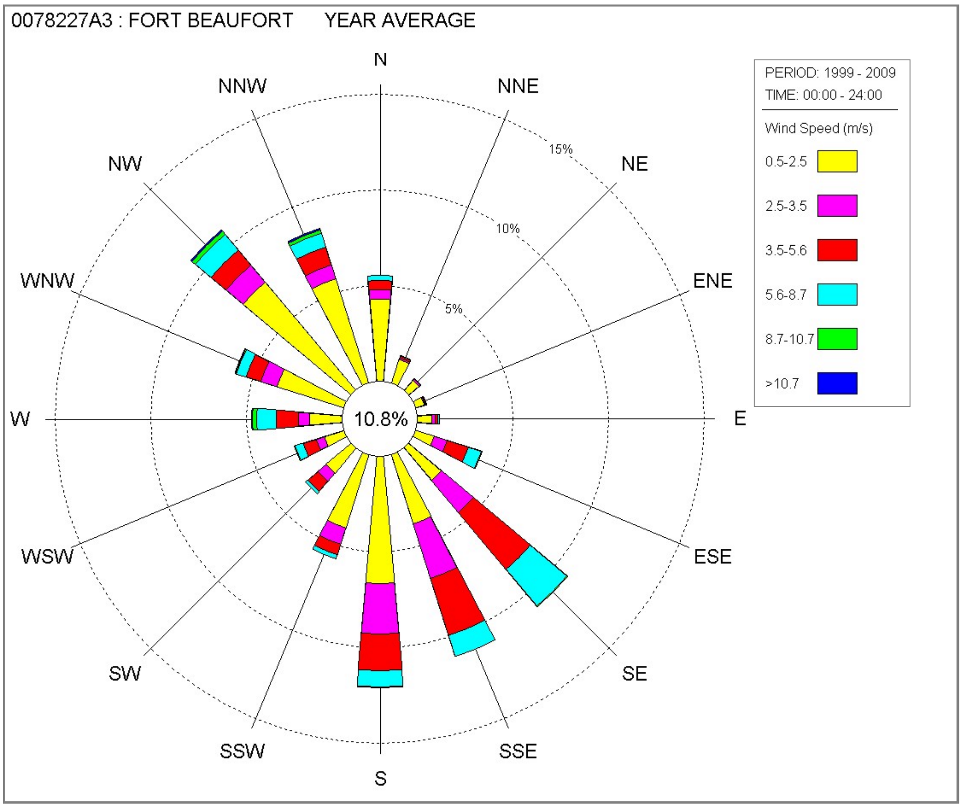


Figure 32: Wind rose for the Fort Beaufort weather station

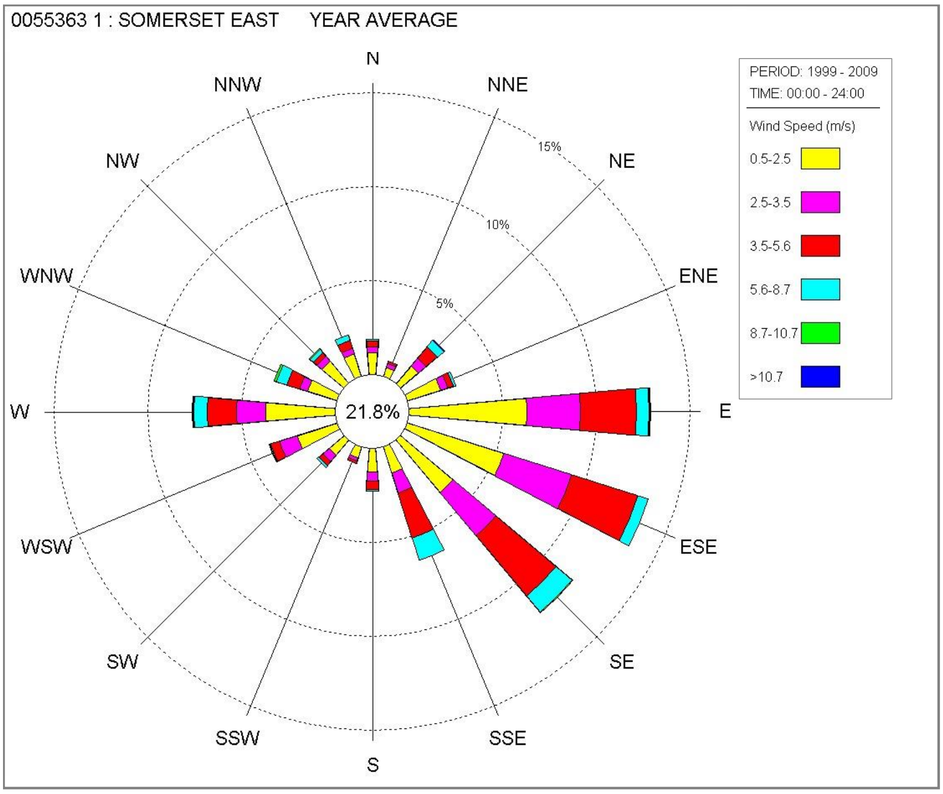


Figure 33: Wind rose for the Somerset East weather station

9.2 Topography

The main land forms in the study area comprise hills and lowlands in the western part of the route, and plains and hills to the east (**Figure 34**). A map of the terrain morphology is contained in **Figure 35**.

Figure 34: Typical scene of the terrain in the eastern (left) and western (right) part of the study area

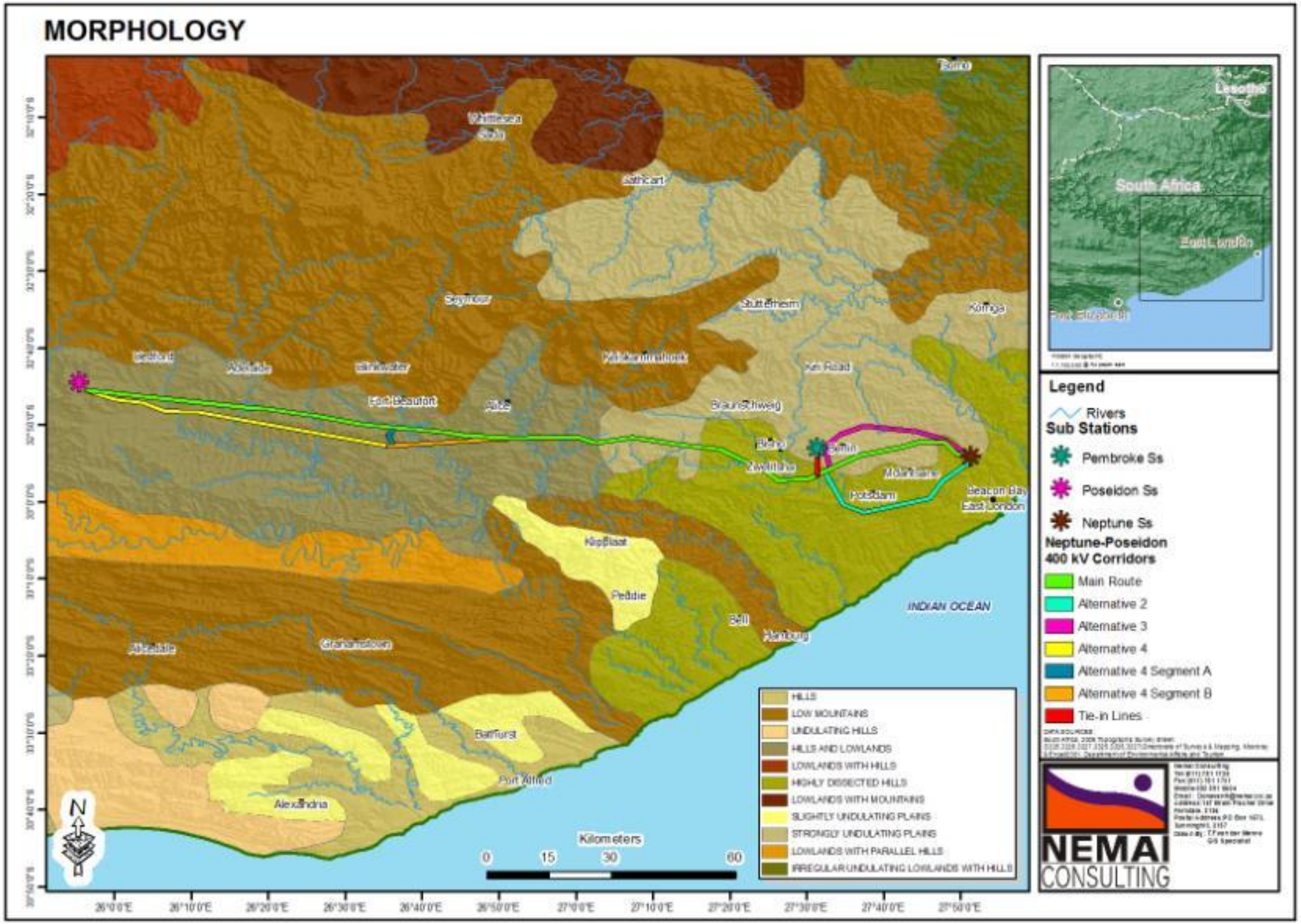


Figure 35: Terrain morphology

Generally, the route traverses rolling hills and valleys. This terrain contains a series of deeply incised gorges, notably along the Keiskamma and Great Fish Rivers. The varying topography affords aesthetic appeal to the area and serves as significant locations in terms of biodiversity, with particular reference to the rocky ridge habitat (central part of study area) with its general steep topography that often retains ecological functionality due to the limited usage for communal grazing and other forms of agriculture. The aforementioned terrain may serve as inaccessible sites for the location of the towers, and these areas will preferably be spanned to avoid the construction on steep slopes and disturbance to sensitive ecological areas.

9.3 Watercourses

For the discussion to follow, watercourses are considered as rivers, streams, natural channels (perennial and seasonal), wetlands and dams, as defined in the National Water Act (Act No. 36 of 1998).

During the walk-down survey and determination of the exact final route of the transmission line, the locations of the towers are selected to prevent impacts to the characteristics of watercourses (i.e. flow regime, water quality, morphology and aquatic biota) and riparian zones. The towers will also be located outside of the 1:100 year floodlines at watercourse crossings.

9.3.1 Rivers

The eastern part of the study area is situated within the Mzimvubu to Keiskamma Water Management Areas (WMAs) and the western section in the Fish to Tsitsikamma WMA. The major rivers affected by the proposed project are tabled below and shown in **Figure 36**. Note that the routes also traverse non-perennial streams along their respective routes.

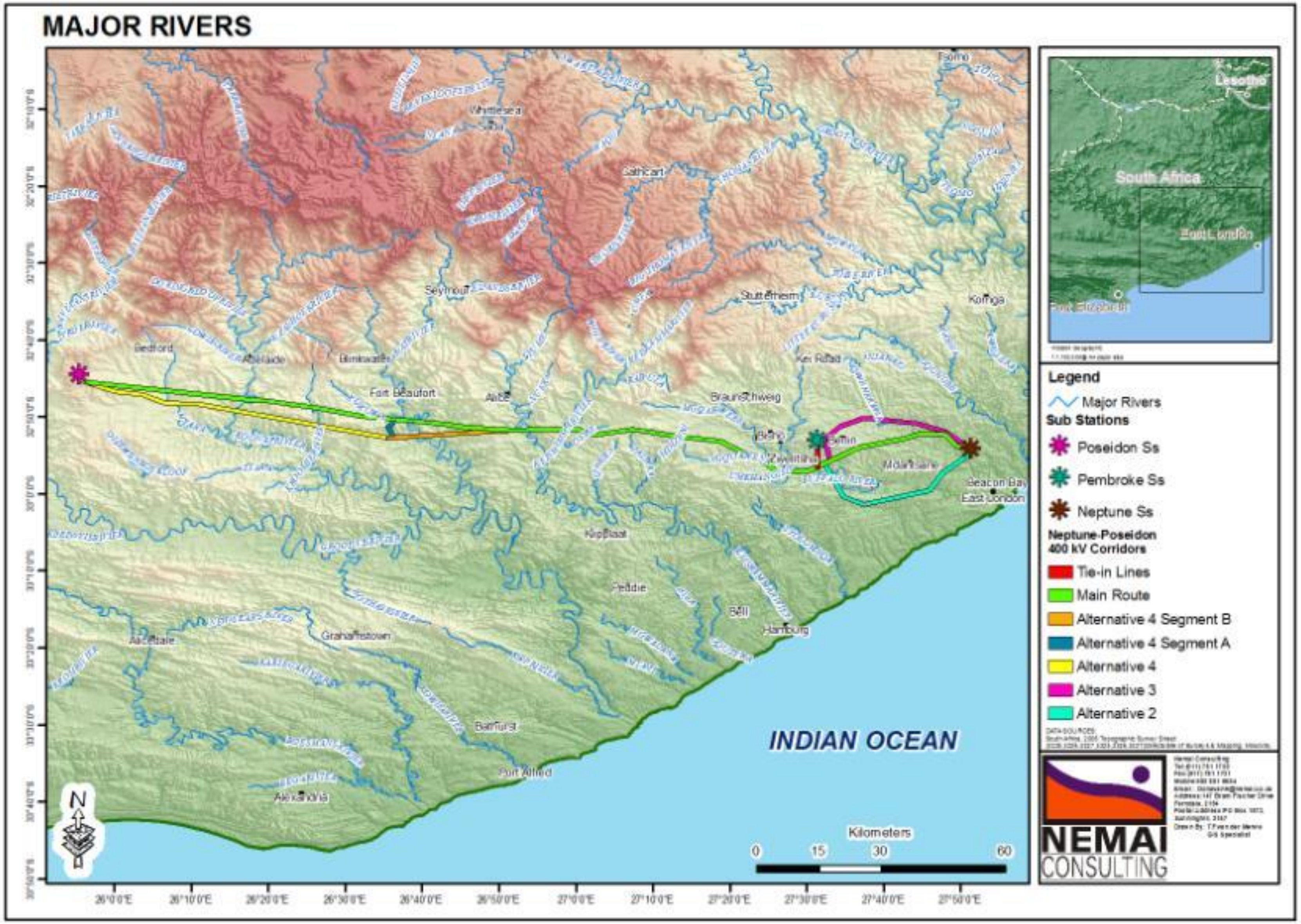


Figure 36: Major rivers (perennial) in the project area

Table 22: Major perennial rivers traversed by the Neptune-Poseidon project (from east to west)

Alignment	WMA	Major Rivers Affected
Main Route	Mzimvubu to Keiskamma	• Nahoon • Buffalo • Keiskamma
	Fish to Tsitsikamma	• Kat • Koonap
Alternative 2	Mzimvubu to Keiskamma	• Nahoon • Buffalo (twice)
Alternative 3	Mzimvubu to Keiskamma	• Nahoon
Alternative 4	Fish to Tsitsikamma	• Koonap
Alternative 4 Segment B	Fish to Tsitsikamma	• Kat

At this stage it is not possible to identify those watercourses that will be affected by access roads via new bridges or upgrading of existing crossings. The EMP will make adequate provision for the management of these aspects. Where required, Eskom will also apply for water use authorisation in terms of the National Water Act (Act No. 36 of 1998) for watercourse crossings.

According to the Integrated Development Plan (IDP) for the Amathole District Municipality (Amathole District Municipality, 2009), the pressures facing freshwater resources in the district include:

- Irrigation return flows increase the naturally high sediment load & salt content of the Great Fish River;
- Microbial contamination from areas with inadequate access to sanitation;
- Solid waste pollution from area with a lack of waste management services;
- Increased sediment load and nutrient concentrations (erosion from overgrazing and vegetation clearing);
- Pollution from industrial areas (Buffalo and Nahoon Rivers); and
- Effluent discharge (both domestic and industrial).

During the construction phase, measures will be implemented to adequately manage runoff and to ensure that sedimentation is prevented.

9.3.2 Dams

The following two major dams are crossed by the Main Route corridor (**Figure 37**):

- Debe Dam; and
- Laing Dam.

Alternative 2 passes more than 450m to the south of the Bridle Drift Dam. All the corridors cross over numerous small dams (generally used for farming purposes).

All impoundments will be avoided during the placement of the towers, as the towers can span a maximum distance of ± 500 m (depending on the topography of the area).

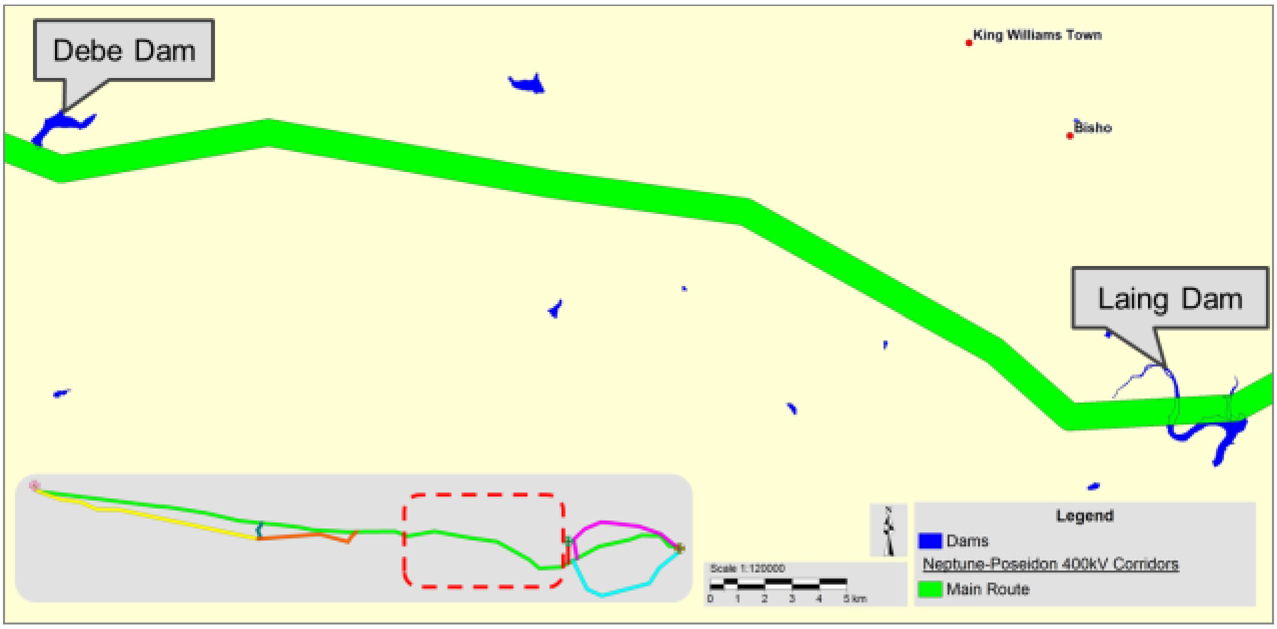


Figure 37: Main dams traversed by the transmission line

9.3.3 Wetlands

Figures 38 - 40 indicate the possible locations of wetlands (including non-perennial pans) along the power line routes, as identified on a desktop level through an appraisal of the topographical map and the National Wetlands Map II of the South African National Biodiversity Institute (SANBI), which was extracted from the National Land Cover 2000 dataset.

The maps to follow are not necessarily regarded as comprehensive and a more detailed identification of wetlands will be conducted during the walk-down survey, to ensure that these systems and adequate buffer zones are avoided during the siting of the towers.

Figure 38: Wetlands located in eastern part of project area

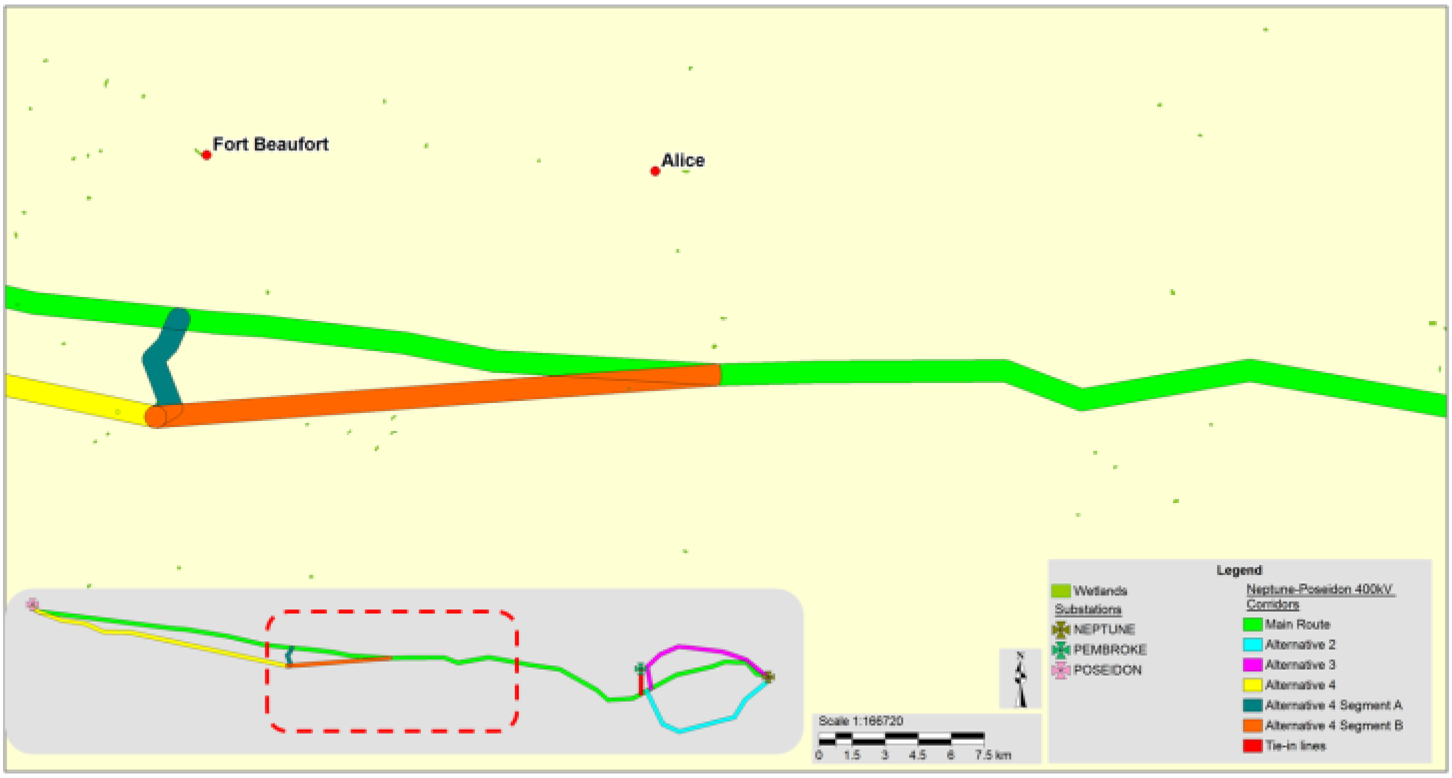


Figure 39: Wetlands located in central part of project area

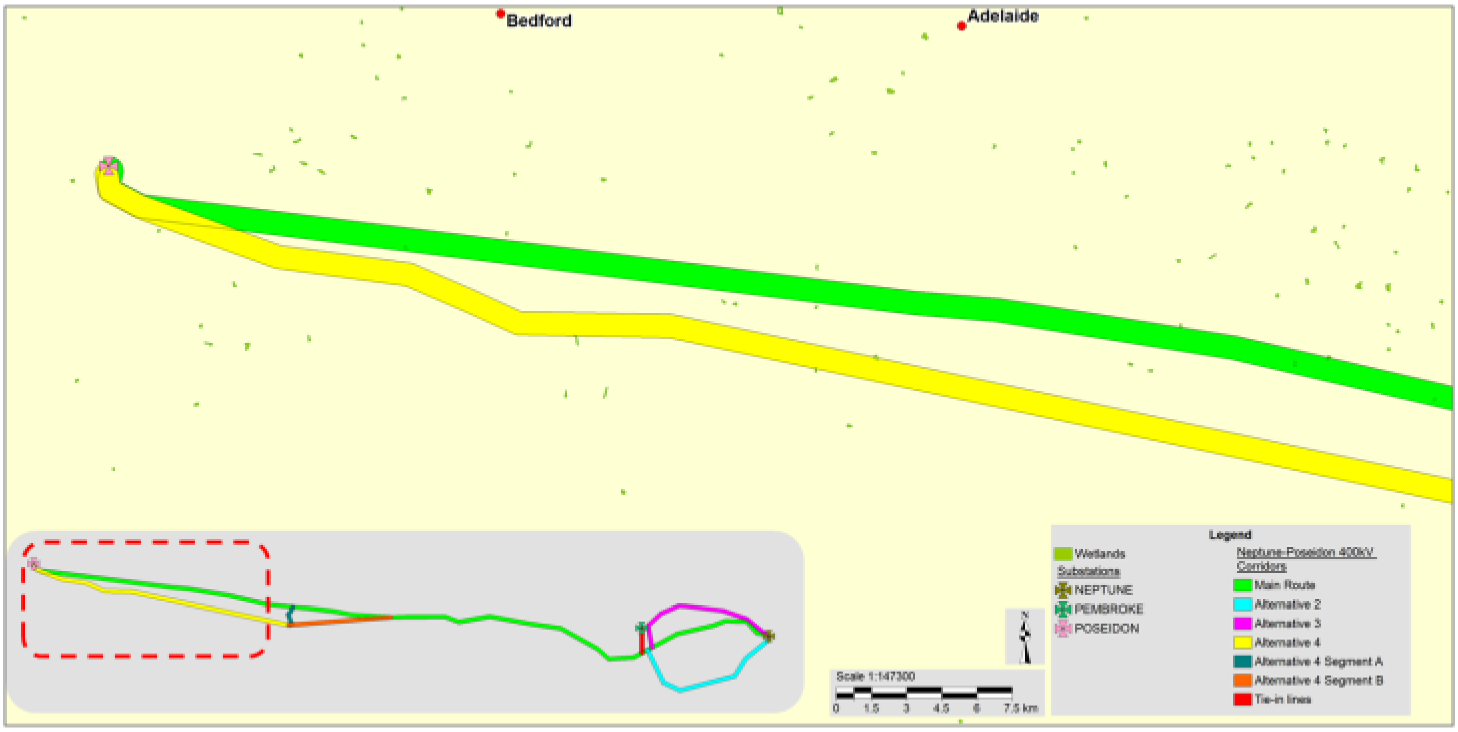


Figure 40: Wetlands located in western part of project area

9.4 Geology and Soil

The geotechnical conditions are of particular importance for establishing the appropriate sites for the tower foundations. A general description of the geological conditions in the project area is provided below.

The study area is underlain by the Karoo Supergroup and the Beaufort Group (see **Figure 41**).

The soils along the routes are predominantly formed from mudstone, shale, sandstone and dolerite and exhibit features of low rainfall environments in hilly terrain. The most of the area consists of imperfectly drained sandy soils. Unconsolidated soils are quite consistent along this section of the route comprising a relatively thin cover of colluvialsilts and clays overlying mostly mudrock.

The simplified geological map of the project area follows.

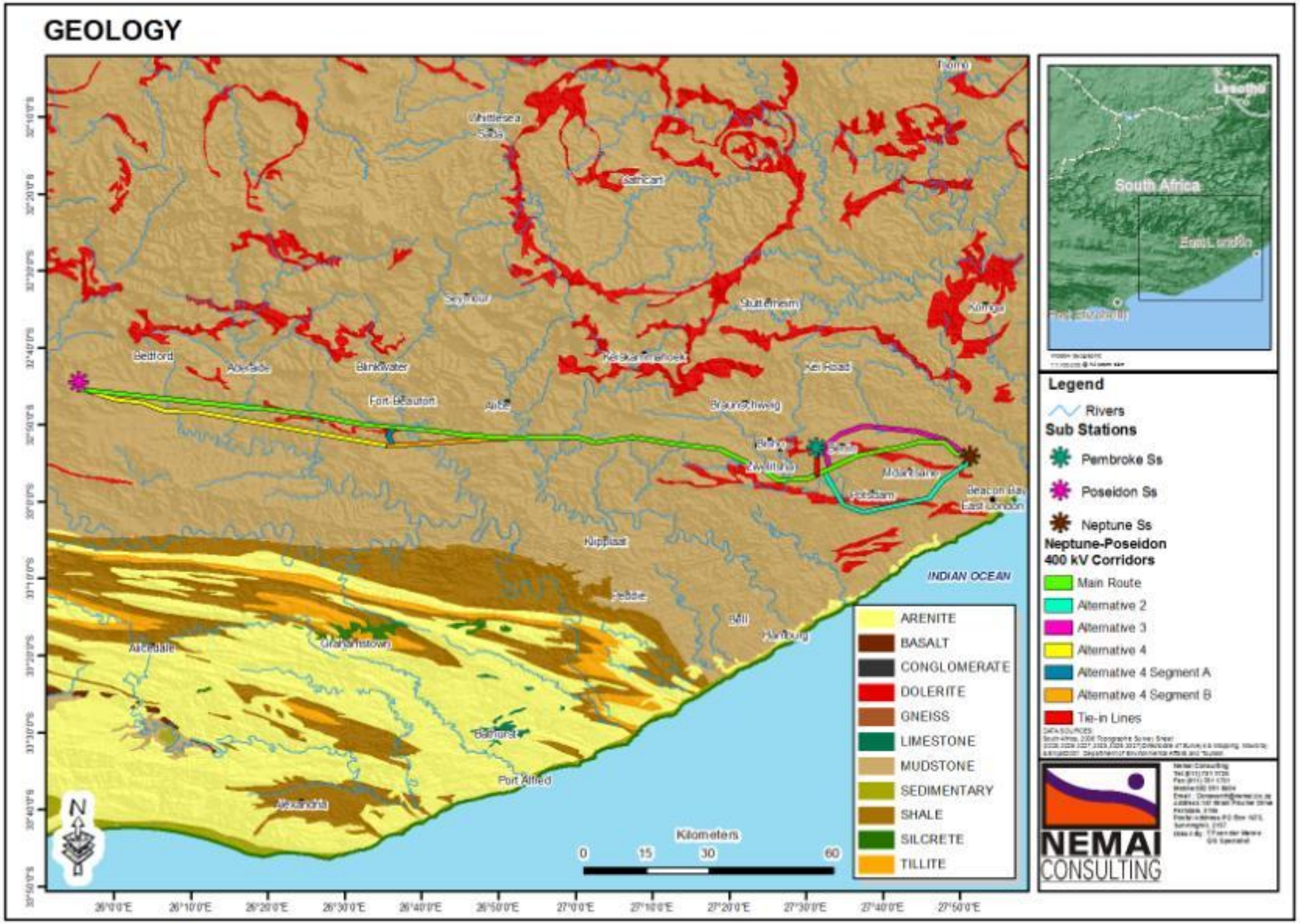


Figure 41: Simplified Geological Map of Project Area

9.5 Flora

Refer to **Section 10.1** for a synopsis of the Faunal, Floral and Avifaunal Ecological Survey (Enviross, 2011), as contained in ***Appendix F1***. The potential impacts to floral features and the concomitant mitigation measures as assessed in **Section 11.4**. An extract from this specialist study that explains the floral features of the receiving environment follows.

9.5.1 Floral Endemism

The survey area falls within the Albany Centre of Plant Endemism (CoPE), with the eastern extremes falling into a transitional zone between the Albany Centre and the Maputoland-Pondoland Region. This area encompasses approximately 4 000 species, with approximately 600 (15%) being endemic to the region. Of the 600 species, 364 species are succulents, with 60.6% of these being endemic to the region. The region is therefore relatively rich in succulent floral species diversity.

Specific threats to the vegetation and flora in the Albany Centre include rapid urbanisation, industrial development, and land clearing for agricultural crops, poor grazing management and the spread of alien plants, especially by *Opuntia ficus-indica* (Cactaceae). Conservation areas and further threats will be discussed further under the respective vegetation types.

9.5.2 Vegetation Types and Floral Community Structures

The proposed Neptune-Poseidon power line alternatives incorporate a wide diversity of habitat types, geologies, topographies and climatic zones, with the result that it traverses an area of rich floral diversity in both species and community structures (vegetation types). The vegetation community structures described in the paragraphs below allude to the vegetation types associated with each alternative and the conservation status of the vegetation types within the region pertaining to the alternative routes. The details for these vegetation types and how they are associated with each route alternative are presented in **Table 23**.

The only vegetation type that is of conservational concern in the project area is Buffels Thicket. This is a vegetation type that occurs in association with the Buffels River valleys and its tributaries located along the coastal areas near East London. This incorporates are area of urban development, is an area conducive to supporting forestry and also incorporates areas of agricultural cultivation (agronomy). The localised distribution of this vegetation type, and the relative proportion of transformed areas, means that this vegetation type is considered conservationally *Vulnerable*.

Table 23: Vegetation type details for each proposed route alternative (Enviross, 2011)

Alternative Route	Vegetation types	Biome	Bioregion	Conservation status	Distance (km)
Main Route	Albany Coastal Belt	Albany Thicket	Albany Thicket	Least Threatened	23.827
	Great Fish Thicket	Albany Thicket	Albany Thicket	Least Threatened	22.754
	Buffels Thicket	Albany Thicket	Albany Thicket	Vulnerable	14.400
	Eastern Cape Escarpment Thicket	Albany Thicket	Albany Thicket	Least Threatened	1.480
	Bhisho Thornveld	Savanna	Sub-escarpment Savanna	Least Threatened	85.320
	Bedford Dry Grassland	Grassland	Sub-escarpment Grassland	Least Threatened	76.583
Alternative 2	Albany Coastal Belt	Albany Thicket	Albany Thicket	Least Threatened	28.491
	Buffels Thicket	Albany Thicket	Albany Thicket	Vulnerable	19.312
	Southern Mistbelt Forest	Forest	Zonal & Intrazonal Forests	Least Threatened	0.277
Alternative 3	Albany Coastal Belt	Albany Thicket	Albany Thicket	Least Threatened	13.512
	Buffels Thicket	Albany Thicket	Albany Thicket	Vulnerable	9.368
	Bhisho Thornveld	Savanna	Sub-escarpment Savanna	Least Threatened	21.942
	Southern Mistbelt Forest	Forest	Zonal & Intrazonal Forests	Least Threatened	0.385
Alternative 4	Bedford Dry Grassland	Grassland	Sub-escarpment Grassland	Least Threatened	73.127
	Great Fish Thicket	Albany Thicket	Albany Thicket	Least Threatened	5.642
Alternative 4 Segment A	Eastern Cape Escarpment Thicket	Albany Thicket	Albany Thicket	Least Threatened	1.124
	Bedford Dry Grassland	Grassland	Sub-escarpment Grassland	Least Threatened	3.340
	Great Fish Thicket	Albany Thicket	Albany Thicket	Least Threatened	2.088
Alternative 4 Segment B	Great Fish Thicket	Albany Thicket	Albany Thicket	Least Threatened	13.637
	Bhisho Thornveld	Savanna	Sub-escarpment Savanna	Least Threatened	15.604
Turn-in Lines	Albany Coastal Belt	Albany Thicket	Albany Thicket	Least Threatened	7.131
	Bhisho Thornveld	Savanna	Sub-escarpment Savanna	Least Threatened	9.169

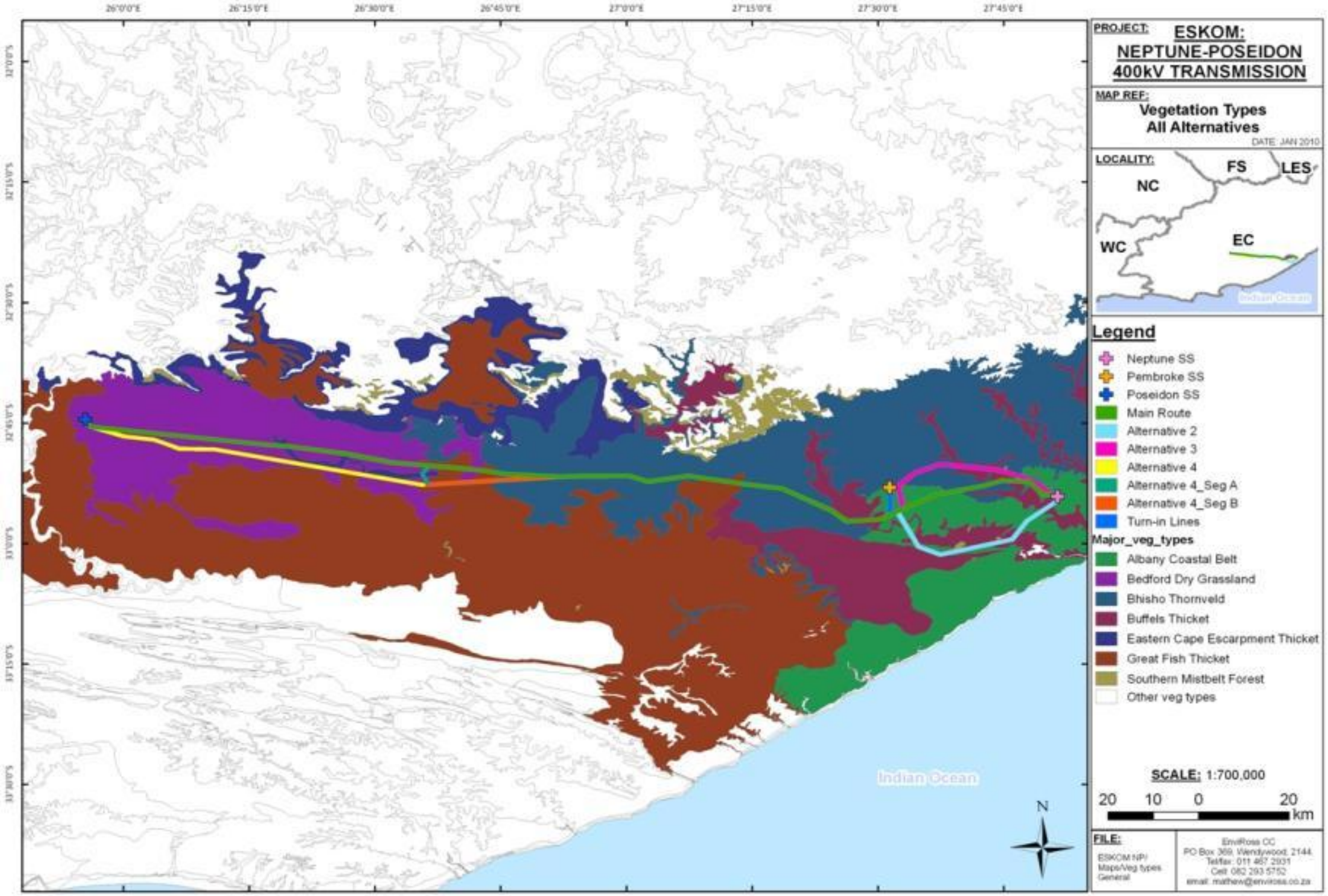


Figure 42: The vegetation types associated with each of the proposed alignment routes (Enviross, 2011)

9.5.2.1 Main Route

The proposed main route originates at the Neptune Substation, which is located within the Albany Coastal Belt vegetation type. This vegetation type is extremely variable, incorporating the area from the Indian Ocean coast to areas between 15 km and 30 km inland. It incorporates forest thickets through to grasslands. The area associated with the Neptune Substation falls within the higher-lying savanna thickets, with an undulating topography. The land use is dominated by residential smallholdings, where some agriculture is practised, mainly to raise horses, sheep and cattle. Much of the natural thicket areas have been cleared and incorporate a greater proportion of grasslands for improvement of the grazing capacity. There is also a high inclusion of overhead powerlines within the area due to the Neptune Substation, which necessitated the clearance of trees and shrubs of a certain height for maintenance of powerline servitude areas. The removal of the tree and shrub components, together with the subsequent land disturbances has allowed for the encroachment of exotic vegetation. Some forestry areas and areas reminiscent of forestry were observed, which is another potential source of the exotic vegetation encroachment within the area. The most dominant species noted here was *Acacia mearnsii* (Black wattle).

The proposed Main Route traverses areas that are interspersed with Bhisho Thornveld and Buffels Thicket as it heads in a westerly direction. Relatively inaccessible areas such as ravines and areas including steep topographies retain natural vegetation, but as the proposed route heads further westward the inclusion of rural settlement areas and settlement density increases, which increases the amount of vegetation transformation and degradation. These areas are mostly concentrated on the higher-lying and flatter regions. Bush clearing for increased grazing capacity and firewood collection, together with cattle grazing remains a dominance land use within this area.

The proposed Main Route then runs south-westwards through an area of Buffels Thicket as it follows south of King Williams Town that, due to steep topographies, has retained much of its natural features. As the proposed Main Route approaches the Pembroke Substation, the land use and subsequent ecological pressures remain similar with the occurrences of rural settlement areas surrounded by communal grazing lands. Overgrazing and poor land and veld management means that soil erosion, mostly in the form of gulley formation, is an important veld degradation factor.

After passing King William's Town and the associated rural settlement areas, the route heads in a north-westerly direction through a substantial portion of Bhisho Thornveld. These areas remain closely linked to rural communities and communal grazing lands. The impacts on the ecological features within these areas are exacerbated by the increased aridity as the route moves westwards. The grassy layers are heavily grazed by cattle, sheep and goats by both the subsistence and formal farming sectors. This has led to bush encroachment in many areas.

The route then moves through an area of Great Fish Thicket where the proposed alignment crosses through the Kat River Valley. This is an area that is rich in succulents and floral species specifically adapted to survive the arid nature of the landscape. Some game farming and rearing of goats is the main land use within this region, with agronomy only being practised within areas associated with watercourses. The vegetation structures have therefore largely retained their ecological structure and functionality as there is only limited capacity for grazing within this vegetation unit.

The proposed Main Route then remains within Bedford Dry Grassland for the remainder until terminating at Poseidon Substation. This grassland type is also characteristically arid in nature and therefore the grassy component is not particularly diverse. It is, however, interspersed with a rich succulent and small shrub component. These areas are utilised for grazing of cattle and goats, with the result that some transformation of the vegetation structures has taken place. The riparian vegetation along the watercourses within the area is dominated by

Acacia karroo. This species can be seen to be encroaching into the grassland areas where the veld has been disturbed.

9.5.2.2 Alternative 2

Alternative 2 originates at the Neptune Substation and therefore these ecological and vegetation features will not be repeated here. The proposed alignment route runs southwards and moves through Albany Coastal Belt and Buffels Thicket as it crosses through the river valleys. As this alternative runs in a south-westerly direction, it remains parallel and closer to the coastline than the proposed Main Route and therefore is associated with denser and more substantial vegetation. The Buffels Thicket vegetation type within the areas south of Mdantsane is dominated by relatively dense forest thickets. Inaccessibility to the river valleys means that this vegetation type has largely retained its ecological integrity, excepting where roadways and powerline servitudes have otherwise necessitated clearing. This proposed alignment route also has an association with Southern Mistbelt Forest – a vegetation unit that has also largely retained its ecological integrity due to its association with difficult terrain.

The higher-lying sections of this proposed alignment route are associated with Albany Coastal Belt. This vegetation unit within this area is heavily utilised for grazing and rural settlement and therefore has retained limited ecological integrity.

9.5.2.3 Alternative 3

Upon leaving the Neptune Substation, Alternative 3 moves north-westwards and moves through an undulating Albany Coastal Belt area which is interspersed with Bhisho Thornveld. The ecological impacts within this area are similar to those of the proposed Main Route. As this proposed alignment route moves north-westwards, it moves further away from main centres of rural settlements, meaning that the overall ecological integrity of the vegetation units associated with it within these areas is relatively less impacted. The proposed routes runs through sections of Buffels Thicket and Southern Mistbelt Forest, both of which are typified by thick vegetation associated with difficult terrain. These vegetation units have therefore generally retained their ecological integrity. As this proposed alignment route runs further westwards and before heading southwards to join in with the proposed Main Route near the Pembroke Substation, it crosses through an area of Bhisho Thornveld. Large-scale commercial cattle farming within this area has necessitated the clearing of the trees and shrubs to increase the grazing capacity. Pasture grasses have been cultivated to further improve the grazing capacity within this area, with the dominant species being *Digitaria eriantha*.

9.5.2.4 Alternative 4 and Alternative Segments

Alternative 4 runs primarily through Bedford Dry Grassland and shares much of the vegetation and landscape features of the proposed Main Route.

Segment A crosses an area of Eastern Cape Escarpment Thicket, which traverses the area of Bedford Dry Grassland. The Eastern Cape Escarpment Thicket forms within the valley riparian areas associated with a non-perennial tributary of the Koonap River that runs from east to west.

Segment B includes an area of Great Fish Thicket within the lower lying areas and then a section of Bhisho Thornveld before joining up with the proposed Main Route. The aridity and highly undulating topography of these areas makes for largely natural ecological integrity and retention of the overall vegetation features.

9.5.2.5 Turn-in Lines

The proposed Turn-in Lines runs almost exclusively through Albany Coastal Belt within an area with a high inclusion of rural settlement and communal grazing. Very little of the natural vegetation features have been retained within this area.

9.5.3 Floral Species of Conservational Concern

Floral species of conservational concern are categorised according to their conservation status. Red Data Listed (RDL) species are those classified as *Critically Endangered* (CE), *Endangered* (EN) or *Vulnerable* (VU). Species are regarded as being Orange Listed if they fall into the categories of *Near Threatened* (NT), *Rare* (Ra), *Declining* or *Data Deficient* (DD). *Data Deficient* species are further categorised into DDD (Data deficient – insufficiently known) or DDT (Data deficient – taxonomically problematic).

The desktop survey for protected, RDL and Orange listed floral species showed that various species of conservational concern occur within the Quarter Degree Square (QDS) grids associated with the proposed powerline route alternatives.

9.5.3.1 RDL Floral Species

It should be noted that no RDL floral species were observed during the ground-truthing field surveys and that their probability of occurrence is based largely on historical distributions reiterated by the identification of suitable habitat. More accurate identification of RDL species that could be impacted by the construction of the overhead powerline and associated towers can only be undertaken during the walk-down survey. The following RDL and protected species are perceived to be relevant to the survey area:

- **Acanthaceae – *Metarungia galpinii* (EN)**
  This species occurs in forests along rivers below 500m AMSL, in association with Buffels Thicket. There is a greater association with Buffels Thicket associated to the various alternative lines within the QDS of 3237DD, with the proposed Main Route incorporating the least amount of this vegetation type. Buffels Thicket is associated with the Buffels River valley and major tributaries. Much of this can be regarded as riparian vegetation and therefore an ecologically sensitive feature en route. These river valleys all fall within relatively low-lying areas, making for spanning across without the need for significant servitude vegetation clearing as there would be a relatively greater distance between the line and the vegetation as the overhead powerlines are spanned across the valley. This species should therefore not be significantly

impacted within the construction of the overhead powerline, with the proposed Main Route perceivably having the least overall impacts due to having the lowest association with the vegetation type where this species is found.

- **Euphorbiaceae – *Euphorbia globosa* (EN)**

  Habitat descriptions for this species indicate that it is found within low stony hills, not further than 20km from the coast and at altitude ranges of between 20 to 250m AMSL. The relevant QDS is presently dominated mostly by urbanisation and agriculture, with much of the area being regarded as being ecologically degraded. Habitat transformations within recent history have significantly reduced the chances of this species remaining within the region. It is therefore highly unlikely that the construction of the powerline will significantly impact on the conservation of this species.

9.5.3.2 Protected Floral Species

There are tree species that are nationally protected under the National Forests Act (Act No 84 of 1998) that have been recorded from the QDS that incorporates the proposed alignment alternative routes. These are not necessarily species of conservational concern, but have rather been protected from indiscriminant collection and destruction due to them being highly-valued for furniture production, infrastructure construction as well as ornamental use. It should be noted that a permit to remove or destroy protected species has to be sought from the Department of Agriculture, Forestry and Fisheries *(*DAFF*)* prior to the removal or destruction of these species. The following species have been recorded from the QDS grids:

- **Cornaceae - *Curtisia dentata* (NT, Protected)**

  This species occurs within the mistbelt, coastal and montane forests from the coast to 1800 m AMSL. This habitat type is found within the Buffels River valley. River valleys and the associated riparian vegetation are generally spanned as it falls within relatively lower-lying areas. Riparian habitat is regarded as an ecologically sensitive habitat unit and should be allowed to retain its natural features as far as possible.

- **Podocarpaceae - *Podocarpus falcatus* (Protected)**

  This species occurs in high (montane and mistbelt) forests, as well as lower-lying wooded ravines. The associated QDS grids are highly transformed to accommodate the associated land uses of small-scale agriculture and urbanisation. Areas where this species are therefore most likely to occur are ravines and steep mountain slopes that are generally protected through their inaccessibility.

- **Podocarpaceae - *Podocarpus latifolius* (Protected)**

  This species occurs in montane, mistbelt and riverine forests. This habitat type is found within the Buffels River valley. As mentioned, river valleys and the associated riparian vegetation are generally spanned as it falls within relatively lower-lying areas.

- **Cappraceae - *Boscia albitrunca* (Protected)**

  This species generally occurs within the more arid western regions of the survey area. It occurs in dry, open woodland and bushveld, often associated with termite mounds. This species was observed to be common within its distribution range within the survey area. The vegetation within these areas is sparse and does not attain a substantial height due to limiting factors imposed upon it by the habitat (poor soils, lack of moisture, etc.). The threat of line faults through fire is therefore limited. This warrants that this species need not be removed from the servitude areas. It is therefore proposed that this species be allowed to remain *in situ* where it occurs within the servitude areas as far as possible.

- **Pittosporaceae - *Pittosporum viridiflorum* (Protected)**

  This species occurs in deciduous woodland, scrub, riverine fringe thicket and evergreen forest, as well as on rocky outcrops. This wide range of habitat types means that this species could occur within a wide variety of areas associated with the servitude areas of the associated QDS grids. The areas that have retained their natural ecological features are thought to be most pertinent to supporting this species.

- **Sapotaceae - *Sideroxylon inerme* subsp. *inerme* (Protected)**

This species occurs in forests along coastal areas and inland along riverine forests and woodlands, often associated with termite mounds. It is most likely that this species remains within the riverine valley forests and thickets in its distributional range within the survey region. As mentioned previously, this habitat unit should be treated as ecologically sensitive and therefore should not be unduly impacted by the proposed development activities – thereby limiting the impact of the powerline construction on the overall conservation of this species.

9.5.3.3 Orange Listed Floral Species

Floral species are regarded as being Orange Listed for a variety of reasons and include the conservational status categories of *Near Threatened* (NT), *Rare* (Ra), *Declining* or *Data Deficient* (DD). Many of these species are species that are readily utilised in traditional medicine (medicinal plants) and therefore collection pressure plays a large role in reducing the population size of these species. Only species that are categorised as *Near Threatened* (NT) are described in detail below:

- **Zamiaceae - Encephalartos caffer (NT)**

  This species has been recorded within sour grassveld and occasionally in thicket, often amongst rocks. No areas representing the Grassland biome are recorded from the QDS grids, but thicket does occur. Areas that have retained natural features within these grids have been indicated as potentially suitable habitat for *Encephalartos altensteinii* that includes thicket habitat. The protection of these areas within these two QDS grids is therefore thought to also be applicable to *Encephalartos caffer*.

- **Zamiaceae - *Encephalartos lehmannii* (NT)**

  This species has been recorded within semi arid areas mostly on sandstone hills, mountain slopes and, occasionally clusters can be found on hard, open ground at the edge of dry watercourses. There is very limited association of the proposed routes within the associated QDS grid and therefore construction activities within this area is thought to not significantly impact on this species. The area associated with the proposed servitude alternatives already fall within an existing MTS (Main Transmission System) servitude, or very closely associated to it. This means that these servitude areas have already been transformed through vegetation clearing, rendering the impact of the construction of a powerline within these areas on the conservation of this species largely insignificant.

- **Amaryllidaceae - *Crinum campanulatum* (NT)**

  This species is restricted to the Albany floristic region, where it occurs in temporary pools and seasonal marshes in grasslands in clay to fine-grained mud soils. There is limited interaction with the proposed powerline construction within the associated QDS. The impact of the construction within this QDS on any RDL plants will therefore be limited.

- **Zamiaceae - *Encephalartos altensteinii* (VU)**

  The *Encephalartos* spp. recorded from the area are under threat due to collection pressure from plant collectors for illegal trade. Habitat degradation, coupled to the slow reproductive rate of these species, makes them vulnerable to transformation and disturbance features. The likelihood of these species occurring within the natural environment outside of protected areas is low; however, these species are known to occur within very inaccessible landscapes. This may allow for the retention of some individuals within the natural areas. This species has been recorded within open shrubland, steep rocky slopes and forests near the coast. They often occur along riverbanks. The associated QDS grid of 3227CC is dominated by ecologically degraded areas, with much of the area having been transformed to accommodate urbanisation and agriculture. There is a rocky ridge that runs in a northwest-southeast direction that includes ravines, steep rocky slopes and associated forest areas where topographical features shelter the vegetation from the elements. It is therefore likely that this area still supports populations of this species. The QDS grid of 3237CD suffers the same ecological transformations that affect 3227CC. There is one area within this QDS that could potentially still support populations of this species, namely the steep river gorges associated with the Laing Dam (proposed Main Route) as well as the forested areas associated with the Buffalo River (Alternative 2) and the areas associated with the Bridle Drift Local Authority Nature Reserve (Alternative 2). The areas within the QDS of 3237DC associated with the proposed alignment routes are also mostly dominated by ecologically degraded and urbanised areas. Some areas are still regarded as being natural, but heavy grazing and utilisation by the people from the surrounding rural settlement areas preclude the likelihood of this species occurring there.

- **Fabaceae - *Umtiza listeriana* (VU)**

  This species is restricted to relatively few forests and to valley thicket in the East London, Kentani and King William's Town districts of the Eastern Cape Province. The valley thickets occur within areas that have suffered some transformation due to vegetation clearing and exotic vegetation encroachment. Valley thickets are most often spanned across during the construction of overhead powerlines of this stature and therefore valley thicket vegetation should not suffer undue destruction, resulting in limited impacts to this species and the habitat where it could potentially occur.

- **Stangeriaceae - *Stangeria eriopus* (VU)**

  This species is restricted to scarp and coastal, Ngongoni and coastal grassland. The lack of protected areas and the heavy grazing that the grassland areas are exposed to within the related QDS grid render it highly unlikely that this species would occur within the proposed servitude alignments. It would, however, be prudent to search for this species during the walk-through survey to confirm that it does not occur within the proposed construction areas.

- **Amaryllidaceae - *Nerine huttoniae* (VU)**

  This species occurs in colonies near riverbanks or in seasonally damp depressions as well as floodplains in sandy alluvial soils. This type of habitat is considered rare in the arid western areas of the survey area. The rarity and ecological importance of this habitat type renders it ecologically sensitive and destruction thereof should be avoided. If this condition is adhered to, then the significance of the potential impact on the conservation of this species emanating from the construction activities can be minimised.

9.6 Fauna

Refer to **Section 10.1** for a synopsis of the Faunal, Floral and Avifaunal Ecological Survey (Enviross, 2011), as contained in ***Appendix F1***. The potential impacts to faunal features and the concomitant mitigation measures as assessed in **Section 11.5**. An extract from this specialist study that explains the faunal features of the receiving environment follows below.

The survey area falls within a region of floral endemism and, due to a high diversity of habitat types and units, it is assumed that faunal diversity will be comparably high. The arid nature of the western region means that many specialist species also would occur within this area. Areas that hold ecological significance have been identified for the Eastern Cape Province and are designated as Critical Biodiversity Areas (CBA's) for both the terrestrial and aquatic habitats. Certain areas pertaining to the proposed alignment route alternatives have also been declared as protected, both within the formal (national parks, provincial reserves, declared state forests, etc.) and informal (conservancies, private game reserves, etc.) sectors. Refer to **Figures 45 – 47** for a spatial presentation of the aforementioned areas.

9.6.1 Mammals

Those mammal species that the proposed development activities would potentially impact are the mobile (mostly confined to smaller species) that remain within the open areas and are free to migrate in or out of the region. Of a total of 100 species that have a historical distribution range that coincides with the survey area, one species (1%) is classified as *Critically Endangered (CE)*, 4 species (4%) as *Endangered (EN)*, 5 (5%) as *Vulnerable (VU)*, 11 (11%) as *Near Threatened (NT),* 9 (9%) as *Data Deficient* (DD) and 70 (70%) as *Least Concern (LC)*. Those species that are RDL and that would be potentially negatively impacted by the proposed development activities are shown in **Table 24**. The full mammalian species biodiversity list is presented in ***Appendix F1***.

Table 24: Mammalian species of conservational concern in the project area (Enviross, 2011)

Species	Name	Status	Occurrence Probability
Red Data Listed (Threatened)			
Diceros bicornis bicornis	Black Rhinoceros - arid ecotype	CE	Reserves only
Ourebia ourebi	Oribi	EN	Low, but would occur within reserves
Cercopithecus mitis labiatus	Samango Monkey	EN	Medium
Mystromys albicaudatus	White-tailed Rat	EN	Low-Med
Rhinolophus swinnyi	Swinny's Horseshoe Bat	EN	Low-Med
Philantomba monticola	Blue Duiker	VU	Low, but would occur in reserves
Dendrohyrax arboreus arboreus	Tree Hyrax	VU	Low-Med
Panthera leo	Lion	VU	Reserves only
Chrysospalax trevelyani	Giant Golden Mole	VU	Med-High
Cercopithecus mitis	Samango Monkey	VU	Medium
Orange Listed (Near threatened)			
Hyaena brunnea	Brown Hyaena	NT	Medium, but would occur in reserves
Leptailurus serval	Serval	NT	High
Lutra maculicollis	Spotted-necked Otter	NT	High
Mellivora capensis	Honey Badger	NT	High
Kerivoula lanosa	Lesser Woolly Bat	NT	Medium
Miniopterus fraterculus	Lesser Long-fingered Bat	NT	Medium
Miniopterus schreibersii	Schreibers' Long-fingered Bat	NT	Medium
Myotis tricolor	Temminck's Hairy Bat	NT	Medium
Rhinolophus capensis	Cape Horseshoe Bat	NT	Medium
Rhinolophus clivosus	Geoffroy's Horseshoe Bat	NT	Medium
Rhinolophus darlingi	Darling's Horseshoe Bat	NT	Medium
Amblysomus hottentotus	Hottentot's Golden Mole	DD	Medium
Crocidura cyanea	Reddish-grey Musk Shrew	DD	High
Crocidura flavescens	Greater Musk Shrew	DD	High
Crocidura silacea	Lesser Grey-brown Musk Shrew	DD	High
Myosorex cafer	Dark-Footed Forest Shrew	DD	High
Myosorex varius	Forest Shrew	DD	High
Poecilogale albinucha	African Weasel	DD	High
Suncus infinitesimus	Least Dwarf Shrew	DD	High
Grammomys dolichurus	Woodland Mouse	DD	High

Table 24 shows that the mammalian species of conservational concern, which occur within the area, are limited to highly-mobile bat species, small carnivores, small rodents and insectivores. Larger species (e.g. rhino and lion) occur within the region, but are confined to reserves and do not occur naturally within the region. Subsistence hunting, urbanisation and habitat transformation within the eastern areas would limit the occurrence of sensitive species. Areas where smaller species could occur would be along the greenbelts associated with riverine forests that provide ecological corridors and increased cover from the relatively denser vegetation. Many of the species of conservational concern are particularly dependent on forest habitat, making this an important habitat unit for general species conservation within the area.

The western areas become increasingly arid and therefore vegetation cover becomes sparser. Sheep and goat farming is the major land use within these areas, which means that small carnivores are persecuted by farmers and vast expanses of fencing that limit the natural movement of wild species also impacts on the conservation of many species within the region.

Those species that are considered to have a medium to high probability of occurrence are limited to those small rodent and insectivorous species that are regarded as being *Data deficient* as well as highly mobile small carnivores. To effectively mitigate the negative impacts relating to these groups of species, attention needs to be given to reducing the general impacts on the habitat units (i.e. minimising the construction footprints, etc.). Even though disturbance factors will play a role in displacing certain more sensitive species, the proposed development activities are not thought to pose significant long-term impacts on the conservation of these species.

9.6.2 Avifauna

Birds are particularly susceptible to impacts from transmission lines, which include electrocution, collision with power lines and loss of habitat. Species groups most at risk are those with heavier bodies and relatively small wingspan, making them less manoeuvrable and therefore more prone to collisions. Species groups include bustards, storks, cranes, eagles, vultures, ibises, etc. Further groups at risk are fast-flying waterfowl, especially ducks and geese. Another group of birds that are known to migrate at night are flamingos (ACEE, 2001; van Rooyen, 2004). These groups of species are represented within the survey area.

The following Important Bird Areas (IBAs) (Barnes, 1998), which are both partially protected, are situated to the north of the Neptune–Poseidon corridor (see **Figure 43**):

- SA091 - Katberg-Readsdale Forest Complex; and
- SA092 - Amatole Forest Complex.

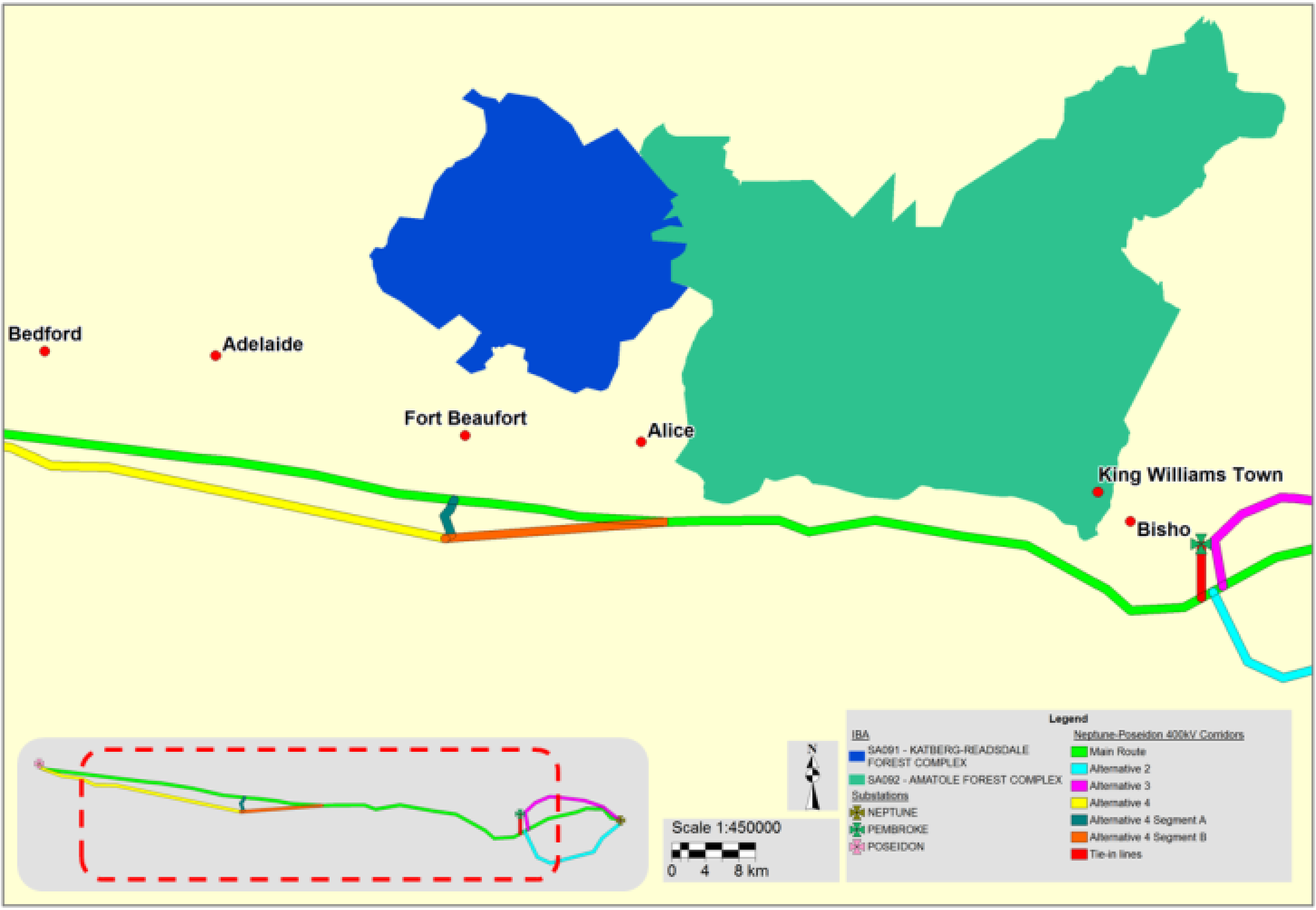


Figure 43: IBAs situated in the region of the Neptune-Poseidon project area

The area has an overall recorded avifaunal species count of 465 species. The full species list is presented in ***Appendix F1***. The diversity of habitat types incorporated into QDS grids from where the complete list is sourced makes for an exaggerated species diversity count and therefore not all of these species would be expected to occur within regions pertaining to the survey area. Examples would be those species specific to the marine shoreline. The RDL species list recorded from the region is presented in **Table 25**. Those species that are known to have a preference to the habitat units presented within the region are thought to suffer potential negative impacts from the proposed development activities.

Table 25: Avifauna species of conservational concern in the project area (Enviross, 2011)

Rob	English Name	Scientific	RDL Status	Wa	Gr	Fa	BW	Ko	RC	To	Fo
Red Data Listed											
80	Eurasian Bittern	*Botaurus stellaris*	CE	1							
222	Whitewinged Flufftail	*Sarothrura ayresi*	EN	1	1						
362	Cape Parrot	*Poicephalus robustus*	EN				1				1
77	Whitebacked Night Heron	*Gorsachius leuconotus*	VU	1							
122	Cape Vulture	*Gyps coprotheres*	VU		1	1	1	1			
140	Martial Eagle	*Polemaetus bellicosus*	VU		1		1	1			
165	African Marsh Harrier	*Circus ranivorus*	VU	1	1	1					
183	Lesser Kestrel	*Falco naumanni*	VU		1	1		1		1	
208	Blue Crane	*Anthropoides paradisea*	VU		1			1			
209	Crowned Crane	*Balearica regulorum*	VU	1	1	1					
221	Striped Flufftail	*Sarothrura affinis*	VU		1						1
229	African Finfoot	*Podica senegalensis*	VU	1							
230	Kori Bustard	*Ardeotis kori*	VU		1		1	1			
232	Ludwig's Bustard	*Neotis ludwigii*	VU		1			1			
233	Whitebellied Korhaan	*Eupodotis senegalensis*	VU		1		1				
463	Southern Ground Hornbill	*Bucorvus leadbeateri*	VU			1	1				
640	Knysna Warbler	*Bradypterus sylvaticus*	VU								1
Orange Listed											
84	Black Stork	*Ciconia nigra*	NT	1		1			1		
90	Yellowbilled Stork	*Mycteria ibis*	NT	1							
96	Greater Flamingo	*Phoenicopterus ruber*	NT	1							
97	Lesser Flamingo	*Phoenicopterus minor*	NT	1							
118	Secretarybird	*Sagittarius serpentarius*	NT		1	1	1	1			
132	Tawny Eagle	*Aquila rapax*	NT				1				
141	African Crowned Eagle	*Stephanoaetus coronatus*	NT								1
167	Pallid Harrier	*Circus macrourus*	NT		1	1					
168	Black Harrier	*Circus maurus*	NT		1	1		1			
171	Peregrine Falcon	*Falco peregrinus*	NT		1			1	1	1	1
172	Lanner Falcon	*Falco biarmicus*	NT			1	1	1	1	1	
231	Stanley's Bustard	*Neotis denhami*	NT		1		1	1			
234	Blue Korhaan	*Eupodotis caerulescens*	NT		1	1		1			
242	Greater Painted Snipe	*Rostratula benghalensis*	NT	1							
257	Blackwinged Lapwing	*Vanellus melanopterus*	NT		1	1					
285	Great Snipe	*Gallinago media*	NT	1	1						
322	Caspian Tern	*Sterna caspia*	NT	1							
430	Halfcollared Kingfisher	*Alcedo semitorquata*	NT	1							
484	Knysna Woodpecker	*Campethera notata*	NT				1				1
492	Melodious Lark	*Mirafra cheniana*	NT		1	1		1			
579	Orange Ground Thrush	*Zoothera gurneyi*	NT								1
BONN Species											
84	White Stork	*Ciconia ciconia*	BONN			1	1	1			

[**Wa** = Wetland (Inland Water); **Gr** = Grassland; **Fa** = Farmland; **BW** = Bushveld and Woodland; **Ko** = Karoo; **RC** = Rocks and Cliffs; **To** = Towns and Gardens; **Fo** = Forest]

There are avifaunal species of conservational significance that have been omitted from the list due to the survey region not incorporating the habitat units that these species are known to frequent. All of these are marine shoreline and coastal specific species and are therefore of no relevance to the survey area. Other species, such as the Egyptian Vulture, are considered extinct from the survey area. BONN species refer to those species that are internationally protected by the BONN Convention. These species are annual migratory birds that are significantly impacted by collisions with overhead infrastructure and habitat destruction on a global scale.

The major migratory routes pertaining to the project coincide with major river valleys and prominent ridge systems. Therefore, mitigating the potential negative impacts of traversing major migratory routes within the area needs to receive special attention.

9.6.3 Reptiles

There are 63 reptilian species recorded from the region pertaining to the survey area. Only the Loggerhead turtle (*Careta caretta*), which is irrelevant to this project area, is of conservational significance and is regarded as *Endangered*.

Inclusion of endemic reptilian species within the survey area is relatively high. The availability of large expanses of open habitat within the region means that reptilian species, in general, have not been unduly impacted by development and habitat transformation. It must, however, be considered that development has a cumulative impact. The full potential reptilian species list is presented in ***Appendix F1***.

Reptilian species are largely dependent on habitat unit structures and prey abundance, which, in turn, also depends on general habitat unit structure and condition. Many reptilian species, together with a large proportion of their prey species, have been shown to be broadly tolerant to a variety of habitat types. The mitigation measures applicable to limiting the impacts on the habitat structures are applicable to the conservation of reptilian species.

The table to follow lists reptilian species recorded from the region that have RDL status or are endemic to South Africa (2) or the southern African subregion.

<u>Table 26:</u> Reptilian species recorded from the region that have RDL status or are endemic to South Africa (2) or the southern African subregion (1) (Enviross, 2011)

Common name	Species	RDL Status	Endemic status
Parrot-beaked tortoise	*Homopus areolatus*	Endem	2
Angulate tortoise	*Chersina angulata*	Endem	1
Tent tortoise	*Psammobates tentorius tentorius*	Endem	2
Delalande's beaked blind snake	*Rhinotyphlops lalandei*	Endem	1
Eastern thread snake	*Leptotyphlops conjunctus conjunctus*	Endem	2
Black threat snake	*Leptotyphlops nigricans*	Endem	2
Southern African python	*Python natalensis*	VU	
Natal black snake	*Macrelaps microlepidotus*	Endem	2
Dusky-bellied water snake	*Lycodonomorphus laevissimus*	Endem	1
Common brown water snake	*Lycodonomorphus rufulus*	Endem	1
Aurora house snake	*Lamprophis aurora*	Endem	2
Common slug eater	*Duberria lutrix lutrix*	Endem	2
Eastern green snake	*Philothamnus natalensis occidentalis*	Endem	2
Southern brown egg-eater	*Dasypeltis inornata*	Endem	1
Spotted harlequin snake	*Homoroselaps lacteus*	Endem	1
Cape cobra	*Naja nivea*	Endem	1
Rinkhals	*Hemachatus haemachatus*	Endem	1
Thin-tailed legless skink	*Acontias gracilicauda gracilicauda*	Endem	2
Giant legless skink	*Acontias plumbeus*	Endem	1
Red-sided skink	*Mabuya homalocephala*	Endem	1
Delalande's sandveld lizard	*Nucras lalandii*	Endem	1
Striped sandveld lizard	*Nucras taeniolata*	Endem	2
Spotted sand lizard	*Pedioplanis lineoocellata pulchella*	Endem	1
Common mountain lizard	*Tropidosaura montana rangeri*	Endem	2
Fitzsimon's long-tailed seps	*Tetradactylus africanus fitzsimonsi*	Endem	2
Cape girdled lizard	*Cordylus cordylus*	Endem	1
Southern rock agama	*Agama atra atra*	Endem	1
Southern dwarf chamaeleon	*Bradypodion ventrale*	Endem	2
Amatola flat gecko	*Afroedura amatolica*	Endem	2
Karoo flat gecko	*Afroedura karroica*	Endem	2
Tembo flat gecko	*Afroedura tembulica*	Endem	2
Marbled leaf-toed gecko	*Afrogecko porphyreus*	Endem	2
Cape thick-toed gecko	*Pachydactylus capensis*	Endem	1
Spotted thick-toed gecko	*Pachydactylus maculatus*	Endem	1

9.6.4 <u>Amphibians</u>

Habitat loss, in all its many forms, was cited as the most pervasive threat facing amphibians and was listed for all species during the analysis for the frog atlas project (Minter, *et al.*, 2004) and therefore habitat destruction should be limited to the absolute minimum throughout the survey area. This is especially pertinent to riparian and wetland habitat units.

There are 26 amphibian species recorded from the region. Of these, two are considered *Endangered* (*Vandijkophrynus amatolicus* – Amatola toad and *Anhydrophryne rattrayi* – Hogsback chirping toad); one is considered *Vulnerable* (*Afrixalus spinifrons* – Natal leaf-folding frog); and one as *Near threatened* (*Pyxicephalus adspersus* – Giant bullfrog). The remainder are regarded as *Least threatened*.

Table 27: Notes on the amphibian species of conservational significance recorded from the region (Enviross, 2011)

Species	Common name	Status	Habitat	Significance to project
Vandijkophrynus amatolicus	Amatola toad	EN	Moist upland grasslands surrounding Winterberg and Amatola Mountains	Low
Anhydrophryne rattrayi	Hogsback chirping toad	EN	Afromontane forests near Amatola and Hogsback Mountains.	Low
Afrixalus spinifrons	Natal leaf-folding frog	VU	Coastal bushveld-grassland and Moist upland grassland along the east coast of KZN and EC.	Low
Pyxicephalus adspersus	Giant bullfrog	NT	Seasonal, shallow, grassy pans within the Grassland, Savanna, Nama Karoo and Thicket Biomes. Shows a preference for sandy soils.	Medium.

There is only one species of conservational concern that falls within the region that is considered significant to the proposed project, namely *Pyxicephalus adspersus* (Giant bullfrog). This species mostly occurs within grasslands, where it over-winters in burrows. It emerges after the first good rains in spring (usually November) to breed in rain-filled depressions, pans and other wetlands. It usually breeds within the Grassland biome, but also has been shown to breed in wetlands within the Savanna, Thicket and Nama Karoo biomes. In order to conserve this species, appropriate conservation buffer zones should be implemented surrounding all suitable wetland habitat units. This habitat unit is particular to the central to eastern regions of the survey area and impacting this habitat unit as well as the immediate adjacent grasslands would impact on the conservation status of this species. The full potential amphibian species diversity list recorded from the region is presented in ***Appendix F1***.

9.6.5 Fish

There are no fish species of conservational concern that would occur within the wetland and open waters within the survey area. The nature of the proposed development activities is such that no major rivers, streams, lakes or impoundments that would support fish communities within the region would be adversely impacted as these habitat types can be effectively avoided or spanned across. Areas of particular importance to aquatic biodiversity conservation have been identified throughout the Eastern Cape and identified as *Critical Biodiversity Areas – Aquatic*.

One of the few perceived direct impacts that could potentially emanate from the activities, and is considered pertinent, is the aggravation of soil erosion within the catchment areas of aquatic habitats. This would lead to siltation and smothering of important biotopes within the aquatic habitats that would lead to displacement of species and reduced reproductive outputs. Soil erosion throughout the construction phase should be actively managed to abate this potential impact.

Another impact on the aquatic environment that needs to be managed is the construction of bridges or the upgrading of existing crossings for access roads.

9.6.6 Invertebrates

The invertebrate taxa that are of conservational concern include the Mygalomorph spiders, scorpions, certain butterfly (Lepidoptera) and dragonfly and damselfly (Odonata) species.

9.6.6.1 Mygalomorph Spiders

The Eastern Cape Province is particularly rich in Mygalomorph species and diversity. This taxon includes various families of trapdoor and baboon spiders. This is a poorly-studied taxon nationally, making accurate distribution data difficult to source. The family of Theraphosidae (baboon spiders) are a nationally protected taxa under CITES, prohibiting collection, trade and destruction without the applicable permits (subject also to provincial legislation). Species of Theraphosidae were observed within proposed servitude areas throughout the survey area, making this a relatively common and widespread taxa throughout the region.

Mygalomorphs are all generally sedentary in habit. The females establish variations of burrows where they generally remain throughout their lifetime.

Males, especially during mating seasons, are generally free-roaming. The females are therefore especially vulnerable to habitat destruction and transformations as disturbances that destroy burrows often destroy the inhabitant, or, if displaced from the burrow, the females have difficulty in establishing new burrows or finding adequate refugia. Conservation of this taxon therefore relies on intact habitat functionality. Care should therefore be practised to minimise the construction footprints for each tower and not to cause undue destruction of habitat.

Mygalomorph spiders inhabit virtually all the habitat types that are represented throughout the survey area, from wet forests to dry grassland. General habitat conservation is therefore the most viable mitigation measure to abate undue impacts on these species – as is applicable to all biodiversity within the region.

9.6.6.2 Butterflies

There are 184 butterfly (Lepidoptera) species recorded from the region pertaining to the survey area, but only one species of conservational concern is noted, namely *Durbaniella clarki belladonna – Lycaenidae* (Clark's rocksitter). This species is considered *Vulnerable*. This species is known to inhabit hilltops, rocky ledges and gullies. General habitat conservation is thought to be most relevant to butterfly conservation as the habitat preferences of this taxon are extremely diverse.

9.7 Conservation Areas

The following protected areas are directly affected by the routes (see **Figure 44)**:

- The Main Route traverses the Kingsdale Game Farm (situated on the Farm Hammonds 148) approximately 50km east of the Poseidon Substation.
- Alternative 2 crosses over the Fort Pato Nature Reserve and a section of the Bridle Drift Dam Nature Reserve. According to the Buffalo City Municipality IDP for 2009/10 and the Spatial Development Framework (SDF), Umtiza and Fort Pato (amongst

others) include some of the main areas of the Open Space System/Environmental Network. Comments have been received from Eastern Cape Parks (refer to completed Comments and Response Report contained in ***Appendix L***), which includes an objection to Alternative 2 due to its potential impact to the Fort Pato Nature Reserve and conflict with the future vision of the area from an eco-tourism perspective.

- Alternative 3 traverses the Mpongo Private Game Reserve, which includes diverse wildlife, including Elephant, Buffalo, White Rhinoceros and Lion. Objections to the route have been received from the reserve, which are reflected in the Comments and Response Report contained in ***Appendix L***.

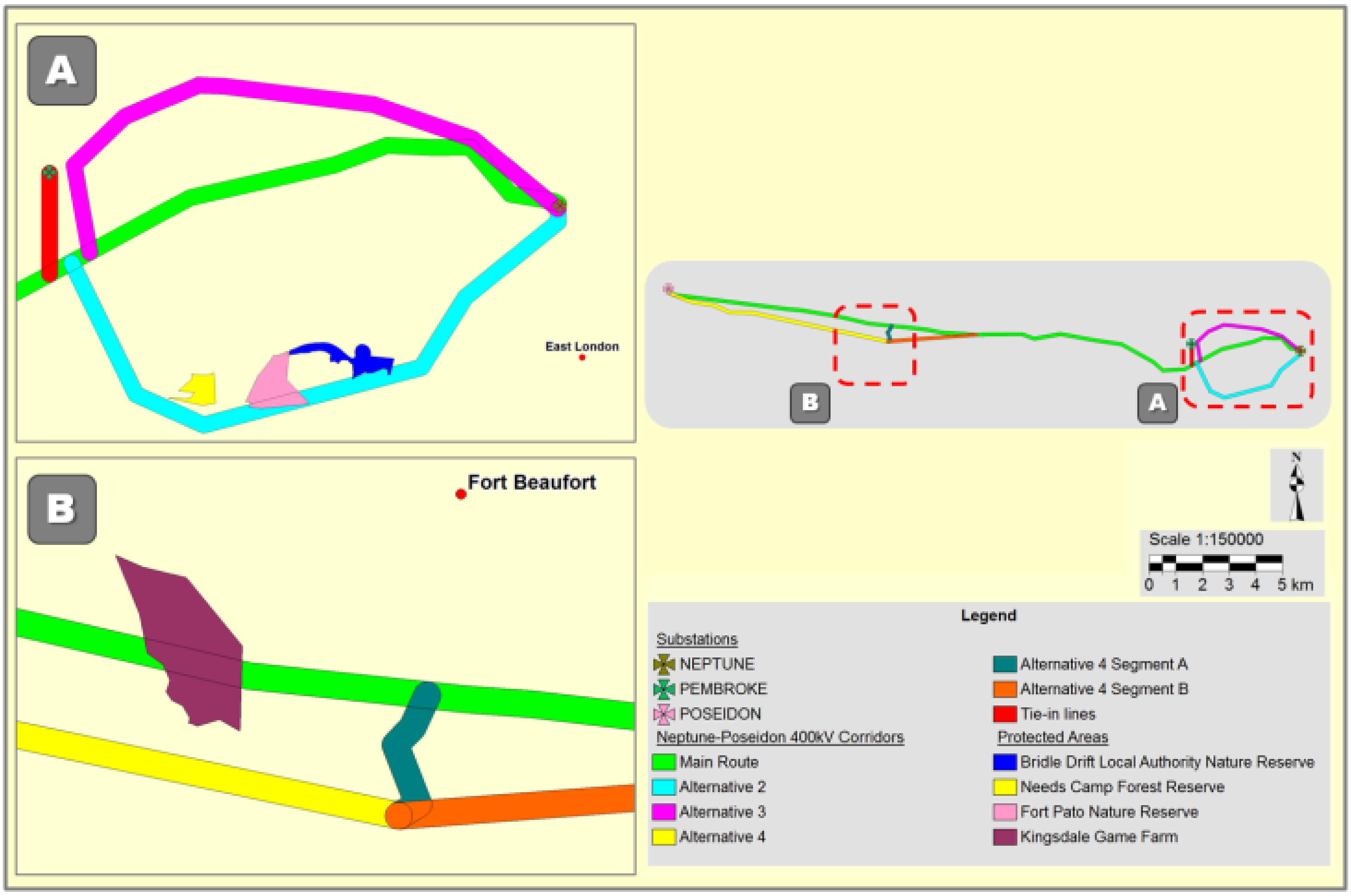


Figure 44: Directly affectec Protected Areas (SANBI, 2005)

The Addo Elephant National Park lies ± 70 km to the south-west of the Poseidon substation.

Refer to **Section 10.1** for a synopsis of the Faunal, Floral and Avifaunal Ecological Survey (Enviross, 2011), as contained in ***Appendix F1***. An extract from this specialist study that explains important areas from a biodiversity and conservation perspective follows below.

Areas within the Eastern Cape regarded as important for biodiversity conservation have been identified by provincial conservation authorities for various reasons that allow for the on-going overall ecological functionality of the region. Many areas have also been set aside for formal conservation (i.e. declared national parks, state forestry areas and reserves) and informal reserves (i.e. conservancies, privately-owned game farms and the like).

The areas set aside and actively managed to promote conservation of the ecological functionality and, in so doing, the faunal and floral features of the area, are therefore vitally important to conservation efforts of the region. Areas known as *Critical Biodiversity Areas* (CBA's) have been identified for both the terrestrial and aquatic habitat units. These CBA's are not necessarily limited to formally and informally-proclaimed conservation areas, but do play a vital role in ecological functionality within the region. These areas include the immediate catchments of major rivers, river systems that are important to maintaining migratory freedom of aquatic fauna and "greenbelt" areas that allow for freedom of migration of terrestrial species.

The areas identified as formally and informally protected as well as the *terrestrial* CBA's (see aquatic CBA's in specialist report - in ***Appendix F1***) are presented in **Figures 45 – 47** (from east to west).

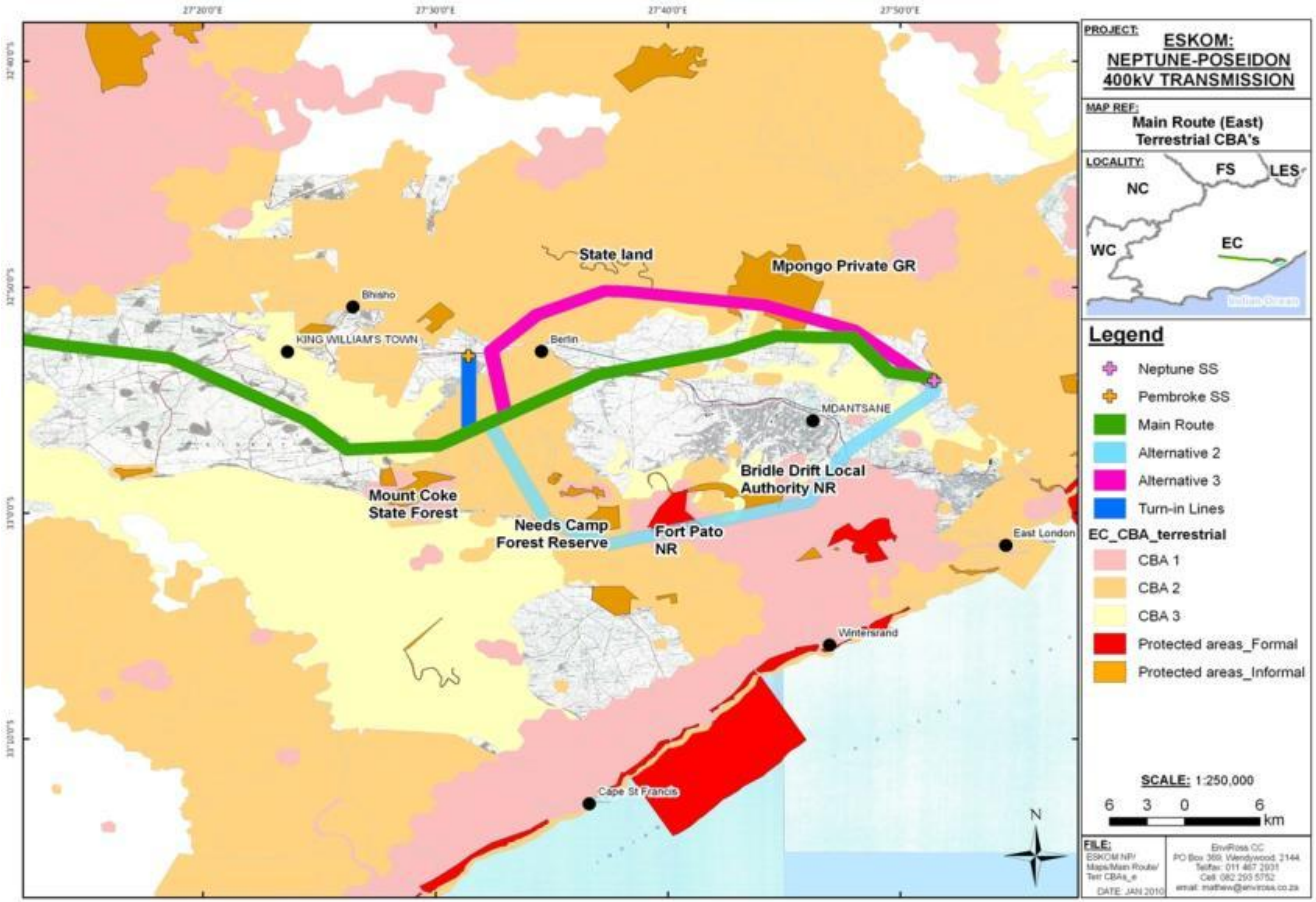


Figure 45: **Formally and informally protected areas and terrestrial CBA's for the eastern section of the project area (Enviross, 2011)**

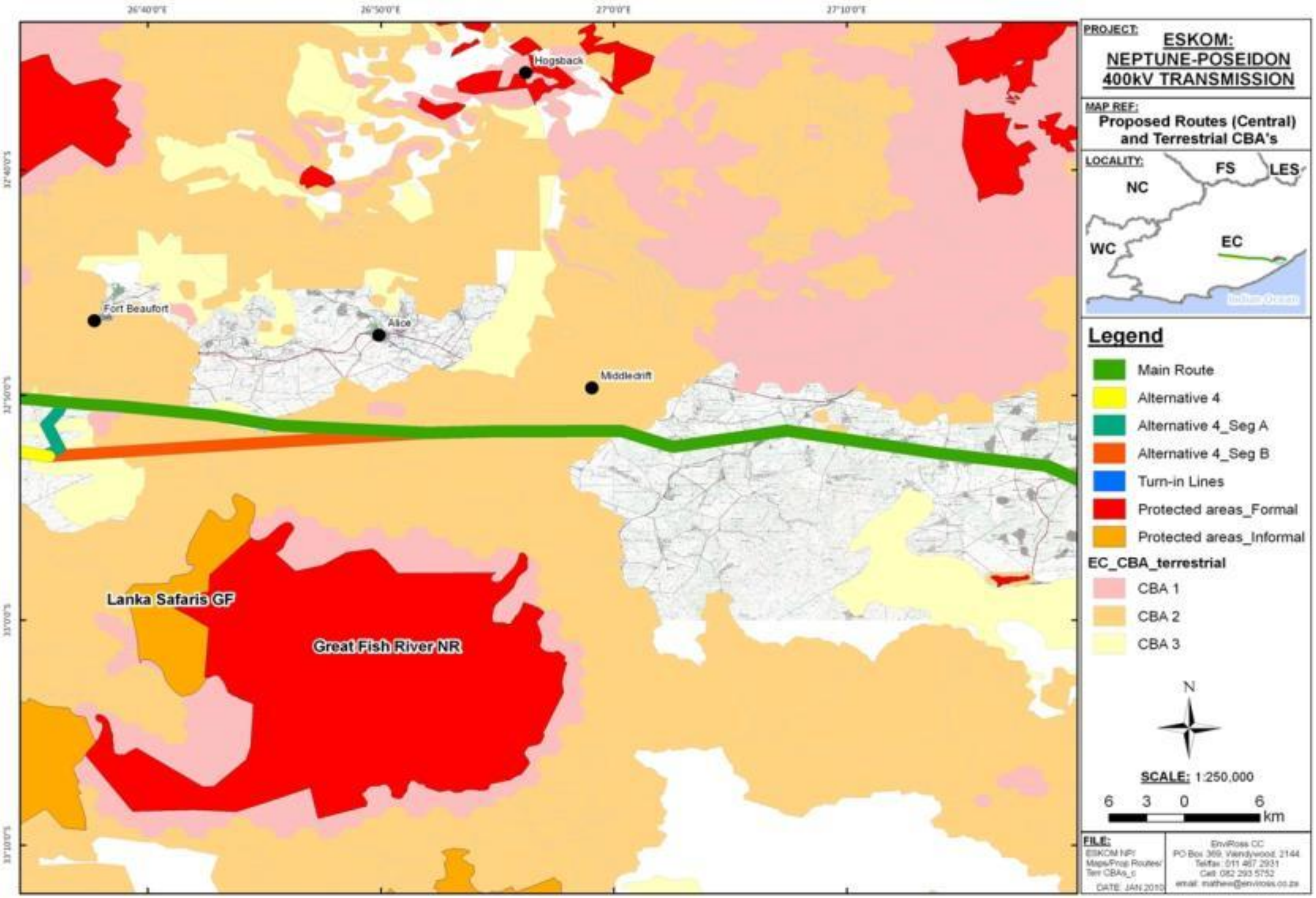


Figure 46: Formally and informally protected areas and terrestrial CBA's for the central section of the project area (Enviross, 2011)

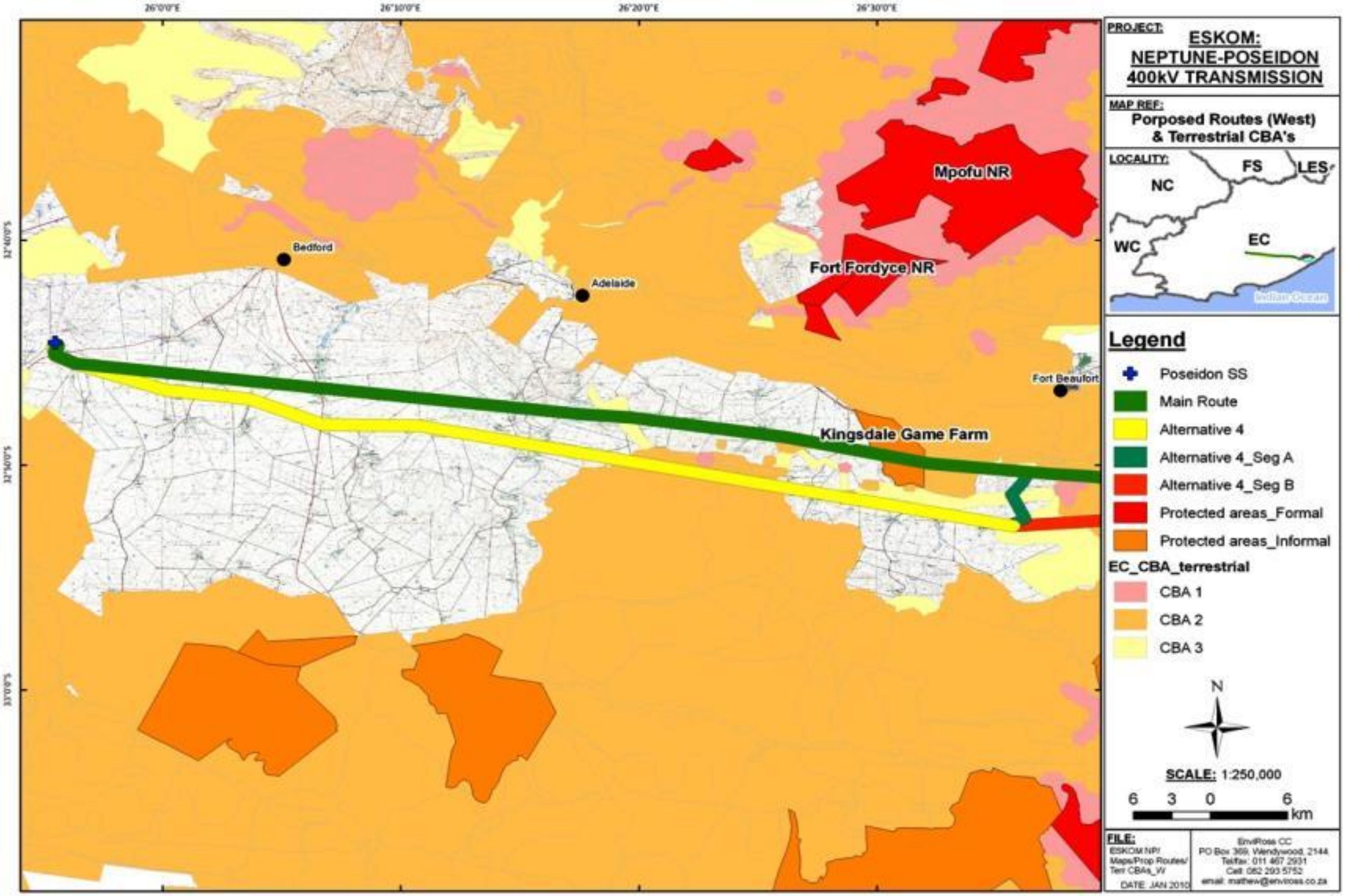


Figure 47: **Formally and informally protected areas and terrestrial CBA's for the western section of the project area (Enviross, 2011)**

9.8 Socio-Economic Aspects

The Eastern is home to 14.3% of South Africa's total population, with an estimated 6,436,769 inhabitants (2001 Census). The Amathole and O.R. Tambo District Municipalities both have 26% share of the Eastern Cape population, while the Ukhahlamba district has the lowest share of the provincial population with only 5%, closely followed by the Cacadu District with 6%.

38.8% of the Eastern Cape populace is urban, with the majority of people living in rural areas. The rural areas contain 10 327 660 hectares (60.9 % of the total Province) of commercial farming land (in 1996) as well as 4 821 077 hectares (28.4% of the total Province) of communal land – land which is held in trust by the Minister of Land Affairs for 'various African traditional communities' (Fort Hare Institute of Social and Economic Research, 2008).

Figure 48: Rural settlement alongside corridor

The national government has targeted the Eastern Cape for rapid socio-economic development to promote growth and reduce poverty by way of making substantial capital available for infrastructure expenditure. One of the strategies adopted by the Eastern

Cape Provincial Government to achieve this desired growth is the development and diversification of the existing manufacturing and tourism sectors, which was achieved by establishing two Industrial Development Zones (IDZ's) (located in East London and Port Elizabeth).

The following two specialist studies related to the social and economic environment were conducted:

- Economic Study (***Appendix F5***) – refer to summary and impact assessment contained in **Sections 10.5** and **11.10**, respectively;
- Social Impact Assessment (***Appendix F6***) – refer to summary and impact assessment contained in **Sections 10.6** and **11.9**, respectively.

This section contains extracts from these studies regarding the project area's socio-economic environment.

9.8.1 Demographic Description of the Area

The social and economic impacts related to the project are assessed against the backdrop of the demographics of the area.

An abridged verion of the demographic data of the region is illustrated in the table to follow, with a more comprehensive version provided in ***Appendix F6***.

Table 28: Demographic data district and local municipal levels (Dr Neville Bews & Associates, 2011)

Population Group	Amatole DC12		Amahlathi EC 124		Buffalo City EC125		Ngqushwa EC126		Ngonkale EC127		Nxuba EC128		Cacadu DC10		Blue Crane Route EC102	
Black	1,536,487	92.30%	108,713	96.43%	616,840	85.16%	82,632	99.46%	123,989	95.30%	16,126	75.10%	168,019	46.22%	12,098	47.33%
Coloured	64,471	3.87%	595	0.53%	52,211	7.21%	201	0.24%	5,758	4.43%	4,019	18.72%	146,119	40.20%	10,573	41.36%
Indian or Asian	2,909	0.17%	301	0.27%	1,939	0.27%	164	0.20%	9	0.01%	14	0.07%	627	0.17%	0	0%
White	60,886	3.66%	3,127	2.77%	53,318	7.36%	82	0.10%	345	0.27%	1,314	6.12%	48,720	13.40%	2,903	11.36%
Gender																
Male	786,904	47.27%	53,202	47.19%	354,109	48.89%	38,379	46.20%	60,768	46.71%	10,414	48.50%	173,635	47.77%	12,146	47.52%
Female	877,874	52.73%	59,528	52.81%	370,199	51.11%	44,700	53.80%	69,333	53.29%	11,059	51.50%	189,857	52.23%	13,415	52.48%
Income - 15-65 years																
No income	577,300	57.09%	42,914	63.59%	248,725	50.54%	30,881	65.59%	54,086	68.19%	7,873	58.80%	103,351	43.71%	7,172	44.77%
R1 - R400	58,625	5.80%	2,214	3.28%	18,677	3.80%	2,176	4.62%	2,735	3.45%	902	6.74%	6,479	2.74%	732	4.57%
R401 - R800	52,930	5.23%	3,110	4.61%	26,181	5.32%	2,062	4.38%	2,658	3.35%	1,264	9.44%	14,862	6.29%	1,190	7.43%
R801 - R1 600	130,815	12.94%	9,901	14.67%	62,514	12.70%	6,010	12.76%	10,303	12.99%	2,104	15.71%	47,488	20.09%	3,015	18.82%
Industry																
Agriculture; hunting; forestry; fishing	16,148	1.60%	1,973	2.92%	6,025	1.22%	780	1.66%	1,878	2.37%	840	6.27%	17,250	7.30%	1,548	9.66%
Mining and quarrying	1,020	0.10%	174	0.26%	370	0.08%	117	0.25%	143	0.18%	10	0.07%	176	0.07%	30	0.19%
Manufacturing	32,397	3.20%	2,314	3.43%	22,807	4.63%	771	1.64%	653	0.82%	591	4.41%	8,605	3.64%	655	4.09%
Electricity; gas and water supply	1,362	0.13%	177	0.26%	975	0.20%	144	0.31%	0	0.00%	12	0.09%	589	0.25%	0	0%
Construction	16,073	1.59%	1,083	1.60%	10,969	2.23%	352	0.75%	864	1.09%	173	1.29%	7,283	3.08%	339	2.12%
Wholesale and retail trade	37,992	3.76%	2,789	4.13%	23,041	4.68%	1,601	3.40%	2,354	2.97%	412	3.08%	9,646	4.08%	471	2.94%
Transport; storage and communication	9,319	0.92%	581	0.86%	6,205	1.26%	109	0.23%	304	0.38%	62	0.46%	1,363	0.58%	99	0.62%
Financial	23,598	2.33%	1,240	1.84%	17,762	3.61%	439	0.93%	819	1.03%	124	0.93%	6,499	2.75%	282	1.76%
Community	58,733	5.81%	3,183	4.72%	35,273	7.17%	1,866	3.96%	3,164	3.99%	718	5.36%	16,054	6.79%	1,219	7.61%
Institution attended 5-24 Years																
Pre-school	17,951	2.47%	839	1.75%	7,473	2.61%	379	1.06%	1,460	2.71%	289	3.60%	3,646	2.70%	502	5.57%
Primary school	256,049	35.18%	16,919	35.19%	86,269	30.17%	12,040	33.55%	16,249	30.11%	2697	33.57%	43,915	32.58%	2915	32.36%
Secondary school	246,776	33.91%	16,661	34.65%	92,867	32.47%	13,471	37.54%	18,202	33.73%	2144	26.68%	32,269	23.94%	2622	29.11%
College	8,911	1.22%	238	0.50%	6,247	2.18%	121	0.34%	493	0.91%	0	0.00%	771	0.57%	12	0.13%
University/University of technology	11,589	1.59%	145	0.30%	7,746	2.71%	64	0.18%	739	1.37%	47	0.58%	1,861	1.38%	0	0%
Employment																
Employed	279,231	27.61%	17,630	26.12%	177,033	35.97%	7,702	16.36%	13,399	16.89%	4,069	30.39%	90,228	38.16%	6,288	39.24%
Unemployed	213,330	21.10%	16,591	24.58%	112,294	22.82%	7,711	16.38%	26,830	33.83%	4,690	35.03%	45,045	19.05%	2,446	15.27%
Not economically active	483,089	47.77%	31,277	46.35%	185,671	37.73%	29,666	63.00%	33,748	42.55%	4,299	32.11%	87,034	36.81%	6,735	42.03%

9.8.2 Economic Status Quo

The economic status quo of the municipalities affected by this transmission line forms the backdrop to the detailed level study of economic composition along the route.

Note that a very small portion of the route lies within the Ngqushwa and Amahalthi Local Municipalities and thus the economic status quo for these two municipalities will not be presented below.

The following 47 Census 2001 sub places are affected by the Main Route.

Table 29: Neptune to Poseidon Main Route Sub Places

Sub Place Code	Sub Place Name	Sub Place Code	Sub Place Name	Sub Place Code	Sub Place Name
20201001	Bedford NU	21422003	KwaBhonke	21602001	Debe Valley
21402000	NONE	21422008	Ngxwalane	21602013	Gqadushe
21402001	Anders Mission	21422009	Rhayi	21602025	Maipase
21402002	Bulembu	21423000	NONE	21602026	Matyolweni
21402007	KwaRayi	21424000	NONE	21602032	Msulungwa
21402008	Mamata	21427001	Phakamisa	21602037	Newtown
21402009	Mxhaxho	21437000	NONE	21602041	Ntonga
21404000	NONE	21437005	Khwetyana	21602048	Singeni
21404001	Dongwe	21437006	KwaMpundu	21602050	Tafeni
21404002	Fort Murray	21437011	Nqonqweni	21624002	Fort Beaufort NU
21404003	Hillcrest	21437014	St Mary	21624004	Victoria East NU
21404013	Nkqonkqweni	21454002	Zwelitsha 9	21628000	NONE
21404015	Rini	21455000	NONE	21628003	Calderwood
21410001	East London NU	21507000	NONE	21704001	Adelaide NU
21422000	NONE	21507003	eNgqokweni	21704002	Bedford NU
21422002	Imidushane	21602000	NONE		

The following 53 Census 2001 sub places are affected by Alternative 2.

Table 30: Neptune to Poseidon Alternative 2 Route Sub Places

Sub Place Code	Sub Place Name	Sub Place Code	Sub Place Name	Sub Place Code	Sub Place Name
20201001	Bedford NU	21424000	NONE	21507003	eNgqokweni
21402000	NONE	21427001	Phakamisa	21602000	NONE
21402001	Anders Mission	21429000	NONE	21602001	Debe Valley
21402002	Bulembu	21429006	Entunja	21602013	Gqadushe
21402007	KwaRayi	21429007	Ezigodlweni	21602025	Maipase
21402008	Mamata	21429012	Kogo Farm	21602026	Matyolweni
21402009	Mxhaxho	21429016	Lovadale	21602032	Msulungwa
21404000	NONE	21429020	Msundulo	21602037	Newtown
21404002	Fort Murray	21429022	Needs Camp	21602041	Ntonga
21404015	Rini	21429027	Patho	21602048	Singeni
21410001	East London NU	21429039	Zigudu	21602050	Tafeni
21414030	Eureka	21433000	NONE	21624002	Fort Beaufort NU
21422000	NONE	21447000	NONE	21624004	Victoria East NU
21422002	Imidushane	21447001	Reeston	21628000	NONE
21422003	KwaBhonke	21449001	Silverdale	21628003	Calderwood
21422008	Ngxwalane	21454002	Zwelitsha 9	21704001	Adelaide NU
21422009	Rhayi	21455000	NONE	21704002	Bedford NU
21423000	NONE	21507000	NONE		

The following 52 Census 2001 sub places are affected by Alternative 3.

Table 31: Neptune to Poseidon Alternative 3 Route Sub Places

Sub Place Code	Sub Place Name	Sub Place Code	Sub Place Name	Sub Place Code	Sub Place Name
20201001	Bedford NU	21421001	Ilitha	21602000	NONE
21326010	King Williams Town NU	21422000	NONE	21602001	Debe Valley
21402000	NONE	21422002	Imidushane	21602013	Gqadushe
21402001	Anders Mission	21422003	KwaBhonke	21602025	Maipase
21402002	Bulembu	21422008	Ngxwalane	21602026	Matyolweni
21402007	KwaRayi	21422009	Rhayi	21602032	Msulungwa
21402008	Mamata	21423000	NONE	21602037	Newtown
21402009	Mxhaxho	21424000	NONE	21602041	Ntonga
21404000	NONE	21427001	Phakamisa	21602048	Singeni
21404002	Fort Murray	21437000	NONE	21602050	Tafeni
21404003	Hillcrest	21437005	Khwetyana	21624002	Fort Beaufort NU

Sub Place Code	Sub Place Name	Sub Place Code	Sub Place Name	Sub Place Code	Sub Place Name
21404009	Mntla	21437008	Kwetyana	21624004	Victoria East NU
21404015	Rini	21437011	Nqonqweni	21628000	NONE
21407000	NONE	21437015	Zikwaba	21628003	Calderwood
21407001	Berlin SH	21454002	Zwelitsha 9	21704001	Adelaide NU
21410001	East London NU	21455000	NONE	21704002	Bedford NU
21410002	King Williams Town NU	21507000	NONE		
21421000	NONE	21507003	eNgqokweni		

The following 47 Census 2001 sub places are affected by this Alternative 4.

Table 32: Neptune to Poseidon Alternative 4 Route Sub Places

Sub Place Code	Sub Place Name	Sub Place Code	Sub Place Name	Sub Place Code	Sub Place Name
20201001	Bedford NU	21422003	KwaBhonke	21602001	Debe Valley
21402000	NONE	21422008	Ngxwalane	21602013	Gqadushe
21402001	Anders Mission	21422009	Rhayi	21602025	Maipase
21402002	Bulembu	21423000	NONE	21602026	Matyolweni
21402007	KwaRayi	21424000	NONE	21602032	Msulungwa
21402008	Mamata	21427001	Phakamisa	21602037	Newtown
21402009	Mxhaxho	21437000	NONE	21602041	Ntonga
21404000	NONE	21437005	Khwetyana	21602048	Singeni
21404001	Dongwe	21437006	KwaMpundu	21602050	Tafeni
21404002	Fort Murray	21437011	Nqonqweni	21624002	Fort Beaufort NU
21404003	Hillcrest	21437014	St Mary	21624004	Victoria East NU
21404013	Nkqonkqweni	21454002	Zwelitsha 9	21628000	NONE
21404015	Rini	21455000	NONE	21628003	Calderwood
21410001	East London NU	21507000	NONE	21704001	Adelaide NU
21422000	NONE	21507003	eNgqokweni	21704002	Bedford NU
21422002	Imidushane	21602000	NONE		

The information presented below has been obtained from the Eastern Cape Socio-Economic Consultative Council and figures are provided to the year 2009.

9.8.2.1 Populations

The population of each local municipality is presented in the table below.

Table 33: Affected Municipality Populations

Municipality/Area	No. of Persons [2009]	Growth or Decline since 2001
Buffalo City Municipality	757 289	Growth
Nkonkobe Local Municipality;	134 484	Growth
Nxuba Local Municipality; and	23 160	Decline
Blue Crane Route Local Municipality.	28 821	Decline

The population in the two eastern most municipalities grew between 2001 and 2009, this is not true of the western most municipalities. This pattern hints at a lack of economic and social opportunities and at outward migration to seek out these opportunities.

9.8.2.2 Gross Values Added

The table below presents the Gross Value Added for each municipality.

Table 34: Affected Municipality Gross Value Added

Municipality/Area	GVA [millions, 2009]	% of Eastern Cape GVA	Growth or Decline since 2001
Buffalo City Municipality	26 576	21%	Growth
Nkonkobe Local Municipality	1 435	1%	Growth
Nxuba Local Municipality	467	0.4%	Growth
Blue Crane Route Local Municipality	602	0.5%	Growth
Eastern Cape Province	125 621	100%	

Gross Value Added (GVA) is defined as the value of goods and services produced in an geographic area. The relationship between GVA and Gross Domestic Product (GDP) is GVA plus taxes on products minus subsidies on products.

The table shows that the largest economy affected by the project is that of the Buffalo City Municipality which contributes 21% of the Eastern Cape Economy. The other three municipalities together contribute less than 2% to the Eastern

Cape economy. Thus, in economic terms, disruption in the Buffalo City Municipality would most negatively affect the economy of the Eastern Cape.

The table to follow presents the Gross Value Added for the top three economic sectors, plus the value for agriculture, for each municipality affected by the project.

The most important economic sector is General Government, at between 24 and 30% of the total GVA for each municipality. Other important sectors are Finance and Insurance, Wholesale and Retail Trade and Community and Personal Services all contributing about 14% of each municipal economy. The agricultural contribution to GVA is relatively small and ranges between 1 and 8% in the four municipalities.

Table 35: Affected Municipalities GVA - Top Three Sectors Plus Agriculture

Municipality/Area	Top Three Economic Sectors plus Agriculture	GVA [millions, 2009]	% of Municipal GVA
Buffalo City Municipality		26 576	
	General Government	6 271	24%
	Finance and Insurance	3 393	13%
	Business Services	3 314	12%
	Agriculture	209	1%
Nkonkobe Local Municipality		1 435	
	General Government	426	30%
	Whole. Retail Trade	236	16%
	Comm and Pers Services	232	16%
	Agriculture	47	3%
Nxuba Local Municipality		467	
	General Government	122	26%
	Finance and Insurance	70	15%
	Whole. Retail Trade	58	12%
	Agriculture	32	7%
Blue Crane Route Local Municipality		602	
	General Government	145	24%
	Comm and Pers Services	88	15%

Municipality/Area	Top Three Economic Sectors plus Agriculture	GVA [millions, 2009]	% of Municipal GVA
	Finance and Insurance	82	14%
	Agriculture	49	8%
Eastern Cape Province		125 621	

Thus the economy of the study area is characterised by activity in the tertiary sector of the economy. The primary sector; made up of agriculture at about 2% of GVA is a small contributor to the economy. The secondary sector; made up of manufacturing is also a small contributor.

Thus the study area is dependent upon economic activity generated by population size and accessibility and by government spending. Thus any changes in these two measures would disproportionately affect the economy of the district.

9.8.2.3 Employment

The table below shows the size of each economic sector as well as its employment. From this comparison, one can see the employment absorbing industries and those which are not very labour intensive. All figures from this table have been extracted from EconoMonitor, 2010.

Table 36: Labour Absorption Top Three Sectors Plus Agriculture

Municipality/Area	Top Three Economic Sectors plus Agriculture	No. of People Employed [2009]	% of Municipal GVA
Buffalo City Municipality		235 532	
	General Government	46 143	20%
	Finance and Insurance	5 391	2%
	Business Services	24 967	11%
	Agriculture	17 248	7%
Nkonkobe Local Municipality		19 930	
	General Government	3 746	19%
	Whole. Retail Trade	4 104	21%
	Comm and Pers Services	3 363	17%
	Agriculture	4 466	22%

Municipality/Area	Top Three Economic Sectors plus Agriculture	No. of People Employed [2009]	% of Municipal GVA
Nxuba Local Municipality		5 968	
	General Government	790	13%
	Finance and Insurance	134	2%
	Whole. Retail Trade	913	15%
	Agriculture	2 144	36%
Blue Crane Route Local Municipality		9 886	
	General Government	1 314	13%
	Comm and Pers Services	153	2%
	Finance and Insurance	342	3%
	Agriculture	3 955	40%
Eastern Cape Province		1 313 312	

What is striking about the table above is that, apart from General Government, the inversion of the importance of the sectors in terms of employment. One of the largest employers in the three smaller municipalities tends to be agriculture, a status that is not matched by its relatively small GVA. This implies that agriculture is a labour intensive sub-sector. As the largest employer, agriculture thus raises in importance and any disruption to agricultural production will disproportionality impact upon employment in the affected study area.

Other sectors that contribute more to employment than to economic activity are Wholesale and Retail Trade and Community and Personal Services. Thus, from a social perspective, these sectors add disproportionately to employment when they expand and will contribute disproportionately to unemployment when they contract. They could be termed the employment leveraged sectors.

By contrast, there are sectors that are not as employment leveraged. These sectors contribute less to employment than their economic size. Thus when the sector size increases employment does not increase at the same pace, however, when the sector size decreases, unemployment will not increase at the same rate as the economic contraction. In the study area, the main sector in this category is Finance and Insurance.

9.9 Agriculture

The project area is generally rural, with the dominant land uses being given over to livestock raising. Livestock being produced in the area include cattle, sheep, goats and game. Agricultural products from the area include meat, milk and dairy produce, wool. Eco-tourism products include trophies, live game and venison.

Figure 49: Cattle (left) and goats (right) grazing within corridor

Citrus production is important in the areas of Ngqushwa, Nxuba and Nkonkobe. Subsistence farming is encountered in the rural areas. Intensive crop production under irrigation is limited to the valleys.

Known farmers' associations in the project area include the following:

- Agri Eastern Cape;
- Thornpark Farmers Association;
- Buffalo City Agricultural Action Forum;
- Nahoon Valley Farmers Association;
- Adelaide Farmers Association;
- Fort Beaufort Farmers Association; and
- The Kat River Citrus Co-Operation.

Figure 50: Citrus orchard within corridor

Terra Soil Science was appointed to conduct an Agricultural Potential Assessment (contained in ***Appendix F3***) for the project. Refer to **Section 10.3** for a summary of this study. This study found that the impact of the power line pylons will be minimal on the agricultural potential of the land along the routes.

The walk-down survey will aim to avoid (or minimise if avoidance is not possible) the placement of towers within cultivated land, depending of the possible distance that the line can be spanned in these areas.

The impacts associated with the project on livestock are managed through mitigation measures contained in the EMP.

9.10 Air quality

The air quality in the project area can be regarded as good, based on the non-obtrusive land use types (i.e. game farms) encountered within the vicinity of the corridor.

Obvious sources of air quality pollution in the region include the following:

- Emissions from industrial complexes (mainly in East London and King William's Town);
- Urban-related emissions from towns;
- Dust from agricultural lands, bare areas and use of dirt roads;
- Tailpipe emissions from vehicles travelling along the road network;
- Burning of wood for household purposes in areas without electricity; and
- Veld fires.

The probable impact of dust emission into the local air during the construction phase will be reduced through the proposed measures contained in the EMP.

No specialist air quality study was undertaken for the proposed Neptune-Poseidon 400 kV power line, as it was not deemed necessary for the type of activities associated with this project. Suitable mitigation measures are included in the EMP to address the identified impacts.

9.11 Noise

Noise in the region emanates primarily from the following sources:

- Towns;
- Farming operations (e.g. use of farming equipment);
- Vehicles on the road network; and
- Trains.

Ridges serve as noise attenuation features, although the ambient noise levels are insignificant on the surrounding area.

During construction, localised increases in noise are anticipated due to the use of equipment (for clearing, grading, tower erection, conductor stringing) and presence of construction workers. and during some later maintenance activities during the operational phase, which will be addressed through suitable mitigation measures contained in the EMP.

During the operational phase, power lines produce an audible sound or buzz because they are producing something called a corona discharge that is interacting with the surrounding air. The corona discharge is a side-effect of the electric field the power line generates by carrying electricity. The discharge can be greater, and the buzzing louder if there is increased moisture or pollutants in the air. Under normal conditions, corona-generated noise is not audible. The noise may be audible under certain wet conditions. Conductors are selected based on factors such as audible noise, corona, and electromagnetic field (EMF) mitigation. In addition, corona rings can be fitted if deemed necessary. Corona is not associated with any adverse health effects in humans or livestock.

A Noise Impact Assessment was not deemed necessary for the type of activities associated with this project.

9.12 Heritage Resources

A Phase 1 Heritage Impact Assessment, in accordance with the National Heritage Resources Act (Act No. 25 of 1999), was conducted (see ***Appendix F2***) for the project. Refer to **Sections 10.2** and **11.6** for a synopsis of the study and a related impact assessment, respectively. An extract from this specialist study that explains the heritage features of the receiving environment follows below.

According to the National Heritage Resources Act (Act No. 25 of 1999), Section 2(vi), the *significance* of heritage sites and artefacts is determined by it aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technical value in relation to the uniqueness, condition of preservation and research potential. This Act stipulates the assessment criteria and grading of archaeological sites. The following categories are distinguished in Section 7 of the Act:

- Grade I: Heritage resources with qualities so exceptional that they are of special national significance;

- 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
- Grade III: Other heritage resources worthy of conservation, on a local authority level.

The occurrence of sites with a Grade I significance will demand that the development activities be drastically altered in order to retain these sites in their original state. For Grade II and Grade III sites, the application of mitigation measures would allow the development activities to continue.

In terms of Section 7 of the National Heritage Resources Act (Act No. 25 of 1999), the sites currently known or which are expected to occur in the study area are evaluated to have the following significance (J van Schalkwyk, 2011):

- Geological sites are viewed to have a high significance on a regional level and have Grade II significance;
- Stratified Stone Age sites are viewed to have a high significance on a regional level and have Grade II significance;
- Farmsteads are viewed to have medium significance on a regional level and have Grade III significance;
- Graves and cemeteries are viewed to have high significance on a local level and have Grade III significance; and
- Industrial heritage sites are viewed to have medium significance on a regional level and have Grade III significance.

The walk-down survey will also attempt to identify heritage resource in order for these features to be avoided during the siting of the towers.

The South African Heritage Resources Agency (SAHRA) is included in the I&AP database and was consulted during the EIA.

Figure 51: Grave sites alongside Main Route corridor

9.13 Transportation

The major linear transportation network in the region is shown in **Figure 52**. The major road crossings are presented in **Table 37**.

Table 37: Major road crossing by the Neptune-Poseidon project (from east to west)

Alignment	Major Roads Affected	
Main Route	• N2 (twice) • R346 • R345	• R67 • R344 • R350
Alternative 2	• N2 • R102	• M3 • R346 (twice)
Alternative 3	• N2	• R102
Alternative 4	• R344	• R350

The majority of the Neptune-Poseidon Main Route runs to the south of the R63 road, as well as a railway line.

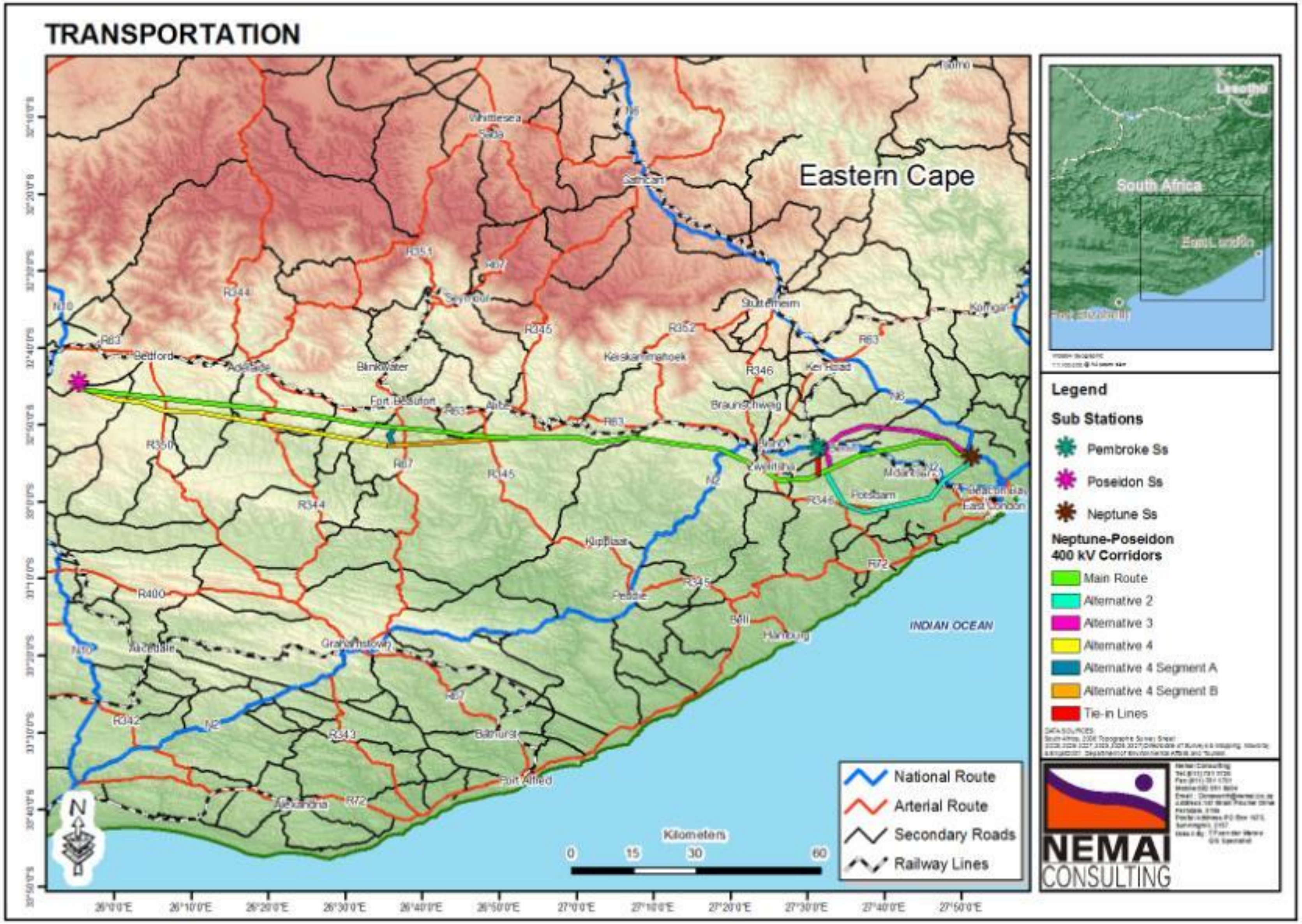


Figure 52: Major Transportation Network in Region

Figure 53: National (left) and Secondary (right) roads in study area (along Main Route)

The Neptune substation is situated just west of the N6, while the Pembroke substation lies just south of the N2 and the Poseidon substation approximately 6.6 km (as the crow flies) east of the N10. Correspondence was received from the South African National Roads Agency Limited (SANRAL), which included the stipulation of requirements and conditions for working in proximity to national roads (refer to the Comments and Response Report in ***Appendix L***).

The routes also cross a number of District Roads that link with the Main roads, as well as internal roads, which grant access to farms and settlements.

The project will require the use of access roads during the construction and operational phases. Existing roads will be used as far as possible, and these roads (including river crossings) will be upgraded where deemed necessary. Where the transmission line runs parallel to existing powerlines, existing access / service roads will be used wherever possible. It was noted during the site inspection that access roads that may have been created for the vacant servitude (Main Route) are overgrown and would need to be graded. In other instances, new roads may need to be created. All requisite access arrangements will be made with the affected landowners. At this stage it is not possible to identify which access roads will be affected by the project. However, the EMP walk-down survey will identify sensitive environmental features that need to be avoided when creating these new roads and the EMP will address the associated impacts.

The alternative alignments in the eastern part of the project area cross a railway line at the following points (note that Transnet is included in the I&AP database):

- Main Route – north of Ngonqweni;
- Alternative 2 – north of Reeston; and
- Alternative 3 – west of the Berlin Industrial Area.

No Traffic Impact Study was conducted, as it was not deemed necessary for the type of activities associated with this project. Suitable mitigation measures are contained in the EMP.

The corridor of the Main Route encroaches on the Bisho Airport, as shown in **Figure 54**. As no alternative routes are suggested in this section of the project area, the final alignment would need to ensure that it is sufficiently located to the north of the airport to avoid any adverse impacts.

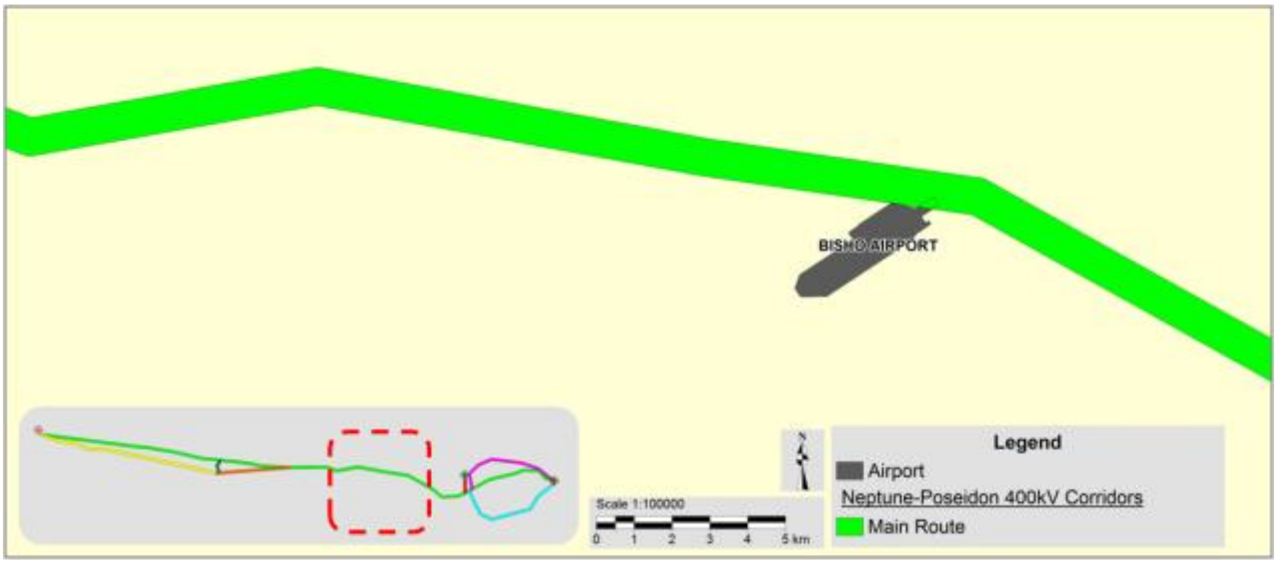


Figure 54: Location of Bisho Airport in relation to Main Route Corridor

9.14 Visual Quality

A Visual Impact Assessment was performed for the project, and it is contained in ***Appendix F4***. Refer to the summary and impact assessment of this study contained in **Sections 10.4** and **11.7**, respectively. An extract from this specialist study that explains the visual features of the receiving environment follows.

The study area is characterised by a rolling, undulating landscape with high topographic variation. Drainage lines meander through the study area and cause shallow incisions where it meets up with rivers.

The majority of the study area is considered to have a moderate landscape character sensitivity due to the relative undeveloped and pristine condition of the landscape, the generally high visual quality and the related tourism value that is placed on the visual resource. High terrain variability occurs through of the study area. Generally the vegetation cover is limited to medium to low shrubs and trees covers which will provide limited visual screening for the proposed transmission line.

Previous human induced activities and interventions have negatively impacted the original landscape character of the different landscape types (e.g. human settlements, subsistence farming, existing infrastructure), which can be classified as landscape disturbances and elements that cause a reduction in the condition of the affected landscape type and detrimentally affect the quality of the visual resource.

Landscape impacts are alterations to the fabric, character, visual quality and/or visual value which will either positively or negatively affect the landscape character. During the construction and operational phases, the project components are expected to impact on the landscape character of the landscape types it traverses.

Within the receiving environment, specific viewers (visual receptors) experience different views of the visual resource and value it differently. They will be affected because of alterations to their views due to the proposed project.

Figure 55: **Picturesque scene within project area**

9.15 Planning Context

The land use and land cover in the study area are shown in **Figure 56** and **Figure 57**, respectively. Residential areas and subsistence farming occurs sporadically in the eastern portion of the overall area, where agricultural smallholdings are dominant. Moving towards the centre of the Main Route, we find tribal land with dispersed villages covering the majority of the region. The land use changes towards the west from rural communal grazing and subsistence areas to formal agricultural and game-farming areas, with an associated substantial increase in active land management. The land cover is emphasised trough Landsat imagery in **Figure 58**, which shows that the western and central sections of the area is predominantly used for extensive grazing and that the eastern part of the route (especially Route 2) is characterised by an increase in forestry activities.

Primary land use impacts from constructing transmission corridors include removal of trees and vegetation (for undeveloped corridors), and the re-clearing of existing transmission line servitudes. The transmission line and servitude would preclude certain productive land uses from continuing on that land (depending on the nature of the use and proximity to the electrical infrastructure).

The IDPs and SDFs for each of the local municipalities that are traversed by the power line alternative routes were reviewed in terms of compatibility of the project with the initiatives of the local authorities. A summary of the findings for each municipality follows.

9.15.1 Amathole District Municipality

As mentioned, the phased-in approach of the greater East London Strengthening Scheme is proposed to ensure long-term sustainability of the Cape and Eastern Grid corridor reliability, which includes the Amathole District Municipality.

9.15.1.1 Buffalo City Local Municipality

The IDP for the Buffalo City Local Municipality recognises the need for a safe, sufficient, functioning and well maintained electricity infrastructure network (Buffalo City Municipality, 2010). This project will aim to improve the reliability of the existing East London Transmission network and the East London network voltage regulation.

According to the IDP and SDF, Umtiza and Fort Pato (amongst others) include some of the main areas of the Open Space System / Environmental Network (Buffalo City Municipality, 2010). The aforementioned protected areas are traversed by the Alternative 2 route.

9.15.1.2 Amahlathi Local Municipality (Alternative 2 only)

The Amahlathi Municipal area has numerous local areas where significant backlogs exist in the provision of basic services such as water, sanitation, electricity and solid waste disposal. The municipality's objectives in relation to electricity / electrification is to provide electricity to all by 2014, provide energy to scarcely populated areas and to provide area lights to all settlements. One of the strategies of the municipality is to align itself with the Eskom Implementation plan

(Amahlathi Municipality, 2007). The Neptune-Poseidon 400kV project will ultimately strive to create additional transmission network capacity to supply the increasing electricity demand in the Southern Grid.

9.15.1.3 Ngqushwa Local Municipality

The electricity supply to the area is provided and maintained by Eskom in accordance with their Rural Electrification Programme. Approximately 90% of the population has access to electricity. In the near future the municipality will look at its capacity to sell and maintain electricity taking over from Eskom. The IDP includes an objective to provide and maintain sustainable levels of engineering and infrastructure services (Ngqushwa Local Municipality, 2011). The Neptune-Poseidon 400kV project will ultimately strive to create additional transmission network capacity to supply the increasing electricity demand in the Southern Grid.

9.15.1.4 Nkonkobe Local Municipality

One of the objectives included in the IDP is to ensure upgrading of electrical reticulation and supply (Nkonkobe Local Municipality, 2008). The Neptune-Poseidon 400kV project will ultimately strive to create additional transmission network capacity to supply the increasing electricity demand in the Southern Grid.

9.15.1.5 Nxuba Local Municipality

According to the SDF, the recommended land uses are conservation, game farming, communal livestock and commercial livestock ranching. In terms of land use management, the specific ecosystems and vegetation communities that require specific environmental management are wetlands, grasslands and other indigenous forests which provide the habitats of important species (Nxuba Local Municipality, 2009). In the municipal area, Alternative 4 runs alongside the existing Pembroke-Poseidon 1 transmission line.

Eskom is the licensed distributor of electricity in the rural area and Nxuba Municipality renders this service in the urban areas of Adelaide and Bedford. In terms of the Key Performance Area: Infrastructural Development and Service Delivery, the electrical network urgently needs to be serviced and maintained. The Neptune-Poseidon 400kV project will ultimately strive to create additional transmission network capacity to supply the increasing electricity demand in the Southern Grid.

9.15.2 <u>Cacadu District Municipality</u>

The IDP draws attention to electricity backlogs that exist in several of the local municipalities. Infrastructure investment and economic development are two of the development priorities identified in the IDP (Cacadu District Municipality, 2010).

9.15.2.1 Blue Crane Route Local Municipality

According to the IDP, the municipality has a good electrical infrastructure base but upgrading is needed in order for the service to be provided effectively. The IDP highlights the upgrading of electricity network and increasing capacity as strategies to meet the objective of reliable and affordable electricity to 80% of consumers by 2012 (Blue Crane Route Municipality, 2009). The Neptune-Poseidon 400kV project will ultimately strive to create additional transmission network capacity to supply the increasing electricity demand in the Southern Grid.

Within this municipality Alternative 4 runs alongside the existing Pembroke-Poseidon 1 transmission line.

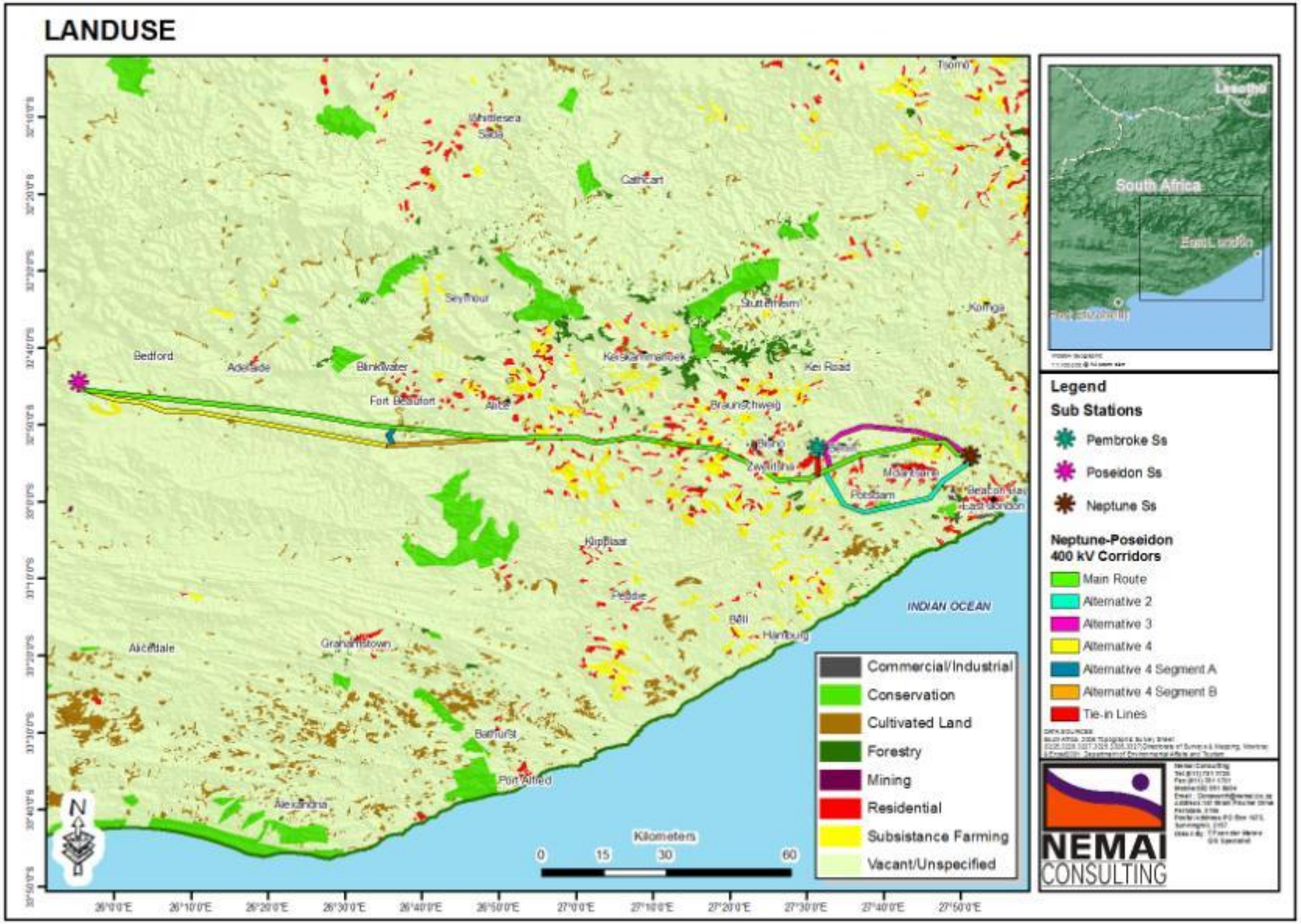


Figure 56: **Land use in project area**

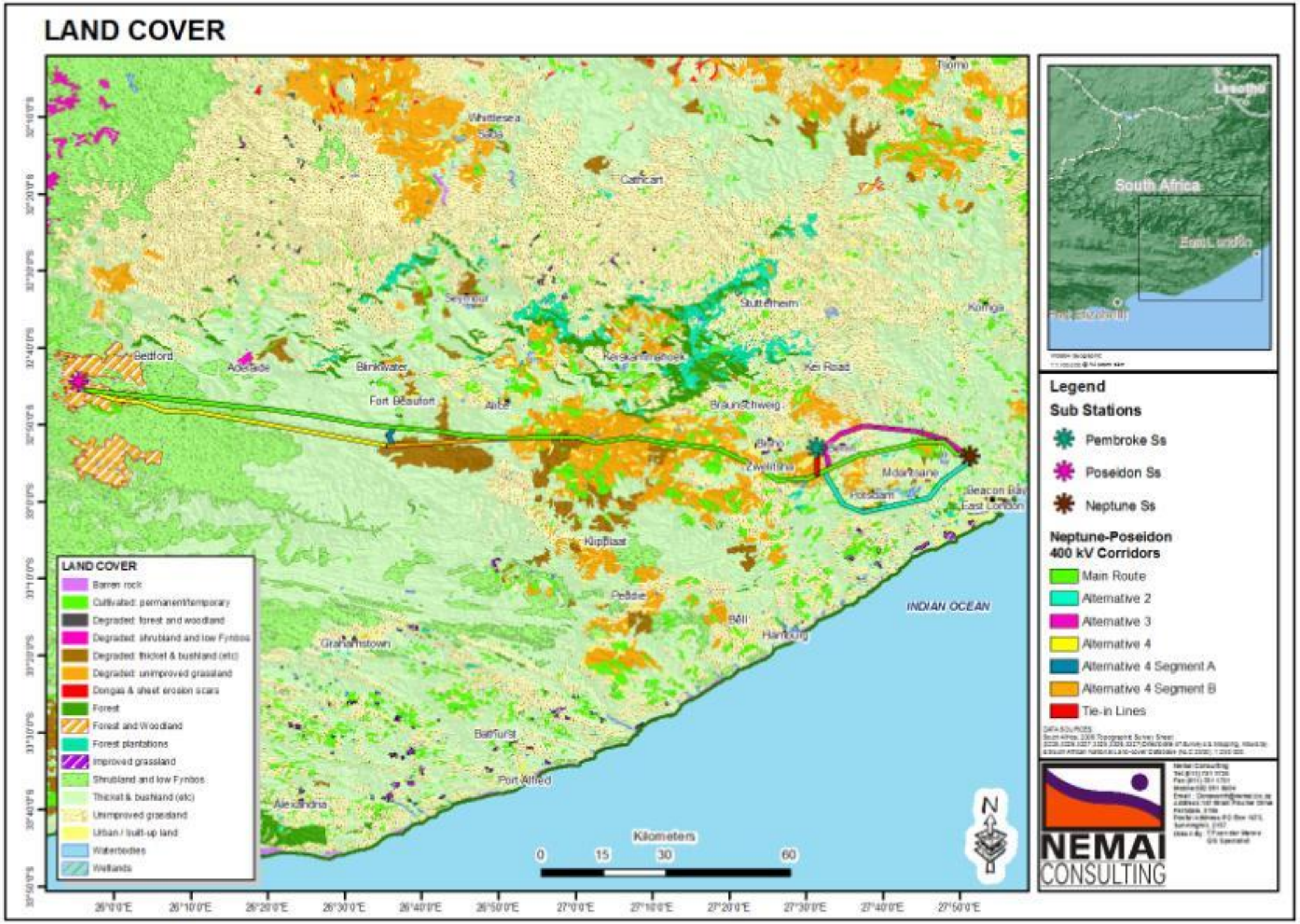


Figure 57: **Land cover in project area**

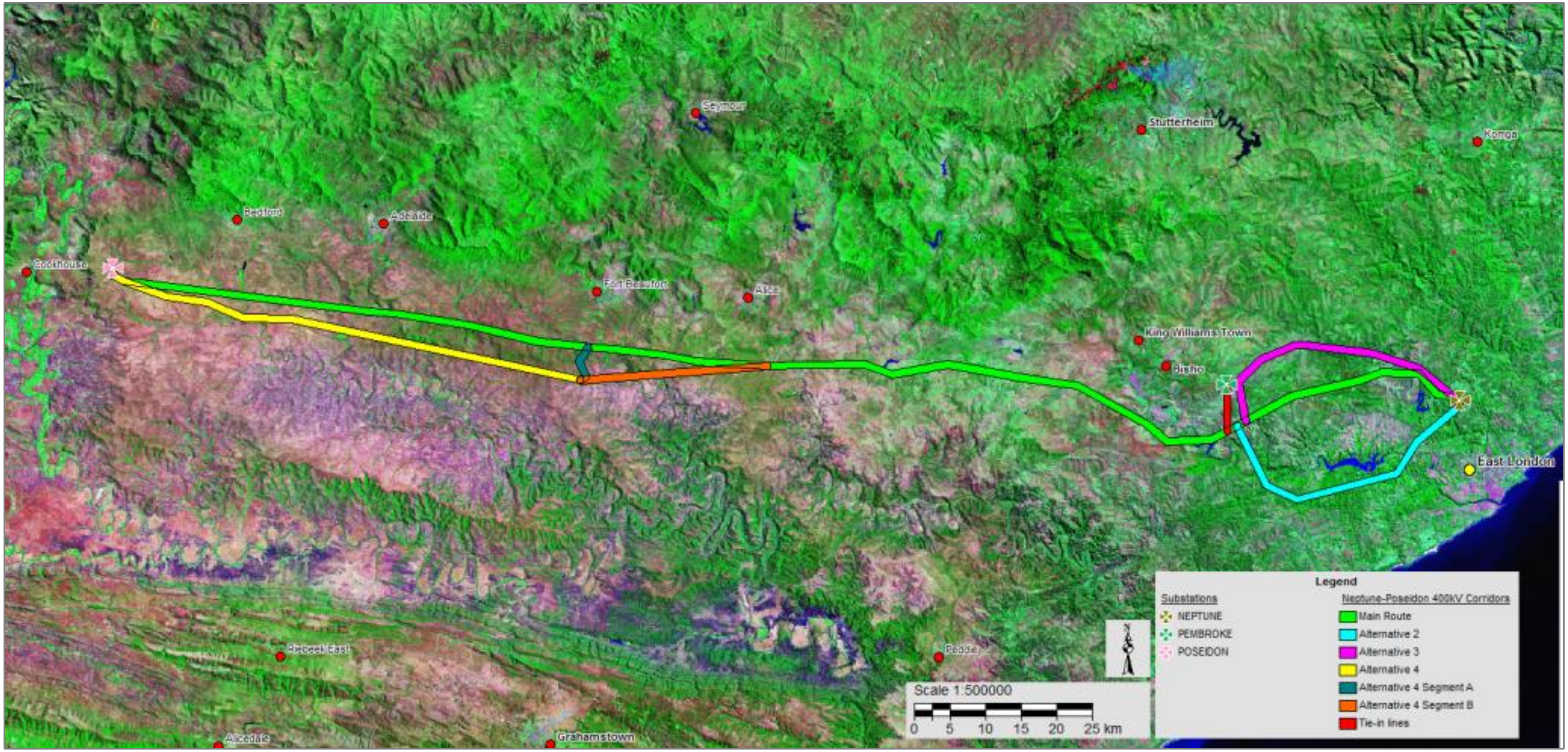


Figure 58: LandSat Imagery for project area

9.16 Tourism

A popular tourist route in Eastern Cape is the Amathole Mountain Escape, which stretches from Stutterheim in the west to Adelaide in the east, and includes Nkonkobe, Amahlathi and Nxuba Municipalities. The Fort Hare University, where Nelson Mandela and other notable African leaders received their education, is located in historical town of Alice.

Provincial nature reserves in the region (refer to **Section 9.7**) offer tourism opportunities. Ecotourism is also popular in the study area, with a number of privately owned game farms particularly in the western portion of the route. Various I&APs (mostly representing game farms) raised concerns regarding the impact of the project on the tourism industry.

The Visual Impact Assessment (***Appendix F4***) includes an appraisal of the project's impacts on tourists from an aesthetics perspective. According to this study, the entire project area is considered to have moderately-high tourism potential. Refer to the summary and impact assessment of this study contained in **Sections 10.4** and **11.7**, respectively. The Social impact Assessment (***Appendix F6***) and Economic Impact Assessment (***Appendix F5***) also evaluate (amongst others) the project's adverse social and financial impacts to tourism.

The EMP aims to address direct and indirect impacts to tourism due to the activities associated with the construction and maintenance of the transmission line.

10 SUMMARY OF SPECIALIST STUDIES

A crucial element of the Plan of Study for the EIA prepared during the Scoping phase was to provide the Terms of Reference for the requisite specialist studies triggered during Scoping. According to Münster (2005), a 'trigger' is "*a particular characteristic of either the receiving environment or the proposed project which indicates that there is likely to be an issue and/or potentially significant impact associated with that proposed development that may require specialist input*". The necessary specialist studies triggered by the findings of the Neptune-Poseidon 400kV Scoping process, aimed at addressing the identified key issues and compliance with legal obligations, include the following:

- Ecological Study (termed Faunal, Floral and Avifaunal Ecological Surveys);
- Heritage Impact Assessment;
- Agricultural Potential Assessment;
- Visual Impact Assessment;
- Economic Study; and
- Social Impact Assessment.

For the inclusion of the findings of the specialist studies into the EIA report, the following guideline was used: *Guideline for the review of specialist input in EIA processes* (Keatimilwe & Ashton, 2005). Key considerations included:

- Ensuring that the specialists have adequately addressed I&APs' issues;
- Ensuring that the specialists' input is relevant, appropriate and unambiguous; and
- Verifying that information regarding the receiving ecological, social and economic environment has been accurately reflected and considered.

The information obtained from the respective specialist studies was incorporated into the EIA report in the following manner:

7. The assumptions and limitations identified in each study were included in **Section 5**;
8. The information was used to complete the description of the receiving environment (**Section 9**) in a more detailed and site-specific manner;

9. A summary of each specialist study is contained in the sub-sections to follow, focusing on the approach to the study, key findings and conclusions drawn;
10. The evaluations performed by the specialists on the alternative routes were included in the comparative analysis (**Section 12**) to identify the most favourable option;
11. The specialists' impacts assessment, and the identified mitigation measures, were included in the overall project impact assessment contained in **Section 11**;
12. Specialist input was obtained to address comments made by I&APs that related to specific environmental features pertaining to each specialist discipline; and
13. Salient recommendations made by the specialists were taken forward to the final EIA Conclusions and Recommendations (**Section 14**).

10.1 Faunal, Floral and Avifaunal Ecological Surveys

Details of the nominated specialist:

Specialist	
Organisation:	Enviross Environmental Impact Studies CC
Name:	Mathew James Ross
Qualifications:	M.Sc – Aquatic Health (UJ). Presently completing a PhD – Aquatic Health (UJ).
No. of years experience:	6
Affiliation (if applicable):	• South African Society for Aquatic Scientists (SASAqS) • Aquatox Forum (Environmentek, CSIR)

This section provides a synopsis of the Faunal, Floral and Avifaunal Ecological Surveys for the Neptune-Poseidon 400kV power line project, as undertaken by Enviross (2011), which is contained in ***Appendix F1***.

The survey methodology included a comprehensive desktop review, utilising available provincial ecological data, relevant literature, Geographical Information System (GIS) databases, topographical maps and aerial photography. This was then supplemented through a ground-truthing phase, where pertinent areas associated with the various route alignment alternatives were visited during field surveys on two different occasions. This allowed for the assessment of the habitat and vegetation units that were identified during the desktop review.

Floral features are explained in the specialist report in terms of (see **Section 9.5**):

- Floral endemism;
- Vegetation types and floral community structures for each alternative route;
- Floral species of conservational concern, including –
  - RDL floral species - Acanthaceae – *Metarungia galpini* (Endangered) and Euphorbiaceae – *Euphorbia globosa* (Endangered);
  - Protected floral species - Cornaceae - *Curtisia dentata* (Near Threatened, Protected), Podocarpaceae - *Podocarpus falcatus* (Protected), Podocarpaceae - *Podocarpus latifolius* (Protected), Cappraceae - *Boscia albitrunca* (Protected), Pittosporaceae - *Pittosporum viridiflorum* (Protected), Sapotaceae - *Sideroxylon inerme* subsp. *inerme* (Protected);
- Orange listed floral species, including –
  - Zamiaceae - *Encephalartos caffer* (Near Threatened); Zamiaceae - *Encephalartos lehmannii* (Near Threatened); Amaryllidaceae - *Crinum campanulatum* (Near Threatened); Zamiaceae - *Encephalartos altensteinii* (Vulnerable); Fabaceae - *Umtiza listeriana* (Vulnerable); Stangeriaceae - *Stangeria eriopus* (Vulnerable); Amaryllidaceae - *Nerine huttoniae* (Vulnerable);
- Areas identified as ecologically sensitive for floral species of conservational concern.

The specialist study presents the findings for faunal features (see **Section 9.6**) in terms of:

- Mammals;
- Avifauna -
  - General avifaunal impacts;
  - Habitat units;
  - Avifaunal species diversity;
  - Impacts on avifauna within the survey area;
  - Proposed mitigation measures;
- Reptiles;
- Amphibians;

- Fish;
- Invertebrates -
    - Mygalomorph spiders; and
    - Butterflies.

The findings culminated in the ecological impact summary and the choice of the preferred power line route, which was based on the following (see **Section 11**):

- Avoids impacts on untransformed and ecologically sensitive habitat;
- Takes into consideration impacts on CBA's (terrestrial and aquatic);
- Will not create undue impacts on conserved areas;
- Is associated with similar existing infrastructure;
- Is associated with a greater proportion of already ecologically degraded areas;
- Avoid the greatest amounts of avifaunal migratory routes and will therefore require the least amount of mitigation;
- Where proposed mitigation measures will potentially have the greatest success in abating negative ecological impacts.

A sensitivity map (**Figure 69**) was produced that considered the following criteria:

- All protected areas are considered ecologically sensitive;
- Rocky ridges, wetlands, aquatic habitat and riparian areas are considered ecologically sensitive;
- Areas that have retained natural ecological features and are not suffering degradation are considered ecologically sensitive;
- Forest areas are considered ecologically sensitive due to the restricted distribution of this habitat unit.

Following completion of the desktop review and field survey, the following general conclusions were drawn:

- Much of the survey area is utilised for communal grazing areas and therefore has suffered land degradation through poor land management. Urbanisation, agriculture and other infrastructure development have also all contributed to land degradation within the survey area. Therefore the ecological significance of impacts emanating from the proposed development activities is thought to be largely insignificant in many areas;

- All route alternatives incorporate habitat units that would support a variety of faunal and floral species biodiversity to a greater or lesser extent – many of which are RDL;
- Impacts on biodiversity and habitat conservation can be successfully mitigated with the sincere efforts of the contractor and construction teams;
- Impacts on protected areas within the survey area should be avoided as far as possible and the route alternatives that would impact the least on protected areas should be preferred;
- The preferred route alternative, according to the least overall ecological impacts, has been proposed (see **Section 12**).
- For avifaunal impacts, mitigation measures following the confirmation of those areas that potentially require mitigation should include the marking of all sections of the lines that pass through migratory routes. It is also further recommended that routine surveys be undertaken once construction has been completed in order to identify any further avifaunal collision hotspot areas. The sections of line within these areas should also be marked. The walk-through survey will also enable the identification of nesting activity within the area of various RDL species. This will allow for mitigation and best practice guidelines to be followed to limit site disturbances.

It is recommended that a walk-through survey of the proposed line alternative be undertaken once a set route has been established. This should be done prior to the onset of the construction phase to survey the area in detail for any RDL species and to develop a comprehensive and pylon site-specific EMP to limit the impacts imposed by the proposed development activities. This is especially pertinent in the areas that have been designated as ecologically sensitive.

10.2 Heritage Impact Assessment

Details of the nominated specialist:

Specialist	
Name:	J van Schalkwyk
Qualifications:	D.Lit Ed.4 Anthropology
No. of years experience:	35
Affiliation (if applicable):	Association of Southern African Professional Archaeologists (ASAPA) - Registration No.: 168

This section provides a synopsis of the Heritage Impact Assessment (J van Schalkwyk, 2011), as contained in ***Appendix F2***.

The aim of the survey was to locate, identify, evaluate and document sites, objects and structures of cultural significance found within the corridors in which it is proposed to develop an electricity transmission line.

The cultural landscape qualities of the region essentially consist of two components. The first is a rural area in which the human occupation is made up of a pre-colonial element (Stone Age) as well as a much later colonial (Settler farmer) component. The second component is a semi-urban landscape dating to the colonial period.

The following heritage sites were identified in the study area (**Figure 59**):

- Pre-colonial archaeological sites dating to all phases of the Stone Age were found to occur in the study area. In some cases the impact of the development would only be indirect, e.g. the power line crossing over a site. In other areas of the proposed development, even though the impact will be focused on a particular node, i.e. tower positions or access/ inspection roads, it will give rise to the physical disturbance of the material and its context. This would result in irreplaceable loss of resources.
- Pre-colonial archaeological sites dating to all phases of the Iron Age are known to occur in the region, but none have been identified in the study area self. Similarly, in some cases the impact of the development would only be indirect, e.g. the power line crossing over a site. In other areas of the proposed development, even though the impact will be focused on a particular node, i.e. tower positions or access/ inspection roads, it will give rise to the physical disturbance of the material and its context. This would result in irreplaceable loss of resources.

- Colonial period or historic period heritage manifest in a wide variety. As the power lines are to cross a rural landscape for the most part, the impact would only be indirect, e.g. the power line crossing over a site. In other areas of the proposed development the impact will be focused on a particular node, i.e. tower positions or access/ inspection roads and will therefore give rise to the physical damage of the features or structures and its context.

Heritage sites are not only fixed features in the environment, occurring within specific spatial confines, but they are also finite in number. Avoiding of impacts on sites is therefore the preferred form of mitigation. In areas where a high density of sites occurs, if at all possible, exclusion zones where no development is to take place, should be set aside. If that is not possible, mitigation can only be achieved through archaeological investigation.

Based on the study, it is concluded that, from a heritage point of view, any of the identified routes or the alternatives would be suitable for development as the physical impact on heritage sites would be low and this can also be mitigated if necessary.

Therefore, for the project to continue, the following recommendations are made from a heritage perspective:

- The management measures set out in the Heritage Impact Assessment report should be implemented prior to construction taking place;
- A visual assessment of the route, taking the heritage sites into consideration, should be done in order to determine its possible impact on heritage tourism in the region;
- Mitigation should be based on avoiding of sites rather than anything else. In order to achieve this, a full “walk down” of the corridor must be done prior to construction taking place, to document all sites, features and objects, in order to propose adjustments to the routes and thereby to avoid as many impacts as possible; and
- No impact on heritage sites, features or objects can be allowed without a valid permit from SAHRA.

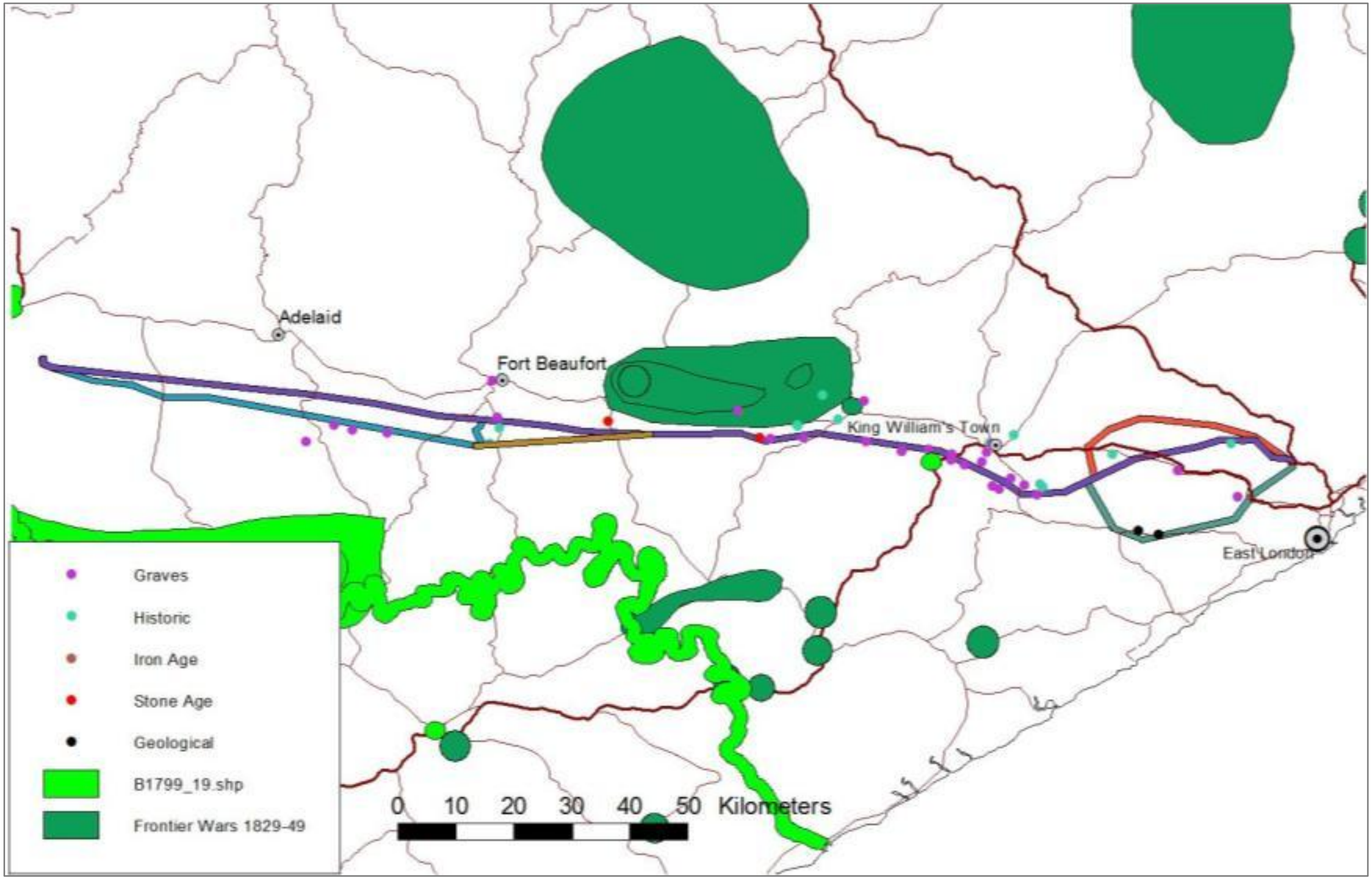


Figure 59: **Distribution of known sites of heritage significance**

10.3 Agricultural Potential Assessment

Details of the nominated specialist:

Specialist	
Organisation:	Terra Soil Science
Name:	J.H. van der Waals
Qualifications:	PhD Soil Science, Pr.Sci.Nat
No. of years experience:	13

Affiliation (if applicable):	• Member of:
	  ○ Soil Science Society of South Africa (SSSSA)
	  ○ Soil Science Society of America (SSSA)
	• Accredited member of:
	  ○ South African Soil Surveyors Organisation (SASSO)
	• Registered with:
	  ○ The South African Council for Natural Scientific Professions (Registration number: 400106/08)

A summary of the Agricultural Potential Assessment (Terra Soil Science, 2011), as contained in ***AppendixFG3***, follows.

A desk-top agricultural potential assessment was conducted for the proposed Neptune-Poseidon 400kV power line route (as well as its alternatives) in the Eastern Cape Province. The exercise entailed the accessing and interpretation of land type and climate data as well as satellite image interpretation.

The power line route traverses a range of terrain features and varying topography on a rough rainfall gradient with increasing rainfall from the west to the east. The soils along the route are predominantly formed from mudstone, shale, sandstone and dolerite and exhibit features of low rainfall environments in hilly terrain.

Land type data for the area comprising the route was obtained from the Institute for Soil Climate and Water (ISCW) of the Agricultural Research Council (ARC). The land type data is presented at a scale of 1:250 000 and entails the division of land into land types, typical terrain cross sections for the land type and the presentation of dominant soil types for each of the identified terrain units (in the cross section). The soil data is classified according to the Binomial System. The soil data was interpreted and re-classified according to the Taxonomic System.

The land types traversed by the power line routes (including alternatives and substations) are provided in **Table 38**.

Table 38: Land types traversed by each power line route and alternative in sequence from west to east (Terra Soil Science, 2011)

Power Line Route	Land Types
Main Route (west to east – Poseidon to Neptune)	Db167, Fc537, Fc543, Fc607, Fb380, Fc559, Fc557, Fb818, Fb819, Ae380, Fb820, Fb821, Bd78, Fb826, Bd79, Fb827, Fa1155, Fb825, Fa1157, Fa413, Ea395, Fa438, Fa265, Ia121, Fa416 and Fa415
Route 2	Fa1157, Fa413, Ea171, Fa1057, Fa949, Ea395, Db184, Ea174 and Fa415
Route 3	Fa1157, Ea395, Fb438, Fa265, Ia121, Fa416 and Fa415
Route 4 and 4(2)	Db167, Fc537, Fc543, Fb387, Fc557, Fb380 and Fc559
Turn-in Lines	Fa1157, Fb438
Poseidon Substation	Db167
Pembroke Substation	Fb438
Neptune Substation	Fa415

The rainfall increases from around 400 mm per year in the west to around 700 mm per year in the east. The rainfall is somewhat erratic but falls mainly in the summer months (November to April).

From the Google Earth images it is clear that the land covered by the western and central sections of the route is used for extensive grazing. The eastern part of the route (and especially Route 2) is characterised by an increase in forestry activities towards the east.

The following conclusions are made regarding the routes:

- The agricultural potential along the route is low to very low due to the dominance of shallow and duplex soils on moderate to steep slopes in undulating and hilly terrain;
- Agricultural potential can increase with the increasing rainfall towards the east but soil constraints exist along the entire route;
- The agricultural potential along Alternative 2 is slightly better than along the other routes and this is indicated by the increase in forestry activities towards the east;

- The climate along the route is of such a nature that rainfall is limiting for dryland agriculture along the western and central sections of the route. The rainfall increases to the east with a resultant slight increase in crop production potential. The soils along all the routes have very little storage capacity of plant available water and the rainfall's effectiveness is therefore decreased (as compared to areas with similar rainfall but sandier and deeper soils);
- It is anticipated that the impact of the power line pylons will be minimal on the agricultural potential of the land along the route. Erosion control measures have to be instituted for each of the pylon construction and erection sites as the soils are highly erodible and unstable, especially once the surface soil, vegetation and plant cover is influenced and compromised;
- The bulk of the soils along the route are not suited to irrigation (save for a few areas of deep soils in alluvial deposition settings) as many have dispersive properties as inherited from the parent materials and dry climate as well as occurring on moderate to steep slopes; and
- The most suitable land use along the bulk of the route is properly controlled extensive grazing. Towards the east the suitability of forestry production increases.

10.4 Visual Impact Assessment

Details of the nominated specialist:

Specialist	
Organisation:	Axis Landscape Architecture
Name:	Gerhard Griesel
Qualifications:	Masters Degree In Landscape Architecture (University of Pretoria); ML(Prof)
No. of years experience:	6
Affiliation (if applicable):	Member of the South African Council of Landscape Architects (SACLAP)

This section provides a synopsis of the Visual Impact Assessment (Axis Landscape Architecture, 2011), as contained in ***Appendix F4***.

The following project components will occur during the construction and operational phases of the project and are identified as elements that may cause a potential landscape and/or visual impact:

- Construction camps and lay-down yards;
- Access roads;
- Upgrading of the two Substations; and
- Transmission line.

Of the four project components, the towers of the transmission line are expected to cause the greatest impacts.

The study area is characterised by a rolling, undulating landscape with high topographic variation. Drainage lines meander through to the study area and cause shallow incisions where it meets up with rivers. The study area consists of vacant, uninterrupted land as well as cultivated, residential areas, subsistence farming and forestry. Extensive game and stock farming is located more to the western side of the study area with scattered citrus farms in the central parts. Subsistence farming activities are more intense from the central to eastern side of the study area where the cultural homelands is located. Human settlements are scattered throughout the study area and the landscape is degraded around these settlements.

The sensitivity of the landscape character is an indication of "…the degree to which a particular landscape can accommodate change from a particular development, without detrimental effects on its character". The majority of the study area is considered to have a *moderate* landscape character sensitivity due to the relative undeveloped and pristine condition of the landscape, the generally high visual quality and the related tourism value that is placed on the visual resource. High terrain variability occurs through of the study area where a moderate Visual Absorption Capacity (VAC) can be expected. Generally the vegetation cover is limited to medium to low shrubs and trees covers which will provide limited visual screening for the proposed transmission line. The landscape character is considered moderately susceptible to change, whether it is a low intensity change over an extensive area or an acute change over a limited area. Generally, the vegetation occurring in the study area is not resilient and recovers very slowly from surface disturbances. This often results in long periods of exposed soil and a reduction in visual quality.

Previous human induced activities and interventions have negatively impacted the original landscape character of the different landscape types. In this case the human settlements with their subsistence farming and existing infrastructure, including transmission lines, roads, etc., can be classified as landscape disturbances and elements that cause a reduction in the condition of the affected landscape type and detrimentally affect the quality of the visual resource.

Landscape impacts are alterations to the fabric, character, visual quality and/or visual value which will either positively or negatively affect the landscape character. During the construction and operational phases, the project components are expected to impact on the landscape character of the landscape types it traverses. Refer to **Section 11.7** for a summary of the anticipated landscape impacts that may occur as a result of the construction of the transmission line.

Within the receiving environment, specific viewers (visual receptors) experience different views of the visual resource and value it differently. They will be affected because of alterations to their views due to the proposed project. The visual receptors are grouped according to their similarities. The visual receptors included in this study are:

- Residents;
- Tourists; and
- Motorists.

The landscape type, through which the transmission line crosses, can mitigate the severity of visual impact through topographical or vegetative screening. In some cases the tower may dominate the view for example, silhouetted against the skyline, or in some cases be absorbed in the landscape. A complex landscape setting with a diverse land cover and topographical variation has the ability to decrease the severity of visual impact more than a mundane landscape.

Generally, the study area is moderately populated, especially the informal settlements and farming communities. These communities are normally situated along main transportation routes or adjacent to rivers or water resources. The major towns have been identified in the visibility analysis as places that will experience intrusive views are:

- East London;
- King William's Town;
- Alice;
- Fort Beaufort;
- Adelaide; and
- Bedford.

Numerous other small villages and farm residents will experience an intrusion on their view due to the presence of the proposed transmission line. It is unpractical to discuss all, but they are recognized as the general population of the study area and are identified as affected visual receptors. Some of the residents in the study area are farm residents, which are sparsely scattered across the study area. Residents of the affected environment are classified as visual receptors of *high* sensitivity owing to their sustained visual exposure to the proposed development as well as their attentive interest towards their living environment.

The study area is renowned for its biodiversity and undulating landscapes. These characteristics provide the basis for the tourism industry which plays a major role in the economy of the Eastern Cape Province. The entire study area is considered to have moderately-high tourism potential.

The major routes in the study area are the R63, N2, N6 and R67 connecting the towns and human settlements. The secondary and tertiary roads are a loose network of gravel roads linking smaller settlements and farms. These road networks in the study area carry a much lower volume of motorists. Their duration of views will be temporary and it is expected that the visual intrusion that they will experience will be low. For this study only motorists using the main routes were considered as there are many countless smaller roads within the study area.

Figure 60 - 67 reflect the results of a visibility assessment, carried out using GIS software. The results provide a clear interpretation of the extent of the visual Influence of the project. Due to the scale of the project, only certain sections of the proposed power line will be visible throughout the study area. The topography provides moderate VAC to visually screen the components of the project and it can therefore be stated that the general visibility of the project will be moderate.

The anticipated visual impacts on residents, tourists and motorists are discussed under **Section 11.7**. The study draws the following conclusions:

- **Landscape impacts:** The greatest landscape impact of the proposed alignments is in the construction phase on sensitive landscape types. The operational phase is characterised by a *moderate* landscape impact on a regional scale on the proposed alignments.
- **Impacts on residents:** The severity can be reduced in both the construction and operational phases through mitigation measures.
- **Impacts on tourists:** The tourism value for the study area is very high**.** Both the construction and operational phases are characterised with a *moderate* visual impact reduced to low with mitigation.
- **Impacts on motorist:** *Low* impacts on motorists are expected in both the construction and operational phases.

The alternative alignments were evaluated against international accepted criteria to determine the impact they will have on the landscape character and the viewers that have been identified in the study area. Refer to **Section 12.2** for the visual appraisal of the alternative alignments.

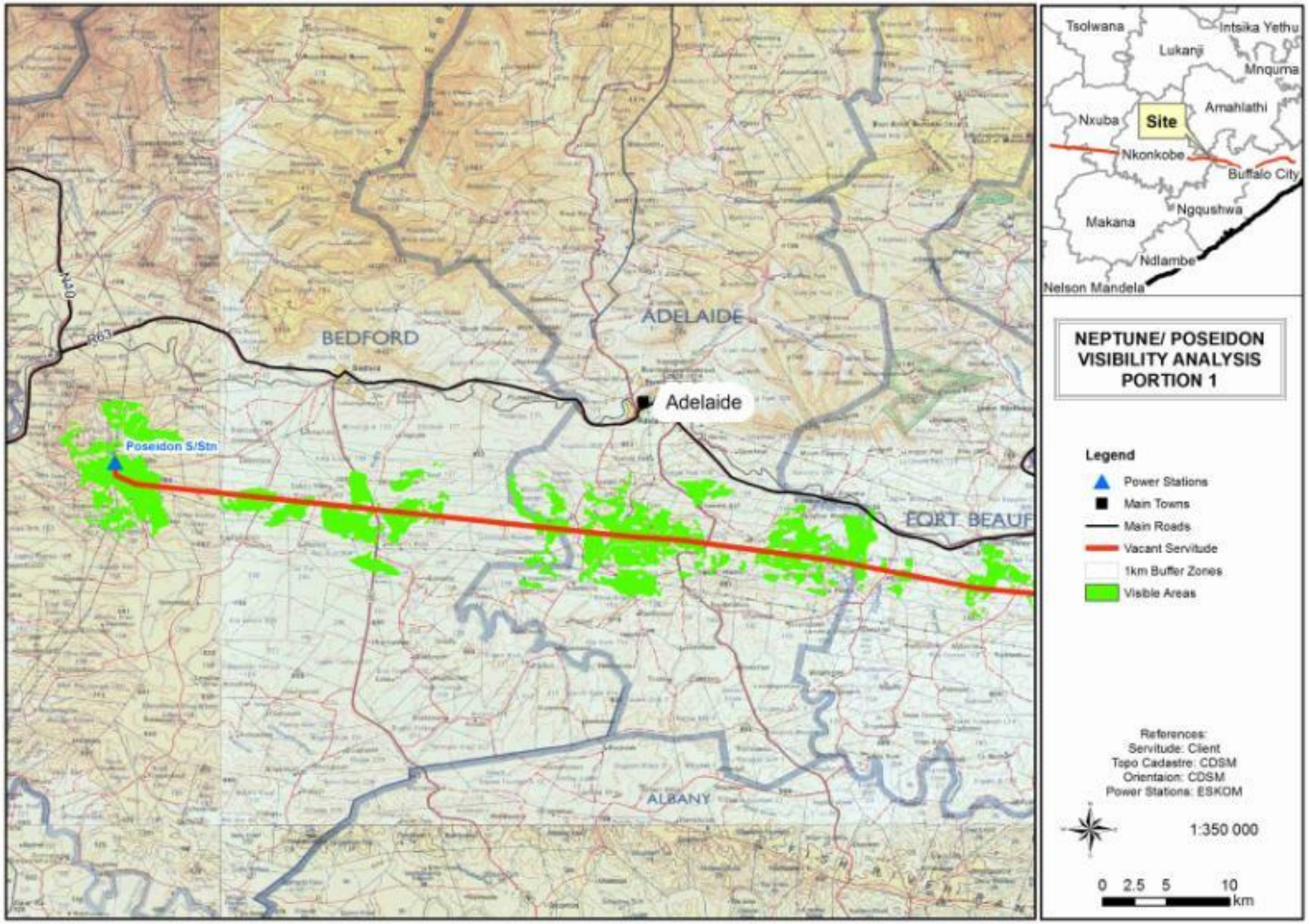


Figure 60: **Visibility Analysis – Main Route (Section 1)**

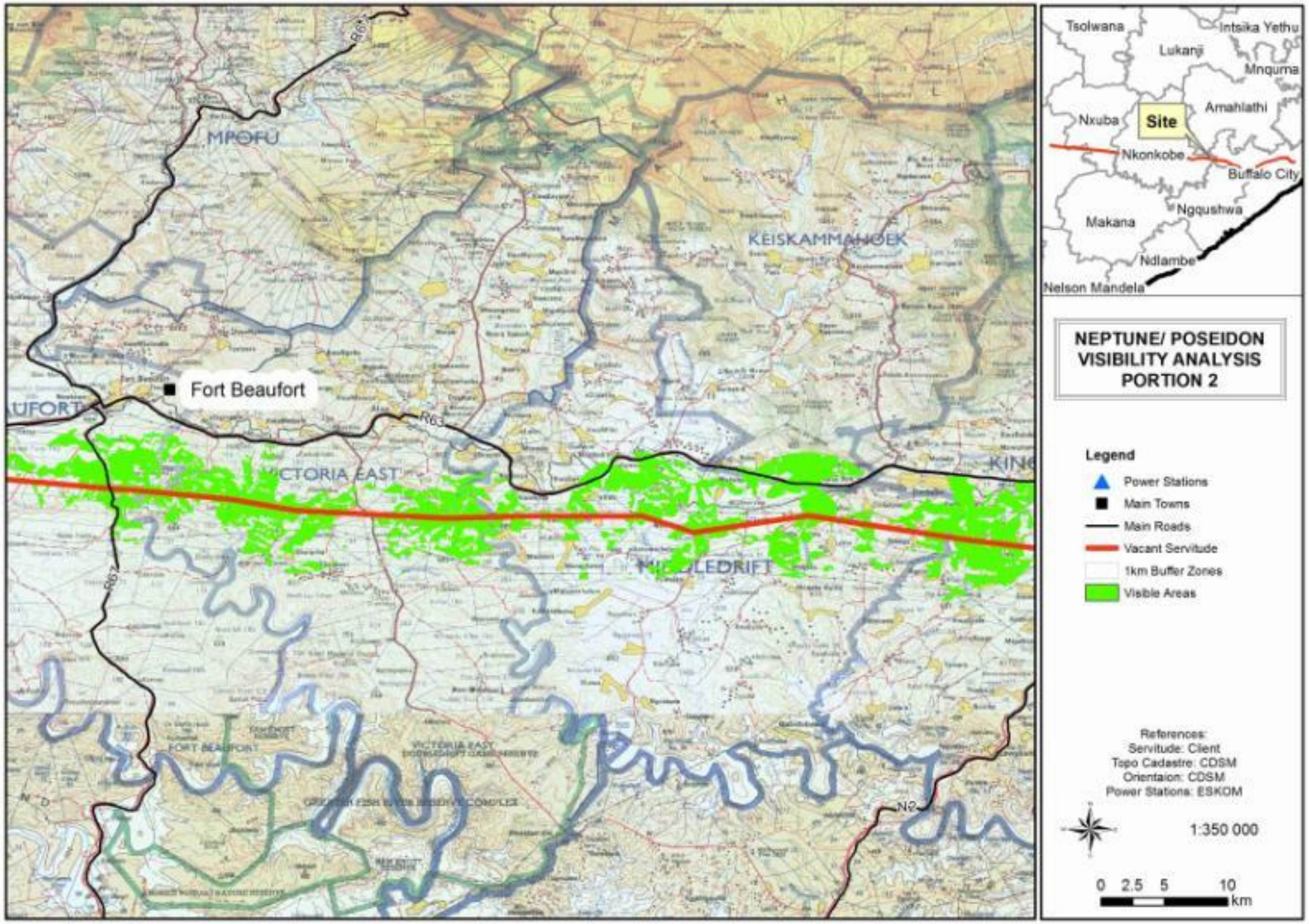


Figure 61: **Visibility Analysis – Main Route (Section 2)**

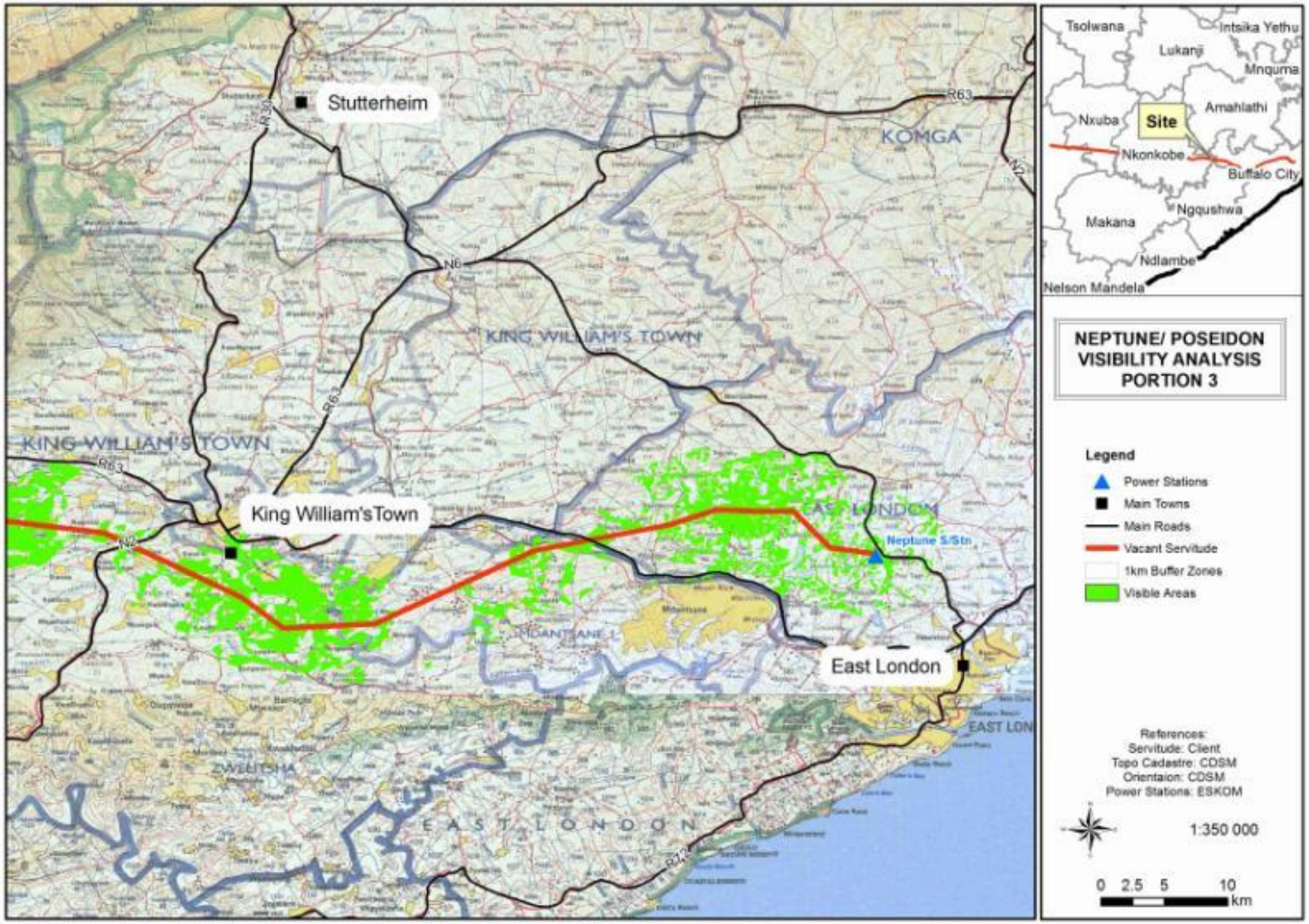


Figure 62: Visibility Analysis – Main Route (Section 3)

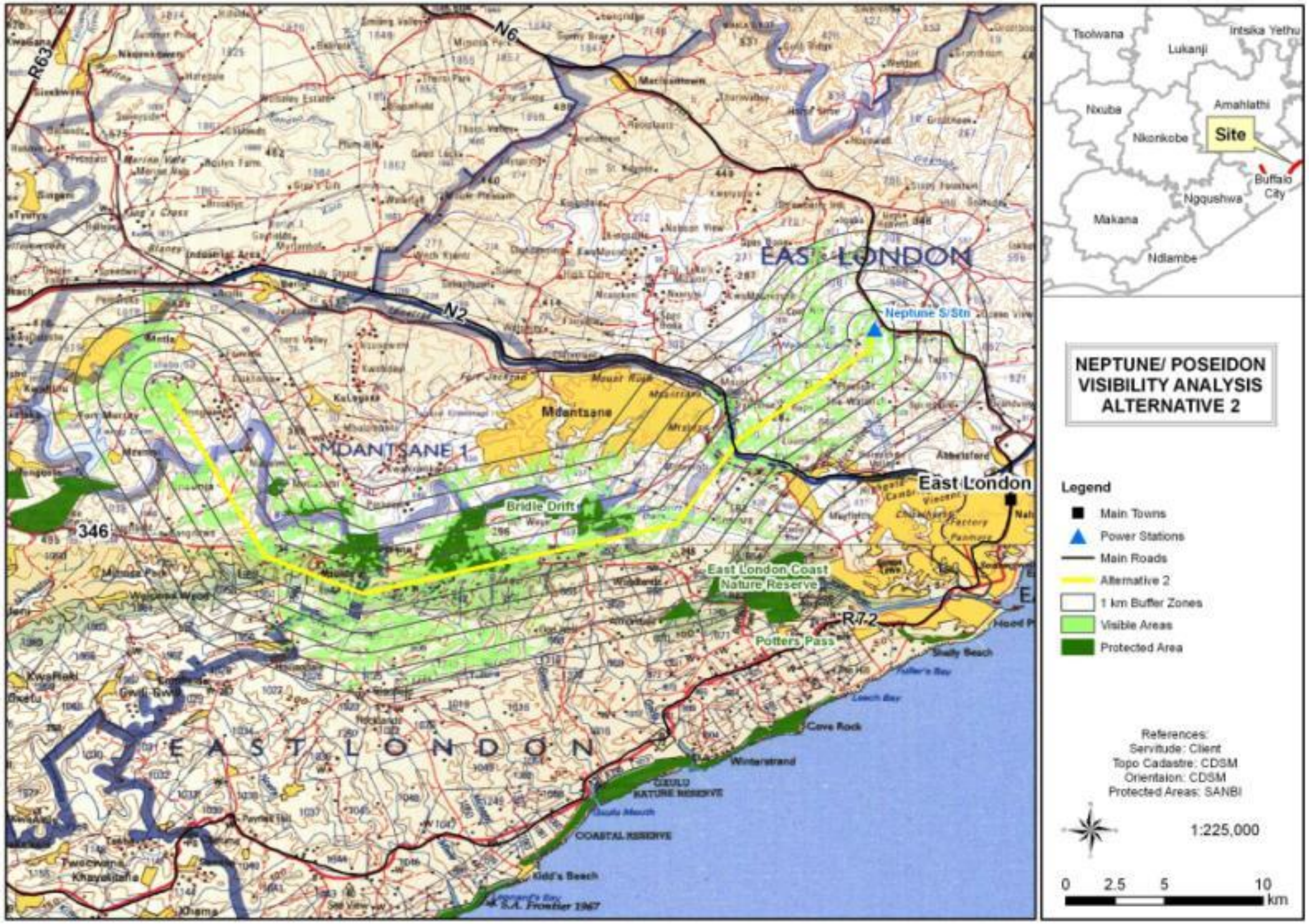


Figure 63: Visibility Analysis – Alternative 2

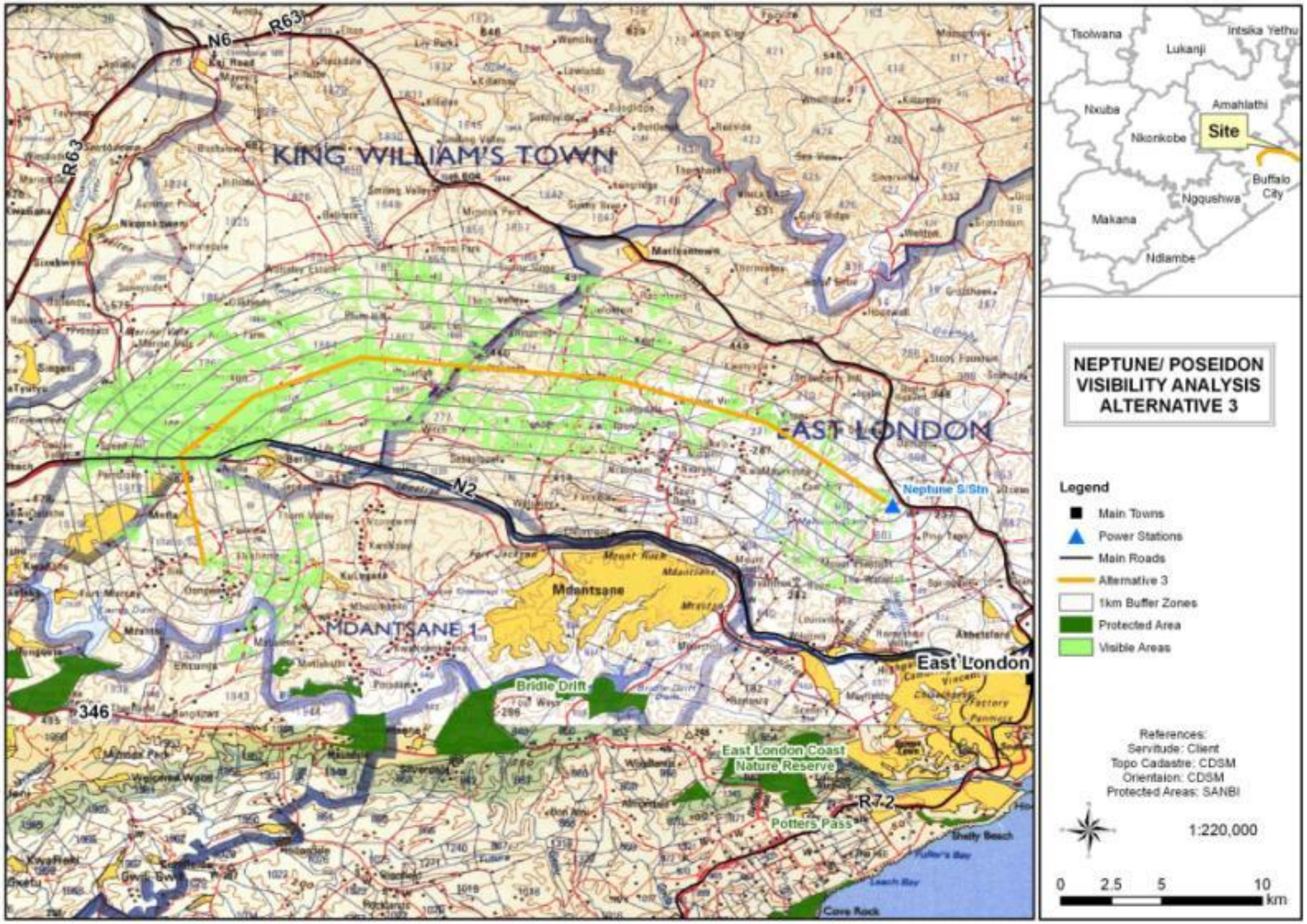


Figure 64: **Visibility Analysis – Alternative 3**

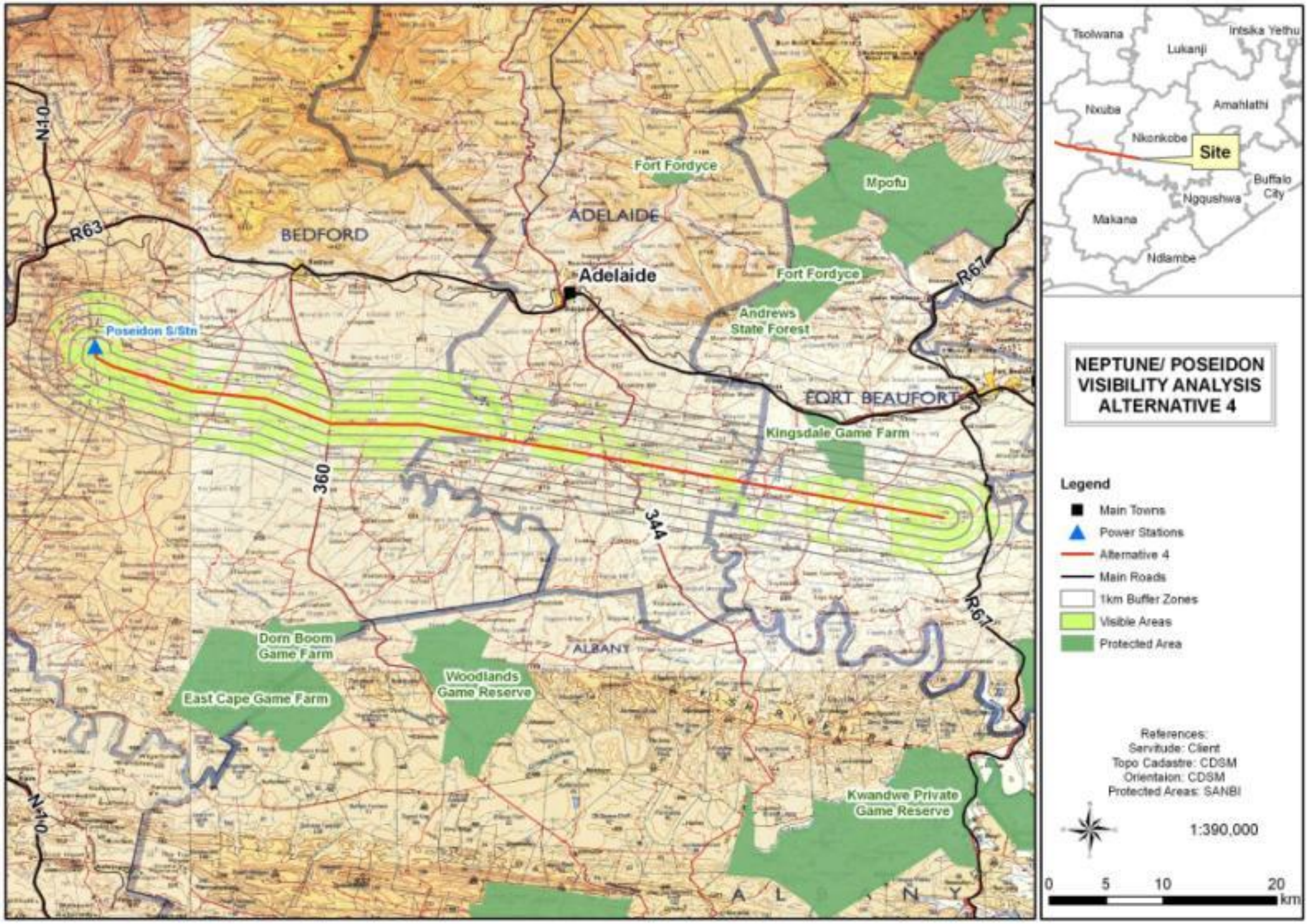


Figure 65: Visibility Analysis – Alternative 4

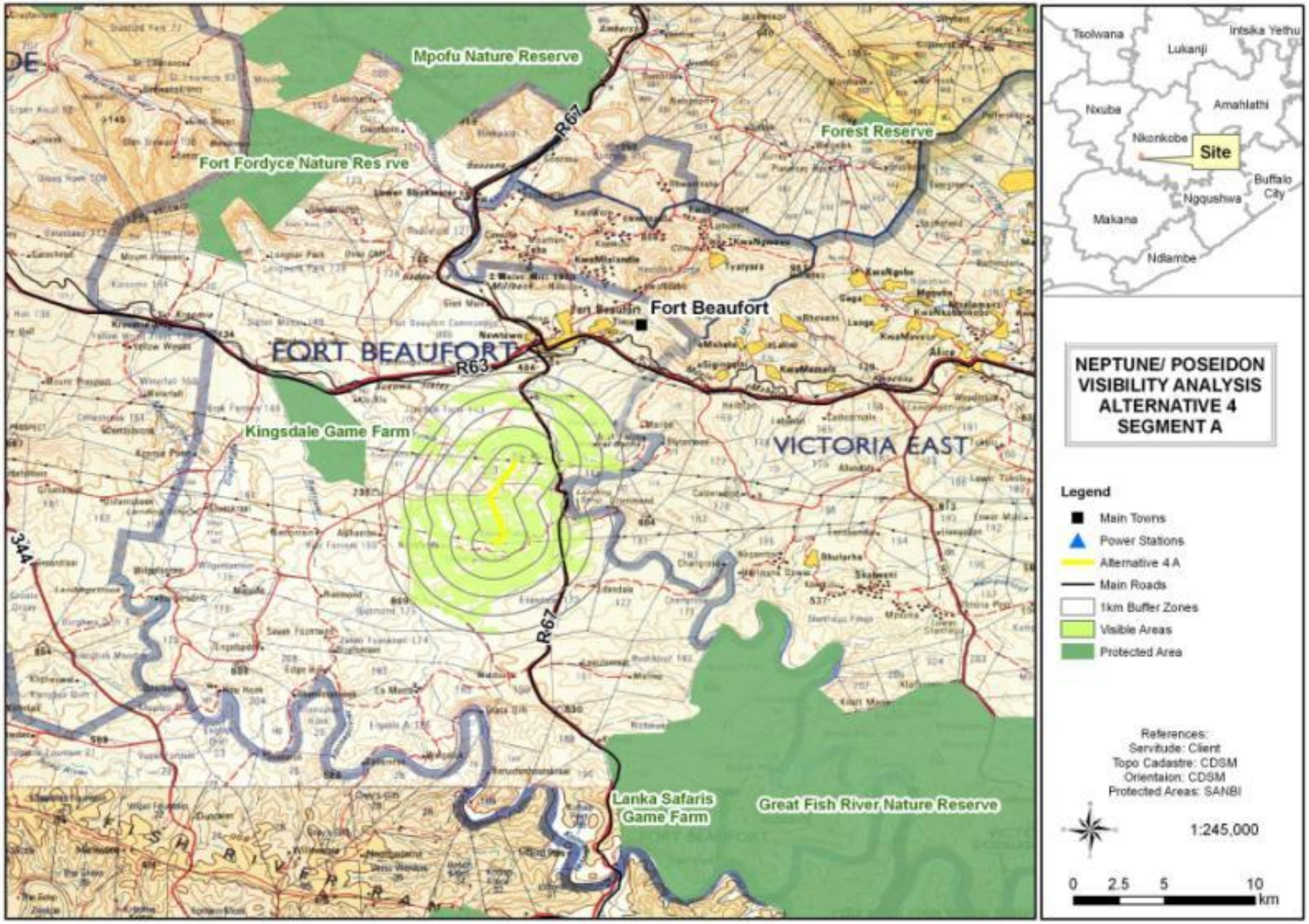


Figure 66: Visibility Analysis – Alternative 4 Segment A

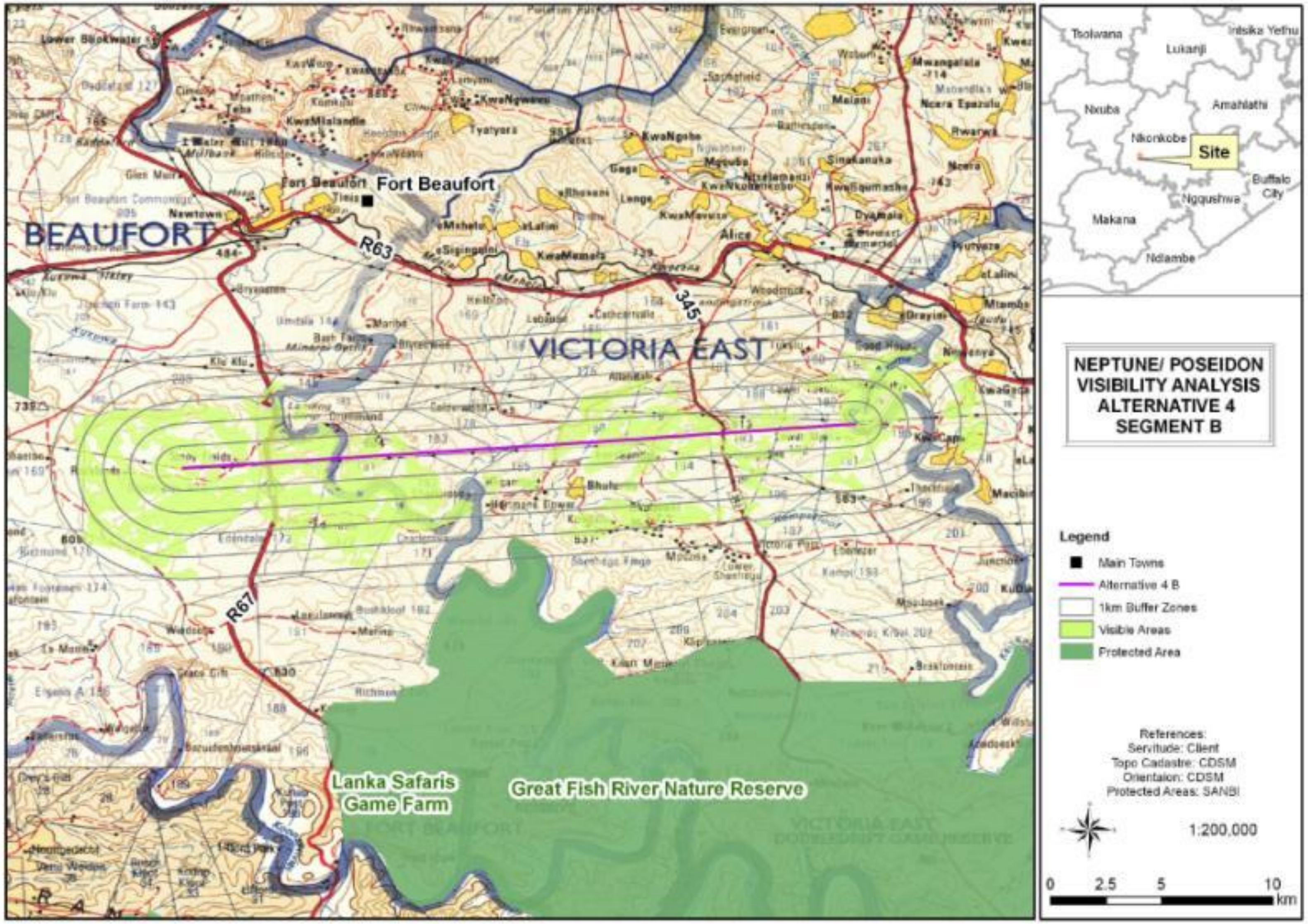


Figure 67: **Visibility Analysis – Alternative 4 Segment B**

10.5 Economic Study

Details of the nominated specialist:

Specialist	
Organisation:	Nemai Consulting
Name:	Ciaran Chidley
Qualifications:	• BSc Eng (Civil) • BA (Economics) • MBA
No. of years experience:	11
Affiliation (if applicable):	N/A

A summary of the Economic Study, as contained in ***Appendix F5***, follows.

The economic study started by providing insight into the economic structure of the areas under which the lines and sub-stations fall. Aspects such as basic population demographics, employment rates, household income, the industrial sector in which residents worked, their education rates and their occupations. The results of this portion of the study found that the populations were generally youthful with low employment levels, at 32% of the workforce. Education levels were generally low, with 44% of inhabitants having not entered secondary schools. One of the most important industries was agriculture which employed about 42% of the people in the study area, followed by private households with about 14% of the total employment. Other sectors of note were wholesale and retail trade, business and financial services and community and personal services. With regards the general occupations found in the study areas, the most common category was the manual labourer, followed by three levels of semi-skilled and skilled workers. Together these occupations averaged between 60-70% of the occupations practiced in the study area.

A macro econometric model was then used to determine the impacts of the project on the provincial economy of the Eastern Cape. The model was an input/output model capturing the sectoral inter-relationships between the various components of the provincial economy. The results of this aspect of the study demonstrated the project's impacts on the provincial economies through direct, indirect and induced impacts.

The study identified and assessed seven economic impacts that required mitigation. The seven are as follows:

1. Economic benefits of improved electricity supply;
2. Loss of income from agricultural land;
3. Loss of income from tourism and leisure;
4. Loss of property value;
5. Damage to Property;
6. The economic impacts of relocation; and
7. Employment and skills transfer during the construction phase.

The study concludes by recommending which route alternatives would have the lowest economic impact. The study supports the conclusion that the transmission lines serve the public good and is of the opinion that the major economic impacts can be mitigated with proper planning, especially around land rights issues and the management of businesses impact along the routes. The study further recommends that local labour be used during construction as far as possible and that the contractor implements a workplace skills programme.

10.6 Social Impact Assessment

Details of the nominated specialist:

Specialist	
Organisation:	Dr. Neville Bews & Associates
Name:	Neville Bews
Qualifications:	• BA (Hons) • Henley Post-Graduate certificate in Management (United Kingdom) • MA (cum laude) • D. Litt et Phil
No. of years experience:	Over 25 years in Human Resource Management and 10 in Social Impact Assessments
Affiliation (if applicable):	International Association of Impact Assessors South Africa IAIAsa

This section provides a summary of the Social Impact Assessment) (Dr Neville Bews & Associates, 2011), as contained in ***Appendix F6***.

The project area is characterised by relatively high levels of HIV prevalence amongst antenatal women, at 27.1% in the Amatole district in 2009, with a lower level of 24.3% in the district of Cacadu. The Eastern Cape Province had an HIV prevalence rate of 28.1% in 2009 while that of South Africa stood at 29.4%. There were high levels of unemployment in the Nxuba Local municipality at 35% while Blue Crane Route had the lowest level of unemployment at 15.3%. There are also a high percentage of people with no income across the route with Nkonkobe registering the highest percentage at 68.2% and Blue Crane Route the lowest at 44.8%. In respect of overall service delivery assessed in 2009, Blue Crane Route and Buffalo City fared the best with both the Ngqushwa and Nkonkobe local municipalities underperforming and there being no assessment data for the Nxuba Local Municipality.

Based on the project description, the social baseline study and analysis of the focus groups, meetings with I&APs and various submissions, the following 20 social impacts were identified (see **Section 11.9**):

- Access across site;
- Access to servitude across private property;
- Crime and security;
- Disturbance of cultural, spiritual and religious sites;
- Economic effects at a micro level;
- Economic effects at a macro level;
- Fencing;
- Fire hazards;
- Health issues related to electromagnetic fields (EMFs);
- Impact on farming operations;
- Job creation;
- Noise;
- Resettlement;
- Safety hazards for people and animals;
- Services and infrastructure;

- SMME opportunities;
- STDs, HIV and AIDS risk;
- Social instability;
- Visual impact and disturbance of sense of place;
- Traffic disruption during construction and maintenance;
- Assessment of alternatives; and
- Do nothing alternative.

In respect of these impacts it was found that most related to the construction phase of the project and that many of these impacts could be reduced through appropriate mitigation measures being applied. Of the more serious impacts were those relating to the operational phase of the project and associated with health issues and property values.

The exposure of people and animals to electromagnetic fields and the potential decline in property values, associated with both electromagnetic fields and the visual impact of the transmission line, were identified as the being the most serious of all impacts identified in association with the proposed power line. However, what was also clear was that there is a scarcity of suitable sites on which to place new infrastructure, such as electrical transmission lines, and that to ignore this difficulty would raise the risk of neglecting to upgrade existing power grids and would ultimately jeopardise the security of a reliable national electricity supply grid.

Consequently, it is quite clear that the 'do nothing' option is inappropriate and that a workable compromise would need to be found. Through such a compromise a balance would need to be established between the requirement of upgrading existing infrastructure and the interests of the people that would be affected by such action.

Refer to **Section 12.2** for an overview of the socially preferred route, as part of the comparative analysis of the alternative alignments.

11 IMPACT ASSESSMENT

11.1 Overview

This section focuses on the pertinent environmental impacts that could potentially be caused by the proposed Neptune-Poseidon 400kV transmission line during the pre-construction, construction and operation phases of the project.

The impacts to the environmental features are linked to the project activities, which in broad terms relate to the physical infrastructure (emphasis on construction and operation stages). Impacts were identified as follows:

- An appraisal of the project description and the receiving environment;
- Impacts associated with listed activities contained in GN No. R386 and R387;
- Issues highlighted by environmental authorities;
- Findings from specialist studies; and
- Comments received during public participation.

11.1.1 Impacts associated with Listed Activities

As mentioned, the project requires authorisation for certain activities listed in the EIA Regulations (2006), which serves as triggers for the environmental assessment process. The impacts associated with the key listed activities follows (note that list is not exhaustive – refer to complete list under **Section 3.1**).

The potential impacts linked to the listed activities are then addressed in the subsequent sections.

Table 39: Impacts associated with the key listed activities

GN No. R. 386 of 21 April 2006		
Listed Activities		**Potential Impact Overview**
1(m)	The construction of facilities or infrastructure, including associated structures or infrastructure, for any purpose in the one in ten year flood line of a river or stream, or within 32 metres from the bank of a river or stream where the flood line is unknown, excluding purposes associated with existing residential use, but including - canals; channels; bridges; dams; and weirs.	• Effects to resource quality (i.e. flow, habitat, biota and water quality) associated with watercourse crossings / erecting the towers in close proximity to watercourses.
4	The dredging, excavation, infilling, removal or moving of soil, sand or rock exceeding 5 cubic meters from a river, tidal lagoon, tidal river, lake, in-stream dam, floodplain or wetland.	• Effects to resource quality (i.e. flow, habitat, biota and water quality) associated with watercourse crossings / erecting the towers in close proximity to watercourses.
7	The above ground storage of a dangerous good, including petrol, diesel, liquid petroleum gas or paraffin, in containers with a combined capacity of more than 30 cubic metres but less than 1 000 cubic metres at any one location or site..	• Pollution of bio-physical environment through poor practices associated with onsite storage of dangerous goods.
12	The transformation or removal of indigenous vegetation of 3 hectares or more or of any size where the transformation or removal would occur within a critically endangered or an endangered ecosystem listed in terms of section 52 of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004).	• Adverse impacts associated with the installation of the transmission line in sensitive, threatened or protected ecosystems.
14	The construction of masts of any material or type and of any height, including those used for telecommunication broadcasting and radio transmission.	• Ecological, social and economic impacts associated with the project life-cycle of the proposed transmission line.
15	The construction of a road that is wider than 4 metres or that has a reserve wider than 6 metres excluding roads that fall within the ambit of another listed activity or which are access roads of less than 30 metres long.	• Access roads to the construction site, borrow pits and construction camps. In most cases, access is easily available from existing road network and access road alongside Exxaro pipeline.
GN No. R. 387 of 21 April 2006		
Listed Activities		**Potential Impact Overview**
1(c)	The construction of facilities or infrastructure, including associated structures or infrastructure, for the above ground storage of a dangerous good, including petrol, diesel, liquid petroleum gas or paraffin, in containers with a combined capacity of 1 000 cubic metres or more at any one location or site including the storage of one or more dangerous goods, in a tank farm.	• Pollution of bio-physical environment through poor practices associated with onsite storage of dangerous goods.
1(l)	The construction of facilities or infrastructure, including associated structures or infrastructure, for the construction of facilities or infrastructure, including associated structures or infrastructure for the transmission and distribution of above ground electricity with a capacity of 120 kilovolts or more.	• Ecological, social and economic impacts associated with the project life-cycle of the proposed transmission line. .
2	Any development activity, including associated structures and infrastructure, where the total area of the developed area is, or is intended to be, 20 hectares or more.	• Impacts associated with the overall physical footprint of the project infrastructure (including pipeline, chambers, BPR, pump station).

11.1.2 Issues raised by Environmental Authorities

The issues highlighted by authorities (both regulatory and commentory) during meetings and contained in correspondence received (refer to ***Appendix K***) are captured in the table to follow.

Table 40: Issues raised by Regulatory and Commentory Authorities

Authority	Issues Raised	Response / Proposed Resolution
Councillors	Nkonkobe Municipality Meeting (11 June 2009)	
	Public participation in the rural areas	Public meetings held in rural areas and meetings to be convened with Traditional leaders.
	Compensation for affected parties	Compensation will be undertaken in the following instances: • Widening of servitude; • Damages caused by contractor; • Moving of structures.
	Benefits to the community	Benefits are as follows: • Labour (unskilled) will be sourced from local communities. • More electricity will be supplied by Eskom for municipalities.
	Access needed to be controlled to prevent loss of livestock during construction.	Access negotiations to be undertaken. EMP to include mitigation measures associated with access roads and safeguarding of livestock.
Traditional Leaders	Meeting (02 July 2009)	
	• Notification period • Notification of people living in the traditional areas • Opportunity to participate	• Individual meeting with Traditional Leaders • Meetings with affected Villages • Notification of chiefs • EIA process and timeframes explained • Public participation process explained
Eastern Cape Parks Board	Reply Forms (15 April – 29 July 2009)	
	Requested copy of the Scoping Report and specialist studies, in particular the Ecological Study, Heritage Impact Assessment and Visual Impact Assessment	Copies of reports to be submitted to Eastern Cape Parks Board.
Eastern Cape Roads and Transport – Mthatha	Reply Forms (15 April – 29 July 2009)	
	Project supported	Noted
Eastern Cape DWA	Reply Forms (15 April – 29 July 2009)	
	Concern for sensitive water environments. River crossings, wetlands etc	Impacts and mitigation measures related to water resources included in EIA Report.

Authority	Issues Raised	Response / Proposed Resolution
SAHRA	Reply Forms (15 April – 29 July 2009)	
	SAHRA to review Heritage Impact Assessment	Copy of EIA Report to be provided to SAHRA.
SANRAL	Reply Forms (15 April – 29 July 2009)	
	• Ensure that SANRAL's prior consideration and approval is acquired. • Eskom to provide SANRAL with details of the crossing points before they are finalised. • Parts of the N2 will still require future upgrading work and the planned crossings will have to accommodate these needs. • Indicate that no tower pole or stay shall be erected within a distance of 60m, measured from the national road reserve boundary. • Allow for a vertical clearance of not less than 7.5m, measured from the crown of the national road to the lowest wire. • Eskom to bear the cost of any potential shifts or relocation required as a result of widening of the road and road construction work and maintenance. • Eskom needs to maintained towers, poles and overhead wires at its own cost and provide the necessary precautions to ensure safety. • Eskom indemnify SANRAL against, and hold it harmless from any claims and damages as a result of the proposed development. • No permanent entrance or exit from the national road shall be permitted. • SANRAL shall not be responsible or liable for any financial expenditure or loss in the event that SANRAL ordering the removal, shifting or relocation of anything related to this permission.	Eskom to abide by SANRAL's requirements.

11.1.3 *Impacts Identified by I&APs*

The issues raised by I&APs during the execution of the EIA, as contained in the Comments and Response Report (***Appendix L***), have been grouped into the following main categories:

- Construction-related impacts -
  - Damage to private property and access roads;
  - Loss of game and livestock due to poor access control and poaching;
  - Safety and security risks;
  - Noise and vibrations;
  - Potential for work opportunities and skills transfer;
  - General poor practices by Contractors;
  - Construction duration and programme.
- Servitude -
  - Type of activities allowed within land use;
  - Servitude width;
  - Provisions of servitude;
  - Additional compensation if servitude conditions have changed;
  - Wayleave procedures to be followed for encroachment into other servitude (notably Transnet, SANRAL, Telkom) and conditions of other servitude owners;
  - Potential of purchasing entire properties affected by route;
  - Historical poor experiences with Eskom for previous power lines;
  - Option of leasing land instead of outright purchase of servitude;
  - Compensation for servitude registration.
- Agriculture -
  - Risks to livestock;
  - Impacts to dairy farms;
  - Loss of cultivated land.
- Game farms -
  - Safety of construction and maintenance staff during hunting;
  - Impacts to game capturing and breeding;
  - Routes traverse a number of private game reserves;
  - Loss of income due to visual deterrence of construction activities and power line infrastructure.
- Potential local benefits -
  - Potential for electricity to facilitate local economic development;
  - Potential for electricity supply for un-serviced areas alongside route;

  - Local benefits associated with project.
- Rural areas -
  - Relocation of structures (e.g. houses, kraals) outside of servitude;
  - Encroachment of human settlements into servitude.
- Transmission network -
  - Future planning and network expansions.
- Biodiversity -
  - Adverse impacts to fauna (including birdlife);
  - Route traverses Fort Pato Nature Reserve;
  - Alignment with Buffalo City Municipality SDF and Municipal Open Space System (MOSS) plans;
  - Habitat fragmentation and habitat destruction;
  - Clearance of sensitive flora species.
- Biophysical environment -
  - Watercourse crossings;
  - Soil erosion;
  - Reinstatement and rehabilitation of the affected area;
  - Steep areas.
- Regional economic benefits -
  - Economic benefits to beneficiaries of electricity and associated socio-economic promotion for region.
- Alternatives -
  - Other alignment options;
  - Placing power line underground;
  - Building of new sub-station;
  - Alignment of route alongside existing transmission lines and roads;
  - Suggestions of possible deviations;
  - Upgrading existing power lines.
- Public participation -
  - Extent of public participation;
  - Additional media for notification;
  - Involvement of tribal authorities and councillors;

  - Manner in which comments will be addressed;
  - Opportunity to provide input into route alignment;
  - Involvement of formal agricultural sector.
- Local social an socio-economic impacts -
  - Reduction in property value;
  - Visual impacts;
  - Impacts to proposed local developments and sub-divisions;
  - Impact to sense of place;
  - Compensation for indirect and direct impacts;
  - Cumulative impact if route is aligned alongside an existing transmission line;
  - More significant impacts to smaller properties.
- EIA process -
  - Appeal process.
- Land use -
  - Peri-urban land use objective in Thorn Park area.
- Electromagnetic field -
  - Risks to human health;
  - Risks to livestock;
  - Noise generated by conductors (i.e. corona);
  - Interference from the power line to cell phone signals.
- Maintenance -
  - Erosion protection;
  - Maintenance of access roads and stormwater;
  - Maintenance activities;
  - Access control;
  - Notification of landowners;
  - Safety and security.

11.1.4 Project Activities and Environmental Aspects

The main project components include the following:

1. Installation of a new 400kV transmission line (including concrete foundations, towers, conductors and anchors);
2. Building of turn-in lines; and
3. Upgrading of existing substations (including new 400kV feeder bays and yard extensions).

In order to understand the impacts related to the project it is necessary to unpack the activities associated with the project life-cycle, as shown below:

Table 41: Activities associated with the Neptune-Poseidon 400kV Power Line Project Life-Cycle

Pre-construction
Project Activities
• Detailed engineering design
• Detailed geotechnical investigations
• Geophysical investigations
• Walk-down survey to identify most suitable sites to position towers
• Arrangements with individual landowners and/or land users
• Procurement process for Contractors

Construction
Project Activities
• On-going consultation with affected parties
• Vegetation clearance
• Pegging of central line and overall footprint
• Site establishment
• Establish construction camps (including material lay-down areas)
• Construction employment
• Delivery of construction material
• Storage and handling of material
• Transportation of equipment, materials and personnel
• Install access gates
• Upgrade existing access roads / build new access roads (where necessary)
• Grading of site (where necessary)
• Excavations for foundations and anchors of towers
• Position premade foundation structures into excavations
• Concrete filling of the foundation
• Erection of steel structures
• Stringing of transmission cables
• Upgrade sub-stations (yard extensions, feeder bays, storm water and safety fences extensions)
• Construction employment
• Refuelling

• Crossing inaccessible sites
• Crossing sensitive areas
• Managing construction sites
• Reinstatement and rehabilitation
• Signing off by landowners
• Handing and taking over of the servitude

Operation
Project Activities
• Access arrangements and requirements
• Routine maintenance inspections
• Management of vegetation clearance
• Repair and maintenance works
• On-going consultation with directly affected parties

Environmental aspects are regarded as those components of an organisation's activities, products and services that are likely to interact with the environment. The following environmental aspects have been identified for the proposed 400kV transmission line, substation upgrades and new turn-in lines, which are linked to the project activities (note that only high-level aspects are provided):

Table 42: Environmental Aspects associated with the Neptune-Poseidon 400kV Power Line Project Life-Cycle

Pre-construction
Environmental Aspects
• Poor construction site planning and layout
• Inaccurate walk-down survey

Construction
Environmental Aspects
• Lack of environmental awareness creation
• Poor consultation with affected parties
• Indiscriminate site clearing
• Poor site establishment
• Poor management of access and use of access roads
• Poor transportation practices
• Poor fencing arrangements
• Erosion
• Disruptions to existing services
• Disturbance of topsoil
• Poor management of excavations
• Inadequate storage and handling of material

• Inadequate storage and handling of hazardous material
• Lack of equipment maintenance
• Poor management of labour force
• Pollution from ablution facilities
• Inadequate management of construction camp
• Poor waste management practices
• Wastage of water
• Disturbance to landowners
• Poor management of pollution generation potential
• Damage to significant flora
• Damage to significant fauna
• Environmental damage at crossings of inaccessible sites
• Environmental damage at crossings of sensitive areas
• Disruption of archaeological and cultural features
• Poor reinstatement and rehabilitation

Operation
Environmental Aspects
• Inadequate management of access, routine maintenance and maintenance works
• Inadequate management of vegetation

11.1.5 Significant Environmental Impacts

Environmental impacts are the change to the environment resulting from an environmental aspect, whether desirable or undesirable. Note that it is not the intention of the impact assessment to evaluate all potential environmental impacts associated by the project's environmental aspects, but rather to focus on the potentially **significant** direct and indirect impacts identified during the Scoping phase and any additional issues uncovered during the EIA stage. The significant environmental impacts are listed in **Table 43**.

The EMP strives to provide a comprehensive list of mitigation measures associated with the overall project-related aspects and impacts for the entire project life-cycle (i.e. pre-construction, construction, operation and decommissioning).

The cumulative impacts are discussed in **Sections 11.11**.

Table 43: Significant environmental impacts associated with the project

CONSTRUCTION PHASE	
Feature	**Impact**
Topography	• Visual impact on ridges • Erosion of affected areas on steep slopes
Surface Water	• Impacts where access roads and the transmission lines cross watercourses
Geology and Soil	• Erosion on steep slopes
Flora	• Removal of vegetation for stringing, building of new access roads, tower construction and construction camp(s) establishment
Fauna	• Impacts to animals on game farms and nature reserves. • Impacts to livestock
Socio-economic	• Loss of income from hunting, game viewing, and crop production • Reduction in property value • Damage to property • Relocation of structures situated within servitude
Agricultural Potential	• Loss of agricultural land • Impacts to animals on game farms • Impacts to livestock
Archaeological and Cultural Features	• Damage to heritage resources
Transportation	• Damage to roads by heavy construction vehicles • Disruption of railway line at crossing
Aesthetics	• Clearing of vegetation. • Construction-related operations.
Tourism	• Visual and noise impacts from construction operations. • Influence to hunting practices. • Influence to ecotourism. • Reduction in tourism to areas affected by construction

OPERATIONAL PHASE	
Feature	**Impact**
Topography	• Visual impact on ridges from disturbed area and infrastructure. • Erosion along access roads on steep slopes.
Surface Water	• Inadequate stormwater management on access roads • Damage to towers from major flood events
Geology and Soil	• Erosion on steep slopes
Flora	• Encroachment by exotic species through inadequate eradication programme. • Clearing of vegetation along maintenance road.
Fauna	• Risk to birds from collision with infrastructure and from electrocution • Loss of game though improper access control • Electrocution of monkeys
Socio-economic	• Loss of land with extension of existing servitude • Reduction in property value • Threats to human and animal health from EMF
Agricultural Potential	• Loss of agricultural land
Transportation	• Use of maintenance roads

OPERATIONAL PHASE	
Feature	**Impact**
Aesthetics	• High visibility of transmission lines. • Inadequate reinstatement and rehabilitation of construction footprint.
Tourism	• High visibility of transmission lines • Loss of “sense of place”

The findings of the specialists are of particular importance in terms of understanding the impacts of the project and managing the adverse implications of the project life-cycle, as these studies focused on the significant environmental issues identified during the execution of the EIA. As can be seen from the various impact assessments performed by the specialists, there are a host of cross-cutting impacts that are addressed in a number of these studies, with particular reference to the visual, social and economic effects of the proposed transmission line. The mitigation measures proposed by the specialists for these similar types of impacts are not regarded as contradictory, as they are aligned with best practices and principles.

11.1.6 Impact Assessment Methodology

The impacts and the proposed management thereof are first discussed on a qualitative level and thereafter quantitatively assessed by using the methodology provided below. Where applicable, the impact assessments and significance ratings provided by the respective specialists are included.

In the case of the specialist studies, most of the impact assessment methodologies deviated from the approach to follow. However, the quantitative basis for these specialist evaluations of the impacts to specific environmental features still satisfied the intention of EIA.

For the methodology of the impact assessment, the analysis is conducted on a quantitative basis with regard to the nature, extent, magnitude, duration, probability and significance of the impacts. The following definitions and scoring system apply:

Nature (/Status)
The project could have a positive, negative or neutral impact on the environment.

Extent
- Local - extend to the site and its immediate surroundings.
- Regional - impact on the region but within the province.
- National - impact on an interprovincial scale.
- International - impact outside of South Africa.

Magnitude
Degree to which impact may cause irreplaceable loss of resources.
- Low - natural and social functions and processes are not affected or minimally affected.
- Medium - affected environment is notably altered; natural and social functions and processes continue albeit in a modified way.
- High - natural or social functions or processes could be substantially affected or altered to the extent that they could temporarily or permanently cease.

Duration
- Short term - 0-5 years.
- Medium term - 5-11 years.
- Long term - impact ceases after the operational life cycle of the activity either because of natural processes or by human intervention.
- Permanent - mitigation either by natural process or by human intervention will not occur in such a way or in such a time span that the impact can be considered transient.

Probability
- Almost certain - the event is expected to occur in most circumstances.
- Likely - the event will probably occur in most circumstances.
- Moderate - the event should occur at some time.
- Unlikely - the event could occur at some time.
- Rare/Remote - the event may occur only in exceptional circumstances.

Significance
Provides an overall impression of an impact's importance, and the degree to which it can be mitigated. The range for significance ratings is as follows-

0 - Impact will not affect the environment. No mitigation necessary.
1- No impact after mitigation.
2- Residual impact after mitigation / some loss of populations and habitats of non-threatened species.
3- Impact cannot be mitigated / exceeds legal or regulatory standard / increases level of risk to public health / extinction of biological species, loss of genetic diversity, rare or endangered species, critical habitat.

11.1.7 Impact Mitigation

Impacts are to be managed by assigning suitable mitigation measures. According to DEAT (2006), the objectives of mitigation are to:

- Find more environmentally sound ways of doing things;
- Enhance the environmental benefits of a proposed activity;
- Avoid, minimise or remedy negative impacts; and
- Ensure that residual negative impacts are within acceptable levels.

Mitigation should strive to abide by the following hierarchy – (1) prevent; (2) reduce; (3) rehabilitate; and/or (4) compensate for the environmental impacts.

Figure 68: Mitigation Hierarchy

The proposed mitigation of the impacts includes specific measures identified by the technical team (including engineering solutions) and environmental specialists, stipulations of environmental authorities and environmental best practices. The mitigation measures that follow in the subsequent sections are not intended to be exhaustive, but rather focus on the significant impacts identified. In this regard, note that the assessment pertains to the proposed 400kV power line and turn-in lines and to a much lesser extent to the upgrading of the substation, where the last-mentioned project component is not regarded to be associated with significant environmental aspects and impacts (based on the proposed works and receiving environment).

The EMP (refer to ***Appendix H***) provides a comprehensive list of mitigation measures for the entire project, which extends beyond the impacts evaluated in the body of the EIA Report.

Box 4:	**Overview of the EMP**

The scope of the Neptune-Poseidon 400kV power line EMP is as follows:

- Establish management objectives during the project life-cycle in order to enhance benefits and minimise adverse environmental impacts;
- Provide targets for management objectives, in terms of desired performance;
- Describe actions required to achieve management objectives;
- Outline institutional structures and roles required to implement the EMP;
- Provide legislative framework; and
- Description of requirements for record keeping, reporting, review, auditing and updating of the EMP.

All liability for the implementation of the EMP (as well as the EIA findings and environmental authorisation) lies with the project proponent (i.e. Eskom).

11.2 Watercourses

11.2.1 Impact Overview

For the discussion to follow watercourses are considered as rivers, streams, natural channels (perennial and seasonal), wetlands and dams. The alternative routes traverse various major rivers (Nahoon, Buffalo, Keiskamma, Kat and Koonap), dams (Debe Dam and Laing Dam), wetlands and pans, as well as numerous non-perennial watercourses. The construction of the line and upgrading or building of new access roads could cause impacts to the "resource quality" of the affected watercourses, which is defined by the National Water Act (Act No. 36 of 1998) as the following:

- Quantity, pattern, timing, water level and assurance of instream **flow**;
- **Water quality**, including physical, chemical and biological characteristics of the water;
- Character and condition of the instream and riparian **habitat**; and
- Characteristics, condition and distribution of the **aquatic biota**.

Impacts to the resource quality of the affected watercourses could include:

- Damage to / loss or habitat (both instream and riparian zone) within the works area;
- Destabilisation of morphology (i.e. river structure);
- Reduction of water quality through sedimentation and poor construction practices;
- Alteration of the flow regime caused by temporary diversions; and
- Reduction in biodiversity of aquatic biota.

Should construction activities encroach upon the regulated area of a watercourse (i.e. 1:100 year floodline / delineated riparian or wetland habitats) water use authorisation will be required in terms of Section 21 of the National Water Act (Act No. 36 of 1998). In accordance with Section 27 of this Act, the following factors need to be taken into consideration by DWA before an authorisation may be issued:

1. Existing lawful water uses;
2. The need to redress the results of past racial and gender discrimination;
3. Efficient and beneficial use of water in the public interest;

4. The socio-economic impact of the water use or uses if authorised; or of the failure to authorise the water use or uses;
5. Any catchment management strategy applicable to the relevant water resource;
6. The likely effect of the water use to be authorised on the water resource and on other water users;
7. The class and the resource quality objectives of the water resource;
8. Investments already made and to be made by the water user in respect of the water use in question;
9. The strategic importance of the water use to be authorised;
10. The quality of water in the water resource which may be required for the Reserve and for meeting international obligations; and
11. The probable duration of any undertaking for which a water use is to be authorised.

Abstraction of water for construction purposes will not be permitted without the requisite authorisations.

11.2.2 *Impact Assessment*

Environmental Feature	**1. Flow**
Relevant Alternatives & Activities	**All alternatives; watercourse crossings; construction camps; access roads**
Project life-cycle	**Construction phase**
Potential Impact	**Proposed Management Objectives / Mitigation Measures**
• Alteration of the flow regime caused by instream and riparian construction activities; • Wetlands may be susceptible to erosion during the clearing, grading and excavation activities.	1.1. No construction activities to encroach upon the regulated area of any watercourse (including buffer zones for wetlands). 1.2. Construction camps to be located not closer than 50m from the edge of riparian habitat / wetland buffer zone. 1.3. Special arrangements for stringing activities to avoid impacts to sensitive watercourse features (including sensitive riparian zones) 1.4. As far as possible, use existing bridge crossings as access roads. 1.5. Manage flow passing through works area for access roads to minimise disturbance to flow regime and to prevent erosion. 1.6. Prevent possible erosion caused by temporary instream diversion, associated with construction of access roads. 1.7. Remove diversion following construction of access roads and reinstate and rehabilitate affected works area.

	+/- Impacts	**Extent**	**Magnitude**	**Duration**	**Probability**	**Significance**
Before Mitigation	–-	local	medium	short-term	likely	2
After Mitigation	–-	local	medium	short-term	unlikely	1

Environmental Feature	**2. River Morphology**
Relevant Alternatives & Activities	**All alternatives; watercourse crossings; access roads; maintenance**
Project life-cycle	**Construction & operation phases**
Potential Impact	**Proposed Management Objectives / Mitigation Measures**
• Destabilisation of morphology (i.e. river structure); • Erosion of watercourse structure; • Damage to / loss of habitat (both instream and in the riparian zone) within the works area.	2.1. Repeat mitigation measures 1.1 – 1.7. 2.2. Select most appropriate crossing point based on geotechnical conditions. 2.3. Select most appropriate crossing point based on sensitivity of riparian habitat (e.g. protected trees, large trees that afford bank stabilisation) and instream habitat, depending on technical feasibility. 2.4. For access roads, reinstate (shaping) and rehabilitate (indigenous riparian vegetation) affected areas. Install suitable buttressing to prevent future erosion, if required.

	+/- Impacts	**Extent**	**Magnitude**	**Duration**	**Probability**	**Significance**
Before Mitigation	–-	local	medium	permanent	likely	2
After Mitigation	–-	local	low-medium	short-term	moderate	1

Environmental Feature	3. Water Quality
Relevant Alternatives & Activities	All alternatives; watercourse crossings; construction camps; access roads; maintenance
Project life-cycle	Construction phase & operation phases
Potential Impact	**Proposed Management Objectives / Mitigation Measures**
• Contamination of surface water through sedimentation from instream works, silt-laden runoff from disturbed areas, and improper practices (e.g. poor management of waste water and disposal of solid waste).	3.1. Repeat mitigation measures 1.1 – 1.7 and 2.2 – 2.4. 3.2. Temporary diversion and other dewatering techniques (e.g. pumping) to maintain a dry works area. 3.3. Where necessary for access roads, install instream silt traps during construction within the watercourse channel and along the riparian habitat. Instream silt traps are to be maintained and serviced on a regular basis. 3.4. Implement suitable stormwater measures during construction to manage ingress of runoff into watercourses. 3.5. Ensure proper storage of material (including fuel, paint) that could cause water pollution. Ensure proper storage and careful handling of hazardous substances with spill prevention materials at hand. 3.6. Ensure proper waste management and housekeeping.

	+/- Impacts	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	–-	local	medium	short-term	likely	2
After Mitigation	–-	local	low-medium	short-term	moderate	1

Environmental Feature	4. Aquatic Biota
Relevant Alternatives & Activities	All alternatives; watercourse crossings; access roads; maintenance
Project life-cycle	Construction phase
Potential Impact	**Proposed Management Objectives / Mitigation Measures**
• Clogging of gills from increased silt loads; • Alteration of habitat; • Disturbance to migration patterns; • Poaching / illegal fishing.	4.1. Repeat mitigation measures 1.1 – 1.7, 2.2 – 2.4 and 3.2 – 3.6. 4.2. Temporary diversion for construction of access roads to allow for movement of aquatic fauna, as far as possible. 4.3. Environmental induction of all construction workers and implementation of disciplinary procedures for non-compliance.

	+/- Impacts	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	–-	local	medium	short-term	likely	2
After Mitigation	–-	local	low-medium	short-term	moderate	1

Environmental Feature	5. Pans and Wetlands
Relevant Alternatives & Activities	All alternatives; watercourse crossings; access roads; maintenance
Project life-cycle	Construction & operation phase
Potential Impact	**Proposed Management Objectives / Mitigation Measures**
Damage to wetlands from crossings, including erosion, loss of vegetation, adverse effects to biota, and disturbance of flow.	5.1. Repeat mitigation measures 1.1 – 1.7, 2.2 – 2.4, 3.2 – 3.6 and 4.2 – 4.3. 5.2. Identify wetlands during walk-down survey. Wetland systems and their buffer zones are regarded as no-go areas during the project life-cycle.

	+/- Impacts	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	–-	local	medium-high	short-term	likely	3
After Mitigation	–-	local	medium	short-term	unlikely	1

11.3 Geology and Soil

11.3.1 Impact Overview

In areas of steep terrain soil erosion could occur following the clearing of vegetation, grading of tower sites, and use of access roads. Use of heavy equipment during the construction phase could lead to soil compaction.

According to the Agricultural Potential Assessment (Terra Soil Science, 2011), erosion control measures have to be instituted for each of the pylon construction and erection sites as the soils are highly erodible and unstable, especially once the surface soil, vegetation and plant cover is influenced and compromised. During public participation landowners also expressed concerns reading the use of access roads, due to the steep gradients, which could result in soil erosion.

11.3.2 *Impact Assessment*

Environmental Feature	**6. Geology & Soil**
Relevant Alternatives & Activities	**All alternatives; access roads; construction camps**
Project life-cycle	**Construction & operation phase**
Potential Impact	**Proposed Management Objectives / Mitigation Measures**
• Soil erosion on steep slopes. • Erosion along access roads.	6.1. No cutting and filling in areas of 4% sideslope and less. 6.2. Stabilisation of cleared areas to prevent and control erosion. The method chosen (e.g. watering, planting, retaining structures, commercial anti-erosion compounds) will be selected according to the site specific conditions. 6.3. Drainage management should also be implemented to ensure the minimisation of potential erosion on access roads. 6.4. Acceptable reinstatement and rehabilitation to prevent erosion during operation phase.

	+/- Impacts	**Extent**	**Magnitude**	**Duration**	**Probability**	**Significance**
Before Mitigation	–-	local	medium-high	short-long	likely	3
After Mitigation	–-	local	low	short-term	unlikely	1

11.4 Flora

11.4.1 *Impact Overview*

The main reasons for managing the vegetation under power lines include the following:

- Ensuring safe clearances under and around power lines;
- Ensuring adequate access for inspection, maintenance and repair activities; and
- Reduction of fuels for fires under power lines that cause flashovers.

Potential impacts to vegetation resulting from the construction of the proposed transmission line include the clearance of an 8 m-wide strip down the centre of a transmission line servitude for stringing purposes.

During the operational phase, vegetation that could possibly interfere with the operation and/or reliability of the power line must be trimmed or completely cleared. In terms of the Conservation of Agricultural Resources Act (Act No. 43 of 1983), all alien invasive species in the servitude is cleared and chemically treated for the total width of the servitude.

Refer to **Section 12.2.1** for an overview of the impacts to floral features associated with the alternative routes, as identified through the Faunal, Floral and Avifaunal Ecological Surveys (Enviross, 2011), which is contained in ***Appendix F1***. Based on the potential impact to RDL species, vegetation unit conservation and natural or protected areas, the specialist study preferred the following options:

- Western region – Alternative 4; and
- Eastern region – Main route.

The project is to be executed in accordance with Eskom's Transmission Vegetation Management Guideline (TGL41-334) (contained in EMP - ***Appendix H***), which includes provision of the following:

- Integrated Vegetation Management;
- Biomes, Plant Species and Right of Way Management;
- Atmospheric and Climatic Conditions and Vegetation Management;
- Veld Management Practices;
- Laws and Policies;
- Suggested Vegetation Management Practices;
- Commercial Forests;
- Sugar Cane;
- Karoo Biome;
- Fynbos;
- Indigenous Forests; and
- Fire Protection and Fire Fighting Associations.

The walk-down survey team will include an ecological specialist who will identify sensitive floral species within the corridor. The necessary permits will be obtained under the National Forests Act (Act No. 84 of 1998) if avoidance of sensitive species is not possible during the siting of the towers and confirmation of the development footprint.

Note that the potential impacts to the riparian habitat and the associated mitigation measures are discussed under **Section 11.2**.

11.4.2 Impact Assessment

The following impacts assessment for floral features and associated attributes was extracted from the Faunal, Floral and Avifaunal Ecological Surveys (Enviross, 2011) (refer to ***Appendix F1*** for an overview of the rating system).

Environmental Feature	**7. Flora**
Relevant Alternatives & Activities	**All alternatives; access roads; construction camps**
Project life-cycle	**Construction & operation phase**

Potential environmental impact	Project activity or issue	Environmental significance *before* mitigation								Environmental significance *after* mitigation as per EMP							
		S	D	I	E	R	P	Conf	SP	S	D	I	E	R	P	Conf	SP
PRECONSTRUCTION & CONSTRUCTION PHASES																	
Habitat destruction	Vegetation removal through soil stripping.	3	1	3	3	2	5	High	40	3	1	1	2	3	3	High	12
Impacts on RDL floral and faunal species	Direct impacts due to inclusion of RDL species in vegetation removal.	3	1	1	3	2	2	High	12	2	1	1	2	3	1	High	3
Impacts on floral communities	Vegetation removal and site disturbances leading to shifts in floral community and habitat unit structures.	3	5	3	4	1	5	High	70	2	2	3	2	3	3	High	18
	Depletion of biodiversity through indiscriminate collecting and harvesting of floral species by construction teams.	2	1	1	2	3	3	High	3	2	1	1	1	4	1	High	1
	Disturbances through construction activities that will destroy various floral species.	3	1	3	3	1	4	High	40	3	1	1	2	3	3	High	12
Wetland/Riparian zone habitat impacts	Construction activities altering soil conditions, hydrological features & topography from the movement of heavy machinery, leading to loss of wetland functionality.	2	4	3	4	1	3	High	36	1	2	1	3	1	1	High	6
Compaction of soils	Movement of heavy machinery leading to soil compaction that will modify habitat, destroy vegetation and inhibit re-vegetation.	2	2	3	2	2	5	High	35	2	2	3	2	3	4	Low	24
Soil contamination	Pollution of soils due to oil/fuel leaks & wastes that will affect floral species.	2	2	3	3	1	3	High	27	1	1	1	1	4	1	Low	0
Soil erosion	Erosion of stockpiled topsoil & disturbance of soils due to vegetation stripping leading to habitat inundation and potential smothering of wetland species and other vegetation.	2	1	1	3	2	3	Low	15	1	1	1	2	3	1	Low	2

[Significance of Environmental Impact (SP) = Consequence x Probability (P), where Consequence = Spatial extent (S) + Duration (D) + Intensity (I) + Effects on important ecosystems (E)) - Reversibility (R). SP ratings: 0-33 (Low), 34-74 (Medium), 75-100 (High)]

Environmental Impacts	Mitigation Measures	Time Frames
• Destruction of RDL and sensitive floral species; • Transformation of vegetation community structures; • Soil disturbances that allow for the establishment of exotic vegetation; • Damage to plant life.	7.1. Prior to the onset of the construction phase, a thorough search through the preferred alignment route and servitude roads (walk-through survey) should be undertaken during the flowering season of known RDL floral species in order to remove and rescue potentially affected species; 7.2. Existing servitudes and roadways should be utilised as far as possible, thereby limiting the impact of establishing new service roads; 7.3. Individuals can be translocated to outside of the footprint area or removed to a suitable botanical garden for cultivation and protection. This should only be done after consultation with the provincial conservation authorities; 7.4. Movement of personnel and machinery to be limited to the areas designated for the established access roadways; 7.5. No movement of personnel or machinery to take place within any wetland areas in order for this ecologically sensitive habitat unit to retain its features; 7.6. Any recruitment of exotic vegetation to be managed on an ongoing basis until indigenous pioneering vegetation has dominated the disturbed areas. These species should be limited to naturally-occurring species representative of the vegetation type for the locality. Ongoing monitoring of exotic vegetation recruitment should be undertaken and any recruitment controlled; 7.7. Dumping or storage of topsoil must not be done on established vegetation, but should remain within designated areas; 7.8. Workers and machinery to remain inside construction footprint. All labourers to be informed of disciplinary actions for the wilful damage to plants; 7.9. Only the taller floral species and those individuals that pose a significant fire risk to the overhead power line should be removed within the savannoid servitude areas. Forested gullies, valleys and riparian vegetation should be spanned as far as possible from higher ground so that the removal of vegetation can be minimised; 7.10. Indiscriminate damage of vegetation to be avoided.	Construction phase
• Damage to plant life outside of the servitude area; • Encroachment of alien vegetation.	7.11. Ecologically sensitive areas should be retained as prohibited areas; 7.12. Eskom employees to remain inside servitude. All staff to be informed of disciplinary actions for the wilful damage to plants; 7.13. Encroachment of alien vegetation to be monitored for regularly and controlled.	Operation phase

11.5 Fauna

11.5.1 Impact Overview

The following game reserves (formal and informal) are situated along the alternative alignments (list not exhaustive in terms of private game farms):

- Main Route – Kingsdale Game Farm; various private game farms;
- Alternative 2 – Fort Pato Nature Reserve; Bridle Drift Dam Nature Reserve;
- Alternative 3 – Mpongo Private Game Reserve; and
- Alternative 4 – Various private game farms.

The management of potential impacts on game reserves (e.g. interference with hunting, game viewing and other eco-tourism activities, disturbance and risk of harm to game animals, disturbance to breeding patterns of animals, temporary movement of game fences, risk of poaching, loss of animals due to improper access control and loss of habitat) demands special attention.

Alternative 4 purposely follows an existing transmission line in an attempt to limit the disturbance to game farms in the western section of the project area. Specific provisions are included in the EMP to manage impacts to animals on game farms, and the related objectives and mitigation measures are included in the assessment below.

As part of the Faunal, Floral and Avifaunal Ecological Surveys (Enviross, 2011), all the proposed route alternatives were assessed individually in order to determine which would impact the least on avifaunal conservation. Below are some pertinent points that were taken into consideration by Enviross (2011) during the evaluation of the route alternatives with specific reference to avifaunal impacts and conservation:

1. The species community structures within the various areas pertaining to the proposed project and what proportions of these communities are at risk to collision impacts and are of conservational significance;
2. The degree of habitat destruction that is considered important to avifaunal conservation (especially RDL species);

3. Areas that are prone to adverse weather conditions that would increase the risk of collisions (mist, high wind velocities, etc.);
4. Cultivated grain and pasture crops are often seasonally attractive to many species (e.g. cranes and storks);
5. Traversing areas that incorporate topographical features that are known to be used by migratory birds as navigational aids, such as mountains, shorelines and river valleys, that pose a risk of collisions with overhead lines should preferable be avoided;
6. Route alternatives would be preferred that are located in close proximity to the existing main transmission system infrastructure. Studies have shown that migratory birds become familiar with the powerline patterns within an area and therefore learn to avoid them;
7. Existing habitat that is considered as being highly degraded due to historical and present transformations is preferred;
8. Habitat units known to be highly productive in supporting breeding, foraging and roosting sites, such as wetlands, should be avoided; and
9. The degree to which each impact can be realistically mitigated in terms of economic viability and the effectiveness of the mitigation measures needs to be evaluated.

The major migratory routes were identified as part of the avifaunal impact survey. The most prominent habitat units within the survey area applicable to supporting avifaunal diversity are river valleys and open waters. Many large wetland bird species would actively and regularly migrate between the larger expanses of water for cyclic feeding, habitat exploitation and breeding. The routes followed would typically coincide with river valleys. This would ultimately lead to an increase in mortalities of various avifaunal species due to collisions with the overhead lines if the line crosses over these habitat types and would therefore require mitigation to lessen the impacts. The major migratory routes pertaining to the project coincide with major river valleys and prominent ridge systems. Therefore, in mitigating the potential negative impacts of traversing major migratory routes within the area, the following summary can be presented. It should be noted that the proposed Main Route cannot be compared to the remainder of the route alternatives as it stretches the entire length of the project whereas the route alternatives are mere deviations of the Main Route and are therefore substantially shorter.

Table 44: Perceived avifaunal impact comparative summary of the various route alternatives.

Site	Impact on migratory routes: Before mitigation	Impact rating on migratory routes: After mitigation	Mitigation measures required	Perceived success of mitigation	Impact rating (out of 10)	Proposed mitigation measures
Main Route	Medium	Low-med	Yes	Med-high	7	Fitting bird flappers on the lines within migratory pathways. Minimising vegetation destruction. Remaining associated with exiting lines.
Alternative 2	High	Medium	Yes	Med-high	4	
Alternative 3	Medium	Low-med	Yes	Med-high	3	
Alternative 4	Low-med	Low	Yes	Med-high	2	
Alternative 4 Seg A	Low	Low	No	N/A	1	
Alternative 4 Seg B	Medium	Low-med	Yes	Med-high	2	
Turn in line	Low	Low	No	N/A	1	

From the preceding table, it can be seen from the risk of collision impacts by birds emanating from the lines crossing through prominent migratory routes can be successfully mitigated to a Low to Medium rating. As mentioned above, the impact rating of the proposed Main Route features as relatively higher than the rest of the alternative routes as it reflects the cumulative impacts throughout the entire length of the line and the various route alternatives represent merely short deviations of this main route. If one looks at the cumulative impacts along the entire route, then the impacts from collisions can be successfully mitigated along the proposed Main Route.

Various mitigation measures have been proposed to reduce the impacts of collisions of birds with power lines. It is well-known that collisions with the overhead shield (earth) wire far outnumber collisions with the phase (conductor) wires. This is because the earth wire is a single line suspended above the conductor lines, which are often bundled together in groups of four or five lines. These bundled lines are therefore far more visible in comparison to the earth wire. Mitigation measures should therefore be aimed to making the earth wire more visible.

The most favourable mitigation measure to lessen the impacts of bird collisions is to plan the alignment in such a way that migratory routes are avoided. In a linear construction of this magnitude there are numerous factors to consider when choosing a preferred route, therefore making major alignment shifts are very often not feasible. Bird Flight Diverters (BFD's) were developed in Europe and are attached to the conductor wires. Studies, however, have indicated that their use has had limited success in averting collision impacts in South Africa. Another device, known as a Bird Flapper, has been used on a large scale in South Africa since 2001 and has proven to be more effective than the use of BFD's. A Bird Flapper is a reflective metallic disc-type device that is loosely attached to the earth wire. The loose-fitting attachment allows the disc to move freely in the wind. The resulting intermittent reflecting of the sun off the disc allows for a device that is highly visible from a greater distance. Fitment frequency of these Bird Flappers has been suggested at 10m intervals and staggered along parallel lines, resulting in a bird Flapper device being visible along every 5m of line. These devices should be fitted along all areas were migratory routes have been identified within the survey area along the chosen preferred route alternative. Some RDL species are known to migrate at night, when line visibility is at its lowest. Flamingos are known to migrate between major waterbodies at night or during dusk, where they often fall victim to collisions with overhead infrastructure due to poor visibility. Fluorescent tubes that derive power from the conductor fields of the lines have been shown to avert this impact in high impact areas.

Another mitigation measure that has been suggested is the removal of the earth shield wire from areas where migratory routes have been identified, as long as these areas do not fall within areas that are subjected to major electrical storms. This is considered non-feasible due to technical constraints and implications.

Habitat destruction and the associated displacement of various avifaunal species is thought to be a lesser potential impact on the general avifaunal conservation within the survey area. The general aridity of the survey area, especially within the western regions, means that clearing of vegetation within the servitude to an acceptable height to safeguard against fire hazards and therefore habitat loss could be minimised. River valleys harbour a greater density of taller vegetation. This is especially evident in the riparian forests within the eastern regions of the survey area. These tall trees support breeding of many avifaunal species that will be displaced if the vegetation is cleared to accommodate the servitude. The river valleys occur within lower-lying areas that could be spanned in a manner that would not necessitate vegetation clearing. It is recommended that minimal vegetation be removed from within servitude areas and only limited to a height class that could pose a fire risk to the overhead lines.

The project will adhere to Eskom's Transmission Bird Collision Prevention Guideline (TGL41-335).

As with the flora, the walk-down survey team will include an ecologist who will identify suitable habitat for sensitive faunal features. Where possible, these sites will be regarded as no-go for the location of towers.

11.5.2 Impact Assessment

Environmental Feature	**8. Fauna – Game Reserves**
Relevant Alternatives & Activities	**All alternatives; access roads; construction camps**
Project life-cycle	**Construction & operation phase**
Potential Impact	**Proposed Management Objectives / Mitigation Measures**
Disturbance to animals on game farms.	8.1. Adequate consultation with landowner to determine specific requirements in terms of access, fences, game, existing infrastructure along power line route, etc. 8.2. Proper access control to be maintained. 8.3. Ensure that fences damaged or removed during the construction activities are adequately restored of rebuilt to an acceptable standard. 8.4. Strict control of use of construction equipment and machinery to protect game animals. 8.5. Suitable screening of construction area and safeguarding of excavations on game farms. 8.6. Stringent and dedicated control of poaching.

	+/- Impacts	**Extent**	**Magnitude**	**Duration**	**Probability**	**Significance**
Before Mitigation	–-	local	medium-high	short-term	likely	3
After Mitigation	–-	local	medium	short-term	unlikely	2

The impacts assessment for faunal features and associated attributes is supplemented by the following evaluation conducted as part of the Faunal, Floral and Avifaunal Ecological Surveys (Enviross, 2011) (refer to ***Appendix F1*** for an overview of the rating system).

Environmental Feature	9. Fauna - General
Relevant Alternatives & Activities	All alternatives; access roads; construction camps
Project life-cycle	Construction & operation phase

Potential environmental impact	Project activity or issue	Environmental significance *before* mitigation								Environmental significance *after* mitigation as per EMP							
		S	D	I	E	R	P	Conf	SP	S	D	I	E	R	P	Conf	SP
PRECONSTRUCTION & CONSTRUCTION PHASES																	
Habitat destruction	Vegetation removal through soil stripping.	3	1	3	3	2	5	High	40	3	1	1	2	3	3	High	12
Impacts on RDL faunal species	Direct impacts due to inclusion of RDL species in vegetation removal.	3	1	1	3	2	2	High	12	2	1	1	2	3	1	High	3
Impacts on faunal communities	Habitat destruction leading to loss of faunal diversity.	3	5	3	4	1	5	High	70	2	2	3	2	3	3	High	18
	Impacts on faunal communities by indiscriminate collecting and hunting by construction teams.	2	1	1	2	3	3	High	3	2	1	1	1	4	1	High	1
	Increased disturbance factors that will displace sensitive faunal species.	3	1	1	3	2	2	High	12	2	1	1	2	3	1	High	3
Impacts on RDL avifaunal species – Habitat destruction leading to displacement.	Direct impacts due to inclusion of RDL species nesting sites in vegetation removal or habitat destruction leading to RDL species displacement.	1	1	1	3	1	2	High	10	1	1	1	1	4	1	High	0
Impacts on avifaunal communities	Vegetation removal and site disturbances leading to shifts in floral community and habitat unit structures. This would shift the avifaunal communities dependent on the habitat.	3	5	3	4	1	5	High	70	2	2	3	2	3	3	High	18
	Depletion of avifaunal biodiversity through indiscriminate collecting and hunting by construction teams.	2	1	1	2	3	3	High	3	2	1	1	1	4	1	High	1
	Disturbances through construction activities that will displace various avifaunal species.	3	1	1	3	2	2	High	12	2	1	1	2	3	1	High	3
Wetland/Riparian zone habitat impacts	Construction activities altering soil conditions, hydrological features & topography from the movement of heavy machinery, leading to loss of wetland functionality. This will affect wetland-dependent faunal species.	2	4	3	4	1	3	High	36	1	2	1	3	1	1	High	6

[Significance of Environmental Impact (SP) = Consequence x Probability (P), where Consequence = Spatial extent (S) + Duration (D) + Intensity (I) + Effects on important ecosystems (E)) - Reversibility (R). SP ratings: 0-33 (Low), 34-74 (Medium), 75-100 (High)]

Environmental Impacts	Mitigation Measures	Time Frames
• Habitat destruction; • Destruction of RDL and displacement of sensitive avifaunal species; • Impacts on avifaunal biodiversity.	9.1. Important habitat to avifaunal conservation within the area (i.e. wetland habitat) should be avoided; 9.2. Movement of personnel and machinery to be limited to the areas designated for the established servitude. 9.3. No movement of personnel or machinery to take place within the wetland areas in order for this ecologically sensitive habitat unit to retain its features; 9.4. Dumping or storage of topsoil must not be done on established vegetation, but should remain within the construction footprint. 9.5. Workers and machinery to remain inside construction footprint. All labourers to be informed of disciplinary actions for the wilful damage to habitat. 9.6. Indiscriminate damage of the environment to be avoided.	Construction phase
• Collisions with overhead tie-in lines.	9.7. Mitigation measures are aimed at making the overhead line more visible to flying birds; 9.8. Bird flappers (found to be more effective than Bird Flight Diverters (BFD's) to be placed on lines within areas identified as important migratory routes.	Construction & operation phases
• Bird streamers causing electrical faults.	9.9. Perch management through the use of perch deterrents (bird guards) can be used and fitted at least 1m directly above and on both sides of the phase conductor. Open perch areas should be allowed to remain.	Construction operation phases
• Ongoing impacts that will affect avifaunal biodiversity; • Collisions of avifauna with overhead lines.	9.10. Ecologically sensitive areas should be retained as prohibited areas ; 9.11. Eskom employees to remain inside construction footprint. All staff to be informed of disciplinary actions for the wilful damage to plants and animals; 9.12. Maintenance crews to monitor for bird collisions and to mitigate for this impact within areas identified as hotspot collision areas not previously identified during the pre-construction and construction phase.	Operation phase

11.6 Heritage Resources

11.6.1 Impact Overview

A Phase 1 Heritage Impact Assessment, in accordance with Section 38 of the National Heritage Resources Act (Act No. 25 of 1999), was conducted as the project exceeds 300m in length. SAHRA was consulted during the execution of the EIA, and this authority requested a copy of the Heritage Impact Assessment for review.

The National Heritage Resources Act (Act No. 25 of 1999) identifies the following categories of significant heritage sites:

- Grade I: Heritage resources with qualities so exceptional that they are of special national significance;
- 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
- Grade III: Other heritage resources worthy of conservation, on a local authority level.

The Heritage Impact Assessment (J van Schalkwyk, 2011) provides a matrix that incorporates the above criteria for each identified site (see **Section 11.6.2**).

The occurrence of sites with a Grade I significance will demand that the development activities be drastically altered in order to retain these sites in their original state. For Grade II and Grade III sites, the application of mitigation measures would allow the development activities to continue.

The primary objective of the EMP in terms of archaeology / historical resources is to ensure that no artefacts of historical or cultural value are negatively impacted, damaged or destroyed.

The project will endeavour to avoid heritage resources. To achieve this, a walk-down survey (which includes a heritage specialist) of the corridor will be undertaken prior to construction to document all heritage sites, features and objects. The siting of the towers will then be considered based on the findings of this survey. No heritage resources are to be affected without a valid permit from SAHRA.

11.6.2 *Impact Assessment*

Environmental Feature	10. Heritage Resources
Relevant Alternatives & Activities	All alternatives; access roads; construction camps
Project life-cycle	Construction phase
Potential Impact	**Proposed Management Objectives / Mitigation Measures**
Disturbance of heritage resources.	10.1. Should remains and/or artefacts be discovered on the site during earthworks, all work will cease in the area affected and the Contractor will immediately inform the Construction Manager. 10.2. Should any heritage resources be exposed during excavation or be found on site, a registered heritage specialist must be called to site for inspection. 10.3. Should any heritage resources be exposed during excavation or be found on site, the relevant heritage resource agency (i.e. SAHRA) must be informed about the finding. 10.4. Under no circumstances may any heritage material be destroyed or removed from site. 10.5. Should any remains be found on site that is potentially human remains, the South African Police Service should also be contacted.

	+/- Impacts	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	–-	local	medium-high	short-term	unlikely	2
After Mitigation	–-	local	low	short-term	unlikely	1

The impacts assessment for heritage resources is supplemented by the following evaluation conducted as part of the Heritage Impact Assessment (J van Schalkwyk, 2011).

Environmental Feature	**11. Heritage Resources**
Relevant Alternatives & Activities	**All alternatives; access roads; construction camps**
Project life-cycle	**Construction phase**

Environmental Parameter	**Pre-colonial: Stone Age sites**	
Issue/Impact/Environmental Effect/Nature	Many sites are still unknown. Their potential and significance therefore unknown. The impact will be the physical disturbance of the material and its context. Impact will be focused on a particular node, i.e. tower positions or access/ inspection roads	
Extent	Local	
Probability	Definite	
Reversibility	Irreversible	
Irreplaceable loss of resources	The impact will result in significant loss of resources	
Duration	Permanent	
Cumulative effect	High cumulative impact	
Intensity/magnitude	Very high	
Significance Rating	Sites have a high significance on a region level – viewed as NHRA Grade II sites. Distinguish from find spots, which have low significance	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	2	2
Probability	3	3
Reversibility	4	4
Irreplaceable loss	3	3
Duration	4	4
Cumulative effect	4	4
Intensity/magnitude	4	2
Significance rating	80 (negative very high)	44 (negative medium)
Mitigation measures	11.1. All of these sites should be avoided as far as possible. 11.2. Sites that cannot be avoided should be excavated in full by an archaeologist qualified in Stone Age archaeology.	

Environmental Parameter	**Pre-colonial: Iron Age sites**	
Issue/Impact/Environmental Effect/Nature	Only a few sites are known. Their potential and significance therefore unknown. The impact will be the physical disturbance of the material and its context. Impact will be focused on a particular node, i.e. tower positions or access/ inspection roads	
Extent	Local	
Probability	Definite	
Reversibility	Irreversible	
Irreplaceable loss of resources	The impact will result in significant loss of resources	
Duration	Permanent	
Cumulative effect	High cumulative impact	
Intensity/magnitude	Very high	
Significance Rating	Sites have a high significance on a region level – viewed as NHRA Grade II sites. Distinguish from find spots, which have low significance	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	2	2
Probability	3	3
Reversibility	4	4
Irreplaceable loss	3	3
Duration	4	4
Cumulative effect	4	4
Intensity/magnitude	4	2
Significance rating	80 (negative very high)	44 (negative medium)
Mitigation measures	11.3. All of these sites should be avoided as far as possible. Sites that cannot be avoided should be excavated in full by an archaeologist.	

Environmental Parameter	**Colonial Period - farmsteads**	
Issue/Impact/Environmental Effect/Nature	The various features are subject to damage. Easier to identify and therefore easier to avoid. Variety of interconnected elements makes up the whole. Impact on part therefore implies an impact on the whole	
Extent	Site	
Probability	Possible	
Reversibility	Partly reversible	
Irreplaceable loss of resources	Marginal loss of resource	
Duration	Long term	
Cumulative effect	Low cumulative impact	
Intensity/magnitude	Medium	
Significance Rating	Sites have a medium significance on a region level – viewed as NHRA Grade III sites.	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	1	1
Probability	2	2
Reversibility	2	2
Irreplaceable loss	2	1
Duration	3	3
Cumulative effect	2	1
Intensity/magnitude	2	2
Significance rating	24 (low negative)	20 (low negative)
Mitigation measures	11.4. Mitigation should take the form of isolating known sites and declare them as no-go zones with sufficient large buffer zones around them for protection. In exceptional cases mitigation can be implemented after required procedures have been followed.	

Environmental Parameter	**Colonial Period – industrial heritage**	
Issue/Impact/Environmental Effect/Nature	Different features are subject to damage. Most are unique – no alternatives or second examples. Easy to identify and therefore easy to avoid	
Extent	Site	
Probability	Possible	
Reversibility	Partly reversible	
Irreplaceable loss of resources	Marginal loss of resources	
Duration	Permanent	
Cumulative effect	Long term	
Intensity/magnitude	Medium	
Significance Rating	Sites have a medium significance on a region level – viewed as NHRA Grade III sites.	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	1	1
Probability	2	2
Reversibility	2	2
Irreplaceable loss	2	1
Duration	3	3
Cumulative effect	2	1
Intensity/magnitude	2	2
Significance rating	24 (low negative)	20 (low negative)
Mitigation measures	11.5. Mitigation should take the form of isolating known sites and declare them as no-go zones with sufficient large buffer zones around them for protection. In exceptional cases mitigation can be implemented after required procedures have been followed, but only as last case scenario	

Environmental Parameter	**Graves, cemeteries and burial grounds**	
Issue/Impact/Environmental Effect/Nature	The impact will be the physical disturbance of the features and its context. Many are hidden and forgotten, i.e. difficult to identify. Impact will be focused on a particular node, i.e. tower positions or access/ inspection roads	
Extent	Local	
Probability	Probable	
Reversibility	Irreversible	
Irreplaceable loss of resources	Significant loss of resources	
Duration	Permanent	
Cumulative effect	Medium cumulative impact	
Intensity/magnitude	Very high	
Significance Rating	Sites have a high significance on a local level – viewed as NHRA Grade III sites.	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	1	1
Probability	2	2
Reversibility	4	4
Irreplaceable loss	3	3
Duration	4	2
Cumulative effect	3	1
Intensity/magnitude	4	1
Significance rating	68 (high negative)	13 (low negative)
Mitigation measures	11.6. Mitigation should take the form of isolating known sites and declare them as no-go zones with sufficient large buffer zones around them for protection. Plan of action should be developed if unknown burial places are discovered. In exceptional cases, relocation of graves can be implemented after required procedures have been followed.	

11.7 Visual Quality

11.7.1 Impact Overview

An extract from the Visual Impact Assessment (Axis Landscape Architecture, 2011) pertaining to the impacts to the visual quality of the project area follows.

11.7.1.1 Significance of Landscape Impacts

Landscape impacts are alterations to the fabric, character, visual quality and/or visual value which will either positively or negatively affect the landscape character. During the construction and operational phases, the project components are expected to impact on the landscape character of the landscape types it traverses.

Construction phase

The activities that are expected to cause landscape impacts and that are associated with the construction phase, are the establishment of the construction camp, construction of access roads and the clearance of the servitude. These activities will create surface disturbances which will result in the removal of vegetation and the exposure of the underlying soil.

The extent of the disturbances will generally affect a relative small footprint area. Access roads to the towers are expected to be a two-track dirt road which will create the minimum disturbance. During construction, the area around the individual towers will be disturbed.

The construction camp and lay-down yards are anticipated to disturb a much larger area. The size and location of the construction camp will play a major role in the severity of the landscape impact.

Servitudes will generally be cleared of higher growing and dense vegetation to reduce biomass that may cause a fire hazard if ignited.

The presence of the roads, overgrazed fields and human settlements as well as existing power lines has caused a localised reduction in the visual quality. Areas along the proposed route are occupied by game farms and drainage systems as well as rocky outcrops, which increases the quality of the landscape. The VAC between Neptune and Poseidon Substations is considered Moderate. These factors limit the severity of landscape impact of the proposed alignment to a moderate degree.

Surface disturbances are also minimised through, for example, utilising existing roads.

The severity of the landscape impact can however be mitigated to a low severity for the proposed alignment. Sensitive placement of the construction camp, limited surface disturbance and prompt rehabilitation are prerequisite conditions if the severity of impact is to be reduced.

Operational phase

Surface disturbances created during construction may remain for an extended period during the operational phase. These are seen as residual affects carried forward from the construction phase and can be completely or substantially mitigated if treated appropriately during the construction phase.

An additional impact will be caused as a result of the presence of the completed transmission line, i.e. that of the evenly spaced towers. The industrial character and the near monumental vertical scale of the towers will severely contrast with the uniform landscape character that prevails through most of the study area.

11.7.1.2 Viewer Sensitivity

Within the receiving environment, specific viewers (visual receptors) experience different views of the visual resource and value it differently. They will be affected because of alterations to their views due to the proposed project. The visual receptors are grouped according to their similarities. The visual receptors included in this study are:

- Residents;
- Tourists; and
- Motorists.

Empirical research indicates that the visibility of a transmission tower, and hence the severity of visual impact, decreases as the distance between the observer and the tower increases. The landscape type, through which the transmission line crosses, can mitigate the severity of visual impact through topographical or vegetative screening. In some cases the tower may dominate the view for example, silhouetted against the skyline, or in some cases be absorbed in the landscape. A complex landscape setting with a diverse land cover and topographical variation has the ability to decrease the severity of visual impact more than a mundane landscape.

11.7.1.3 Visual Impacts on Residents

Generally, the study area is moderately populated, especially the human settlements and farming communities. These communities are normally situated along main transportation routes or adjacent to rivers or water resources. The major towns have been identified in the visibility analysis as places that will experience intrusive views are:

- East London;
- King William's Town;
- Alice;
- Fort Beaufort;
- Adelaide; and
- Bedford.

Numerous other small villages and farm residents will experience an intrusion on their view due to the presence of the proposed Transmission line. It is unpractical to discuss all, but they are recognized as the general population of the study area and are identified as affected visual receptors. Some of the residents in the study area are farm residents, which are sparsely scattered across the study area. Residents of the affected environment are classified as visual receptors of *high* sensitivity owing to their sustained visual exposure to the proposed development as well as their attentive interest towards their living environment.

Due to the scale of the project, only sections of the proposed power line will be visible throughout of the study area. The topography provides moderate VAC to visually screen the components of the project and it can therefore be stated that the general visibility of the project will be moderate.

<u>Construction phase</u>

During the construction phase, unsightly views may be created by the presence of the construction camp and the lay-down yards. The duration of the potential visual impact will be temporary which will result in an anticipated *moderately-low* significance of visual impact for the proposed alignments. The visual exposure to the construction activity will initially be limited and only local farms and human settlements will experience views of the site preparation activity. As the structures increase in scale and height, the Zone of Visual Influence (ZVI) increases, resulting in a greater number of affected viewers and a subsequent increase in visual exposure.

The visual intrusion will progressively increase in severity as the power line increase in scale. The cleared site, construction camp and material lay-down yards will appear unsightly and out of character. Large scale construction elements such as cranes, will be highly visible and increase awareness of the construction activity over a considerable area. The visual intrusion caused during the construction stage will be high, but will be temporary in nature.

Operational phase

The residents of human settlements and farming communities along the power line may experience a high degree of visual intrusion due to their proximity to the alignment. These residents are within 5 km and in some instances within 1 km from the proposed alignment. This is considered the zone of highest visibility in which the highest degree of visual intrusion can be expected.

The presence of a transmission line in the visual field of the residents in this part of the study area will minimally affect the views they currently experience. The silhouette of a transmission line on the horizon will be visible from a great distance and thus increase the ZVI considerably, potentially impacting on more residents.

11.7.1.4 Visual Impacts on Tourists

The study area is renowned for its biodiversity and undulating landscapes. These characteristics provide the basis for the tourism industry which plays a major role in the economy of the Eastern Cape Province.

The entire study area is considered to have moderately-high tourism potential.

Construction phase

The temporary duration of the construction phase is not expected to cause major visual impacts. The location, number and size of the construction camps and lay-down yards will be crucial in regulating the impact. Detail information is not available and it is anticipated that the visual impact will occur localised and that a small number of tourists will be adversely affected by these project components during construction.

The construction camps may however cause a higher visual intrusion on tourists visiting the mostly vacant, western areas of the study area where the possibility of integrating it with existing settlements/towns, is low. Their exposure to possible unsightly views of the construction camps and the associated activity will however be minimal and localised.

The potential visual impact on tourists during the construction phase of the proposed project can be mitigated with relative ease. The greatest factor to consider is the location of the construction camp out of potential views that may be experienced from scenic routes or tourist hotspots.

Operational phase

Considering the extent of the proposed alignment, a great number of tourists will be affected during their visit. Although it is difficult to pinpoint particular locations in the study area that are of specific tourist value, since the entire study area bares value, the most obvious concentration of tourists can be expected in the eastern and central part of the study area. The presence of a transmission line in this undeveloped landscape will severely spoil the views that are currently experienced over the undulating hills.

It can be concluded that the proposed alignment will cause moderately-high visual intrusion for tourists travelling through the study area.

11.7.1.5 Visual Impacts on Motorists

The major routes in the study area include (amongst others) the R63, N2, N6 and R67 connecting the towns and human settlements. The secondary and tertiary roads are a loose network of gravel roads linking smaller settlements and farms. These road networks in the study area carries a much lower volume of motorists. Their duration of views will be temporary and it is expected that the visual intrusion that they will experience will be low. For this report only motorists using the main routes will be considered as there are many countless smaller roads within the study area.

Construction phase

The potential visual impact that may be experienced by motorists during the construction phase is considered to be minimal. Limited information is available and the number, location and size of the construction camps and lay-down yards are essential for accurately assessing the visual impact. It is anticipated that views of the construction camps and lay-down yards of the proposed alignment will be visible from the R63, N2, N6, R67 and local roads.

The presence of the construction camp and lay-down yards may create unsightly views. Motorists' visual exposure to the impact will be brief and the severity of visual impact will be *low*. The significance of potential visual impact is expected to be *low*.

Operational phase

On these roads, the N2 and R63 is the most prominent, carrying the highest volumes of traffic. The severity and significance of visual impact for the proposed alignment on motorists will be *low*. The speed at which motorists travel also has a moderating effect on the severity of the visual impact and further reduces visual exposure.

Mitigation measures are prescribed in the EMP to ensure that the visual appearance of the construction site is not an eyesore the adjacent areas. Examples include the erection of a suitable fence and screen during construction and the reinstatement and rehabilitation of the development footprint.

11.7.2 *Impact Assessment*

Environmental Feature	12. Visual Quality
Relevant Alternatives & Activities	All alternatives; access roads; construction camps
Project life-cycle	Construction phase
Potential Impact	**Proposed Management Objectives / Mitigation Measures**
Reduction in visual quality due to construction activities.	12.1. Suitable screening of works area. 12.2. Construction camps to be situated in areas with reduced impact to tourists. 12.3. On-going housekeeping to maintain a tidy construction area. 12.4. Proper reinstatement and rehabilitation of construction area.

	+/- Impacts	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	–-	local	medium-high	short-term	likely	2
After Mitigation	–-	local	medium	short-term	likely	1

The impacts assessment for the visual quality and associated attributes is supplemented by the following evaluation conducted as part of the Heritage Impact Assessment (Axis Landscape Architecture, 2011).

SIGNIFICANCE OF LANDSCAPE IMPACTS

Activity	Nature of Impact	Extent of Impact	Duration of Impact	Severity of Impact	Probability of Impact	Significance without Mitigation	Significance with Mitigation	Level of Confidence
Construction phase								
Main Route	Negative – Impacting on the visual quality of the landscape due to the presence of foreign elements and a loss of vegetation cover.	Local	Permanent if not mitigated	Moderate	Definite	Moderate	Low	High
Alternative 2				High	Definite	High	Moderate	High
Alternative 3				Moderate	Definite	Moderate	Low	High
Alternative 4				Low	Definite	Low	Low	High
Alternative 4 Segment A				Moderate	Definite	Moderate	Low	High
Alternative 4 Segment B				Low	Definite	Low	Low	High
Operational phase								
Main Route	Negative – Impacting on the visual quality of the landscape due the presence of a transmission line.	Local	Permanent	Moderate	Definite	Moderate	Low	High
Alternative 2				Moderate	Definite	Moderate	Low	High
Alternative 3				Moderate	Definite	Moderate	Low	High
Alternative 4				Low	Definite	Low	Low	High
Alternative 4 Segment A				Moderate	Definite	Moderate	Low	High
Alternative 4 Segment B				Low	Definite	Low	Low	High

VISUAL IMPACTS ON RESIDENTS

Activity	Nature of Impact	Extent of Impact	Duration of Impact	Severity of Impact	Probability of Impact	Significance without Mitigation	Significance with Mitigation	Level of Confidence
Construction phase								
Main Route	Negative – Construction camp and lay-down yards may cause unsightly views.	Local	Temporary	Low	Probable	Low	Low	High
Alternative 2				Moderate	Definite	Moderate	Low	High
Alternative 3				Moderate	Definite	Moderate	Low	High
Alternative 4				Low	Definite	Low	Low	High
Alternative 4 Segment A				Low	Definite	Low	Low	High
Alternative 4 Segment B				Low	Definite	Low	Low	High
Operational phase								
Main Route	Negative – The presence of a transmission line intrudes on existing views and spoils the open views of the landscape.	Local	Permanent	Low	Definite	Low	Low	High
Alternative 2				Moderate	Definite	Moderate	Low	High
Alternative 3				Moderate	Definite	Moderate	Low	High
Alternative 4				Low	Definite	Low	Low	High
Alternative 4 Segment A				Low	Definite	Low	Low	High
Alternative 4 Segment B				Low	Definite	Low	Low	High

VISUAL IMPACTS ON TOURISTS

Activity	Nature of Impact	Extent of Impact	Duration of Impact	Severity of Impact	Probability of Impact	Significance without Mitigation	Significance with Mitigation	Level of Confidence
Construction phase								
Main Route	Negative – Construction camp and lay-down yards may cause unsightly views.	Local	Temporary	Moderate	Probable	Moderate	Low	High
Alternative 2				High	Probable	High	Moderate	High
Alternative 3				High	Probable	High	Moderate	High
Alternative 4				Low	Probable	Low	Low	High
Alternative 4 Segment A				Moderate	Definite	Moderate	Low	High
Alternative 4 Segment B				Low	Probable	Low	Low	High
Operational phase								
Main Route	Negative – The presence of a transmission line intrudes on existing views and spoils the open views of the landscape.	Local	Permanent	Moderate	Definite	Moderate	Low	High
Alternative 2				High	Definite	High	Moderate	High
Alternative 3				High	Definite	High	Moderate	High
Alternative 4				Low	Definite	Low	Low	High
Alternative 4 Segment A				Moderate	Definite	Moderate	Low	High
Alternative 4 Segment B				Low	Probable	Low	Low	High

VISUAL IMPACTS ON MOTORISTS

Activity	Nature of Impact	Extent of Impact	Duration of Impact	Severity of Impact	Probability of Impact	Significance without Mitigation	Significance with Mitigation	Level of Confidence
Construction phase								
Main Route	Negative – Construction camp and lay-down yards may cause unsightly views.	At a number of point locations	Intermittent	Low	Probable	Low	Low	High
Alternative 2				Moderate	Probable	Moderate	Low	High
Alternative 3				Low	Probable	Low	Low	High
Alternative 4				Low	Probable	Low	Low	High
Alternative 4 Segment A				Low	Probable	Low	Low	High
Alternative 4 Segment B				Moderate	Probable	Moderate	Low	High
Operational phase								
Main Route	Negative – The presence of a transmission line intrudes on existing views and spoils the open views of the landscape.	Local	Intermittent	Low	Definite	Low	Low	High
Alternative 2				Moderate	Definite	Moderate	Low	High
Alternative 3				Low	Definite	Low	Low	High
Alternative 4				Low	Definite	Low	Low	High
Alternative 4 Segment A				Low	Probable	Low	Low	High
Alternative 4 Segment B				Moderate	Probable	Moderate	Low	High

11.8 Agriculture

11.8.1 Impact Overview

The impacts of a transmission line of agricultural land use and activities depend on the transmission line design and the type of farming. Transmission lines can affect field operations, irrigation, aerial spraying, wind breaks, and future land development (land use restrictions). Tower placement in farm fields can:

- Create problems for turning field machinery and maintaining efficient fieldwork patterns;
- Create opportunities for weed encroachment;
- Compact soils;
- Result in safety hazards;
- Hinder or prevent aerial activities by planes or helicopters;
- Interfere with moving irrigation equipment; and
- Hinder future consolidation of farm fields or subdividing land for residential development.

It should be noted that the proposed transmission line will not result in the sterilisation of all the land within the servitude, and certain agricultural practices (e.g. some crop cultivation, grazing and the use of farm roads) are still possible.

Concerns were raised during public participation regarding the risk of the EMFs on livestock (including dairies). ***Appendix G*** contains a report compiled by Dr Pretorius on Electric and Magnetic Fields from Overhead Powerlines – A Summary of Technical and Biological Aspects, which includes *inter alia* a summary of the potential impacts of EMFs to animals. According to this study, several large investigations have been carried out on livestock living under and near high voltage power lines and no significant effects on fertility, growth or milk production have been found.

The walk-down survey will aim to avoid (or minimise if avoidance is not possible) the placement of towers within cultivated land, depending of the possible distance that the line can be spanned in these areas.

The impacts associated with the project on livestock are managed through mitigation measures contained in the EMP.

11.8.2 Impact Assessment

Environmental Feature	13. Agriculture
Relevant Alternatives & Activities	All alternatives; access roads; construction camps
Project life-cycle	Construction & operation phase
Potential Impact	**Proposed Management Objectives / Mitigation Measures**
Disturbance to farming practices and livestock.	13.1. Wherever possible, avoid placing transmission line structures in agricultural areas (e.g. span croplands). 13.2. Negotiate with landowner the timing of the construction activities and the exact locations of towers within agricultural land. 13.3. Suitable access arrangements to be made with landowners. 13.4. Safeguarding of livestock against construction activities (e.g. barricading excavations). 13.5. Proper reinstatement and rehabilitation of construction area.

	+/- Impacts	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	–-	local	medium-high	short-term	likely	2
After Mitigation	–-	local	medium	short-term	likely	1

11.9 Social Environment

11.9.1 Impact Overview

The following section was extracted from the Social Impact Assessment) (Dr Neville Bews & Associates, 2011).

The Social Impact Assessment identified the following social impacts:

- Access across site;
- Access to servitude across private property;
- Crime and security;

- Disturbance of cultural, spiritual and religious sites;
- Economic effects at a micro level;
- Economic effects at a macro level;
- Fencing;
- Fire hazards;
- Health issues related to electromagnetic fields (EMFs);
- Impact on farming operations;
- Job creation;
- Noise;
- Resettlement;
- Safety hazards for people and animals;
- Services and infrastructure;
- SMME opportunities;
- STDs, HIV and AIDS risk;
- Social instability;
- Visual impact and disturbance of sense of place; and
- Traffic disruption during construction and maintenance.

It is likely that, during construction and possibly during maintenance, the transmission line will result in a restriction of access across sections of the servitude corridor. As this impact is principally associated with the construction phase of the project it is likely to be temporary in nature and the intensity will depend largely on the construction activity being undertaken at the time. For instance, during excavation and foundation work, access will be more confined than compared to access during the tower assembly and stringing process which may stretch across sections exceeding 1 km. Due to higher population densities along the eastern section of the Main Route, in the vicinity of East London, and to a lesser degree with respect to Alternative 2, the impact of access restrictions across the site will be marginally greater than is the case across the rest of the proposed routes, where the population is somewhat less dense.

During both construction and maintenance, Eskom will require access to the servitude which will at times be gained through privately owned property. This impact is also largely associated with the construction phase of the project and accordingly is likely to be temporary in nature. As with the previous impact the intensity of this impact will depend on the construction activity being undertaken at the time.

There is some possibility that, during the construction phase of the project, an opportunistic criminal element may take advantage of increased activities in some areas around the construction site. However, during operation the only activity that will be associated with the project will be maintenance and repair work which will be sporadic in nature only occurring on average twice yearly.

The economic effect of the project is addressed here at the social rather than economic level. In this regard the project is likely to have a negative effect on the value and potential of certain existing properties, farming activities and commercial enterprises along the route. At the second level the impact concerns the operational phase of the project and is likely to be positive at a national level. The ultimate aim of the project is to augment the southern and eastern electricity supply grids thus improving reliability of supply within both areas.

The economic effects of the project are addressed here, from a social perspective, at the macro-economic level. The construction of the proposed transmission line has become necessary due to increasing demands being placed on electricity supply within the Southern Electricity Grid. These demands, which are estimated to have surpassed 500MW in 2009/2010, will result in the Southern Grid becoming increasingly unstable which, in turn is likely to have both a regional and macro-economic impact. Eskom intends to address this issue through the Neptune-Poseidon Project which they claim will improve the reliability of supply within both the southern and eastern electricity supply grids. In this sense the project is likely to have a positive impact at a national level,

There is a possibility that existing fences may be damaged during the construction and maintenance processes. The issue of damage to fencing is of particular concern to game farmers as they need to ensure that their farms are secured at all times to prevent any loss of game. Apart from this the required fence structures must conform to a particular standard making repairs relatively expensive. During construction it is also important to ensure that construction sites are properly fenced off to prevent any injury to people who and/or animals that may roam in the vicinity of the construction site.

There may be some increase in the risk of veld fires as a result of construction activities. This is as a result of workers smoking and cooking food within the vicinity of the construction sites. Although the risk may be somewhat less during operation it would still exist to some degree during maintenance and repair activities.

Health related issues are related to EMFs and are associated with the operational, rather than construction phase of the project. It is important to note, that although the effects of EMFs are addressed at the social level here the scientific assessment of such health issues are beyond the scope of the specialisation of this study. Consequently, at the social level, health issues are dealt with in terms of public perceptions amongst the affected communities rather than on a scientific basis. The issue of health risks associated with the impact of EMFs on communities living within close proximity of transmission lines and electrical substations and on animals is and remains a controversial and well documented issue. Refer to ***Appendix G*** for a report on Electric and Magnetic Fields from Overhead Powerlines – A Summary of Technical and Biological Aspects.

During construction certain farming activities may be disrupted for a short while as construction teams access farming areas. The impact on farming activities is likely to be less significant during operation as normal farming activities, such as grazing and cultivation are permitted within the servitude. However, certain activities such as the growing of vegetation or building of structures, which would interfere with the safe operation of the power line, are restricted.

The issue of job creation, particularly when it comes to temporary jobs, must also be seen against the argument made by some that temporary job creation can be disruptive to certain communities. The argument is that workers leave what are more secure permanent jobs, to take up what appears to be a better paying temporary position with better working conditions attached, only to find once the temporary job ends that they are unable to regain permanent employment. Notwithstanding this, however, in areas of high unemployment the importance of earning some form of income cannot be underestimated

The psycho-social effects of noise includes irritation, mental health disturbances, noise induced stress and sleep disturbances and has been found to lead to depression. Although difficult to measure on a social level these effects are likely to be most severe where the relative quiet of a rural area is disrupted by noise associated with the construction and operation of the transmission line. The international tendency for evaluating the impact caused by intruding noise is to specify an average ambient noise level of 55dBA and 45dBA during the day and night respectively, as the maximum average ambient noise levels to which residential premises in urban areas should be exposed. As the project is situated in what is a rural area, renowned for tourism and game farming, the issue of noise reduction during construction and operation becomes important. Although it is unlikely that any constant noise emanating from the transmission line is likely to exceed the World Health Organisation's recommended noise limits it is the irritation factor of a prolonged buzzing sound, particularly during wet weather, which is of concern. There may be occasions during construction when the noise level may approach what may be considered to be an unacceptable level, however, this is likely to occur over a short time period.

Any resettlement must be undertaken in accordance with recognised acceptable relocation practices. This is important note as sections of the Main Route pass through what are essentially tribal lands.

During the construction phase excavations will be dug for tower foundations and heavy equipment will be used to drill and construct access roads. Cranes and stringing equipment will also be used to string the transmission cables. Eskom employees will also be working in areas where hunting is undertaken. During operation maintenance and repair work will at times require the use of heavy equipment and may require Eskom staff and/or contractors to venture onto lands used for hunting. All of this increases the risk of accidents and/or fatalities occurring to people and animals.

During the construction of the transmission line there is a risk that, as construction progresses along the route, it may damage various service facilities and existing infrastructure in the area such as existing power lines, water and sewerage facilities as well as farm roads.

A number of opportunities for small businesses and entrepreneurs will possibly be generated through the project. These opportunities will be both directly and indirectly associated with the project with a number being related to the upgrading of the national grid.

There is a risk of STDs, HIV and AIDS infections due to an influx of workers and work seekers during construction.

An increase of workers and job seekers can create a number of negative influences within the host community in respect of

- Increase in prostitution;
- Unplanned and unwanted pregnancies;
- Increase in alcohol and drug related incidents;
- Pressure on local services, such as housing, clinics, schools, water supplies;
- Increase in local prices and the cost of living;
- Tension and conflict within the community and impact on family networks and relationships; and
- Competition for available jobs and resources.

The project is unlikely to result in a significant increase in job opportunities in the area and consequently it is most unlikely to lead to any significant influx of workers and job seekers to the area.

The construction of the transmission line through what is largely a rural area is likely to change the rural atmosphere and lifestyle of the region and consequently, will have a negative effect on the sense of place for some residents. It is quite possible that this will also negatively impact the tourist potential of some game farms and nature reserves through which the line will pass.

There is some likelihood that, particularly during construction, the traffic may be at times be disrupted. The variations in the number of crossings between the various route alternatives and the nature of this impact are such that there are no real significant differences between any of the routes. Consequently, on the basis of this impact, there are no social grounds that would result in any one route alternative being favoured over another.

11.9.2 Impact Assessment

The following impact assessment was extracted from the Social Impact Assessment) (Dr Neville Bews & Associates, 2011).

Environmental Feature	**14. Social Environment**
Relevant Alternatives & Activities	**All alternatives; access roads; construction camps**
Project life-cycle	**Construction & operation phase**

ACCESS ACROSS SITE

Site	Scale	Relevance	Duration	Reversibility	Probability	Significance	Status	Confidence
Construction Phase without Mitigation Measures								
MR	Local	Relevant	Short-term	Reversible	Definite	Medium	Negative	Very
A2	Local	Relevant	Short-term	Reversible	Definite	Low	Negative	Very
A3	Local	Relevant	Short-term	Reversible	Definite	Medium	Negative	Very
A4	Local	Relevant	Short-term	Reversible	Definite	Low	Negative	Very
Se A	Local	Relevant	Short-term	Reversible	Definite	Low	Negative	Very
Se B	Local	Relevant	Short-term	Reversible	Definite	Low	Negative	Very
Operational Phase without Mitigation Measures								
MR	Local	Moderately-Relevant	Long-term	Reversible	Definite	Low	Negative	Very
A2	Local	Moderately-Relevant	Long-term	Reversible	Definite	Low	Negative	Very
A3	Local	Moderately-Relevant	Long-term	Reversible	Definite	Low	Negative	Very
A4	Local	Moderately-Relevant	Long-term	Reversible	Definite	Low	Negative	Very
Se A	Local	Moderately-Relevant	Long-term	Reversible	Definite	Low	Negative	Very
Se B	Local	Moderately-Relevant	Long-term	Reversible	Definite	Low	Negative	Very

Mitigation objective: To limit disruption of access across the selected servitude route.

Mitigation measures:

14.1. Provide strategically distributed crossing points to secure existing routes currently used by both farmers and local communities;

14.2. Consult with property owners, local authorities and communities to ensure that all affected parties are informed of the timing and extent of any disruptions;

14.3. Ensure that service nodes such as schools, clinics, water sources, places of worship, etc. remain easily and safely accessible at all times;

Construction phase with mitigation:

- Main Route – The significance of this impact is likely to revert to low.
- All other route alternatives - It is unlikely that any significant change will occur.

Operational phase with mitigation:

- All routes – As this impact is assessed as low during the operational phase mitigation is unlikely to result in any significant change.

ACCESS TO SERVITUDE ACROSS PRIVATE PROPERTY

Site	Scale	Relevance	Duration	Reversibility	Probability	Significance	Status	Confidence
Construction Phase without Mitigation Measures								
MR	Local	Relevant	Short-term	Reversible	Definite	Medium	Negative	Very
A2	Local	Relevant	Short-term	Reversible	Definite	Medium	Negative	Very
A3	Local	Relevant	Short-term	Reversible	Definite	Medium	Negative	Very
A4	Local	Relevant	Short-term	Reversible	Definite	Medium	Negative	Very
Se A	Local	Relevant	Short-term	Reversible	Definite	Medium	Negative	Very
Se B	Local	Relevant	Short-term	Reversible	Definite	Medium	Negative	Very
Operational Phase without Mitigation Measures								
MR	Local	Moderately-Relevant	Long-term	Reversible	Definite	Low	Negative	Very
A2	Local	Moderately-Relevant	Long-term	Reversible	Definite	Low	Negative	Very
A3	Local	Moderately-Relevant	Long-term	Reversible	Definite	Low	Negative	Very
A4	Local	Moderately-Relevant	Long-term	Reversible	Definite	Low	Negative	Very
Se A	Local	Moderately-Relevant	Long-term	Reversible	Definite	Low	Negative	Very
Se B	Local	Moderately-Relevant	Long-term	Reversible	Definite	Low	Negative	Very

Mitigation objective: To manage access to private property across the selected servitude route.

Mitigation measures:

14.4. Negotiate with landowners to ensure agreement concerning any access to private property;

14.5. Consult with property owners, prior to any access to ensure that they are timeously informed of the duration and nature of the required access;

14.6. Ensure that all staff and the staff of contractors can be clearly identified at all times;

14.7. Ensure that all staff and the staff of contractors are enlightened with regard to the appropriate protocol when entering and working on private property and that they adhere to this protocol at all times.

Construction phase with mitigation:

- All route alternatives - It is likely that mitigation will result in the significance of the impact changing from medium to low.

Operational phase with mitigation:

- All route alternatives – As this impact is assessed as low during the operational phase mitigation is unlikely to result in any significant change.

ECONOMIC EFFECTS AT A MICRO LEVEL

Site	Scale	Relevance	Duration	Reversibility	Probability	Significance	Status	Confidence
Construction Phase without Mitigation Measures								
MR	Local	Relevant	Long-term	Reversible	Definite	Medium	Negative	Very
A2	Local	Relevant	Long-term	Reversible	Definite	Medium	Negative	Very
A3	Local	Relevant	Long-term	Reversible	Definite	Medium	Negative	Very
A4	Local	Relevant	Long-term	Reversible	Definite	Medium	Negative	Very
Se A	Local	Relevant	Long-term	Reversible	Definite	Medium	Negative	Very
Se B	Local	Relevant	Long-term	Reversible	Definite	Medium	Negative	Very
Operational Phase without Mitigation Measures								
MR	Local	Relevant	Long-term	Reversible	Definite	Medium	Negative	Very
A2	Local	Relevant	Long-term	Reversible	Definite	Medium	Negative	Very
A3	Local	Relevant	Long-term	Reversible	Definite	Medium	Negative	Very
A4	Local	Relevant	Long-term	Reversible	Definite	Medium	Negative	Very
Se A	Local	Relevant	Long-term	Reversible	Definite	Medium	Negative	Very
Se B	Local	Relevant	Long-term	Reversible	Definite	Medium	Negative	Very

Mitigation objective during construction: To limit any economic loss suffered by individuals along the route.

Mitigation measures:

14.8. Where feasible adjust the route to reduce the negative economic impact that may occur to individuals, farming and commercial enterprises along the route;

14.9. Consider fair and reasonable compensation for individuals and enterprises economically prejudiced through the project;

14.10. Implement mitigation measures suggested in the economic report.

Construction and operational phases with mitigation:

- All route alternatives – If agreement can be reached in adjusting the route to minimise the negative effects of this impact and/or affected parties are fairly compensated this could result in the significance of the impact changing from medium to low.

ECONOMIC EFFECTS AT A MACRO LEVEL

Site	Scale	Relevance	Duration	Reversibility	Probability	Significance	Status	Confidence
Operational Phase without Optimisation Measures								
National Grid	National	Very Relevant	Long-term	N/A	Definite	High	Positive	Very

Optimisation objective: To enhance the Macro-economic benefit of the project.

Optimisation measures:

14.1. Ensure that the project is run in a responsible manner and that the environment is adequately protected from negative impacts;

14.2. Put adequate monitoring systems in place throughout the duration of the project;

14.3. Ensure that the value of the project is balanced against costs related to both the negative environmental and social impacts in the region;

14.4. Implement the mitigation measures suggested in the economic report.

FENCING

Site	Scale	Relevance	Duration	Reversibility	Probability	Significance	Status	Confidence
Construction Phase without Mitigation Measures								
MR	Local	Relevant	Short-term	Reversible	Definite	Medium	Negative	Very
A2	Local	Relevant	Short-term	Reversible	Definite	Medium	Negative	Very
A3	Local	Relevant	Short-term	Reversible	Definite	Medium	Negative	Very
A4	Local	Relevant	Short-term	Reversible	Definite	Medium	Negative	Very
Se A	Local	Relevant	Short-term	Reversible	Definite	Medium	Negative	Very
Se B	Local	Relevant	Short-term	Reversible	Definite	Medium	Negative	Very
Operational Phase without Mitigation Measures								
MR	Local	Relevant	Long-term	Reversible	Almost certain	Low	Negative	Very
A2	Local	Relevant	Long-term	Reversible	Almost certain	Low	Negative	Very
A3	Local	Relevant	Long-term	Reversible	Almost certain	Low	Negative	Very
A4	Local	Relevant	Long-term	Reversible	Almost certain	Low	Negative	Very
Se A	Local	Relevant	Long-term	Reversible	Almost certain	Low	Negative	Very
Se B	Local	Relevant	Long-term	Reversible	Almost certain	Low	Negative	Very

Mitigation objective: To ensure any damage to existing fencing, which may occur through activities associated with the projects, is repaired and that adequate fencing is provided at all times to protect people and protect and secure animals during the construction and maintenance operations.

Mitigation measures:

During construction;

14.11. The site should be fenced off to prevent access to the construction site;

14.12. Fencing should be inspected weekly and maintained properly by the Contactor until construction is complete;

14.13. Any damage to farm fencing must be adequately and promptly repaired to an acceptable standard.

During the operation;

14.14. Any damage to fencing during routine maintenance and repairs must be adequately and promptly repaired to acceptable standards.

Construction phase with mitigation:

- All route alternatives – It is likely that after mitigation the significance of this impact will change from medium to low.

Operational phase with mitigation:

- All route alternatives – It is unlikely that mitigation will result in any significant change occurring in respect of this impact.

FIRE HAZARDS

Site	Scale	Relevance	Duration	Reversibility	Probability	Significance	Status	Confidence
Construction Phase without Mitigation Measures								
MR	Local	Relevant	Short-term	Reversible	Definite	Medium	Negative	Very
A2	Local	Relevant	Short-term	Reversible	Definite	Medium	Negative	Very
A3	Local	Relevant	Short-term	Reversible	Definite	Medium	Negative	Very
A4	Local	Relevant	Short-term	Reversible	Definite	Medium	Negative	Very
Se A	Local	Relevant	Short-term	Reversible	Definite	Medium	Negative	Very
Se B	Local	Relevant	Short-term	Reversible	Definite	Medium	Negative	Very
Operational Phase without Mitigation Measures								
MR	Local	Relevant	Long-term	Reversible	Almost certain	Low	Negative	Very
A2	Local	Relevant	Long-term	Reversible	Almost certain	Low	Negative	Very
A3	Local	Relevant	Long-term	Reversible	Almost certain	Low	Negative	Very
A4	Local	Relevant	Long-term	Reversible	Almost certain	Low	Negative	Very
Se A	Local	Relevant	Long-term	Reversible	Almost certain	Low	Negative	Very
Se B	Local	Relevant	Long-term	Reversible	Almost certain	Low	Negative	Very

Mitigation objective: To reduce the risk of fires along the transmission line servitude.

Mitigation measures:

14.15. Provide strategically placed emergency access points during both construction and operation so as to ensure that landowners and emergency services are able to respond to the outbreak of a fire.

14.16. Ensure that both construction and maintenance personnel are made aware of the risks and dangers of veld fires and that they behave, at all times, in a manner so as to reduce the risk of fire.

14.17. Ensure close co-operation between landowners and construction and maintenance teams to ensure an effective fire management strategy.

Construction phase with mitigation:

- All route alternatives – It is likely that after mitigation the significance of this impact will change from medium to low.

Operational phase with mitigation:

- All route alternatives – It is unlikely that mitigation will result in any significant change occurring in respect of this impact.

HEALTH ISSUES RELATED TO ELECTROMAGNETIC FIELDS

Site	Scale	Relevance	Duration	Reversibility	Probability	Significance	Status	Confidence
Construction Phase without Mitigation Measures								
MR	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
A2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
A3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
A4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Se A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Se B	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Operational Phase without Mitigation Measures								
MR	Local	Relevant	Long-term	Reversible	Definite	High	Negative	Very
A2	Local	Relevant	Long-term	Reversible	Definite	High	Negative	Very
A3	Local	Relevant	Long-term	Reversible	Definite	High	Negative	Very
A4	Local	Relevant	Long-term	Reversible	Definite	Medium	Negative	Very
Se A	Local	Relevant	Long-term	Reversible	Definite	Medium	Negative	Very
Se B	Local	Relevant	Long-term	Reversible	Definite	Medium	Negative	Very

Mitigation objective: To manage health risks related to the project.

Mitigation measures:

14.18. Undertake an independent health assessment in respect of the dangers that may be associated with electromagnetic fields;

14.19. Follow mitigation measures recommended in the appropriate specialist report/s;

14.20. Put in place a monitoring system to monitor health risks throughout the life of the project;

14.21. Ensure that there is broad based representation, capable of serving both community and company interests in respect of the monitoring facility referred to above.

Construction phase with mitigation:

This impact is not applicable to construction as the effect of EMFs will only commence during operation.

Operational phase with mitigation:

- Main Route and alternatives, 2 and 3 – Mitigation is likely to reduce the significance of this impact from high to medium.
- Alternative 4 – Mitigation is likely to reduce the significance of this impact from medium to low with the proviso that the cumulative effects of placing a number of transmission lines within a single corroder does not exceed acceptable health standards in respect of EMF emissions.

IMPACT ON FARMING OPERATIONS

Site	Scale	Relevance	Duration	Reversibility	Probability	Significance	Status	Confidence
Construction Phase without Mitigation Measures								
MR	Local	Relevant	Short-term	Reversible	Definite	Medium	Negative	Very
A2	Local	Relevant	Short-term	Reversible	Definite	Low	Negative	Very
A3	Local	Relevant	Short-term	Reversible	Definite	Medium	Negative	Very
A4	Local	Relevant	Short-term	Reversible	Definite	Low	Negative	Very
Se A	Local	Relevant	Short-term	Reversible	Definite	Low	Negative	Very
Se B	Local	Relevant	Short-term	Reversible	Definite	Low	Negative	Very
Operational Phase without Mitigation Measures								
MR	Local	Relevant	Long-term	Reversible	Definite	Low	Negative	Very
A2	Local	Relevant	Long-term	Reversible	Definite	Low	Negative	Very
A3	Local	Relevant	Long-term	Reversible	Definite	Medium	Negative	Very
A4	Local	Relevant	Long-term	Reversible	Definite	Low	Negative	Very
Se A	Local	Relevant	Long-term	Reversible	Definite	Low	Negative	Very
Se B	Local	Relevant	Long-term	Reversible	Definite	Low	Negative	Very

Mitigation objective: To reduce disruptions to farming operations that may be caused by the construction of the transmission line

Mitigation measures:

14.22. Liaise with farmers and farmer associations with the aim of finding solutions to any restrictions placed on the movement of farm equipment and animals within and between farms during construction;

14.23. Provide safe and, where possible, convenient access points to limit any disruption to farming activities;

14.24. If and where feasible, coordinate construction activities with farming activities, to minimise disruptions in respect of both sets of activities;

14.25. Where technically feasible adjust the route to minimise any long-term disruptions to farming operations.

Construction phase with mitigation:

- Main Route – The application of mitigation measures is likely to change the significance of the impact from medium to low;
- Alternative 2 – As the significance of this impact is assessed as low mitigation is unlikely to result in any significant change occurring;
- Alternative 3 – The application of mitigation measures is likely to change the significance of the impact from medium to low;
- Alternative 4 – As the significance of this impact is assessed as low mitigation is unlikely to result in any significant change occurring;

Operational phase with mitigation:

- Main Route – As the significance of this impact is assessed as low mitigation is unlikely to result in any significant change occurring;
- Alternative 2 – As the significance of this impact is assessed as low mitigation is unlikely to result in any significant change occurring;
- Alternative 3 – The application of mitigation measures is likely to change the significance of the impact from medium to low;
- Alternative 4 including segments A and B – As the significance of this impact is assessed as low mitigation is unlikely to result in any significant change occurring;

JOB CREATION

Site	Scale	Relevance	Duration	Reversibility	Probability	Significance	Status	Confidence
Construction Phase without Optimisation Measures								
MR	Local	Relevant	Short-term	Reversible	Definite	Low	Positive	Very
A2	Local	Relevant	Short-term	Reversible	Definite	Low	Positive	Very
A3	Local	Relevant	Short-term	Reversible	Definite	Low	Positive	Very
A4	Local	Relevant	Short-term	Reversible	Definite	Low	Positive	Very
Se A	Local	Relevant	Short-term	Reversible	Definite	Low	Positive	Very
Se B	Local	Relevant	Short-term	Reversible	Definite	Low	Positive	Very
Operational Phase without Optimisation Measures								
MR	Local	Relevant	Long-term	Reversible	Definite	Low	Positive	Very
A2	Local	Relevant	Long-term	Reversible	Definite	Low	Positive	Very
A3	Local	Relevant	Long-term	Reversible	Definite	Low	Positive	Very
A4	Local	Relevant	Long-term	Reversible	Definite	Low	Positive	Very
Se A	Local	Relevant	Long-term	Reversible	Definite	Low	Positive	Very
Se B	Local	Relevant	Long-term	Reversible	Definite	Low	Positive	Very

Optimisation objective: To enhance the benefits of job creation.

Optimisation measures:

14.26. Use local labour as far as possible;

14.27. Create opportunities for the employment of women;

14.28. Where possible use labour-intensive methods of construction;

14.29. Go beyond the minimum wage rate and invest in local staff.

Construction phase with mitigation:

All route alternatives – Considering the social environment in which the project will occur, the significance of this impact will be low and optimisation is most unlikely to result in any significant change.

Operational phase with mitigation:

All route alternatives – Considering that the significance of job creation will be indirect at the regional and national levels optimisation is most unlikely to result in any significant change in respect of this impact.

NOISE

Site	Scale	Relevance	Duration	Reversibility	Probability	Significance	Status	Confidence
Construction Phase without Mitigation Measures								
MR	Local	Relevant	Short-term	Reversible	Definite	Low	Negative	Very
A2	Local	Relevant	Short-term	Reversible	Definite	Low	Negative	Very
A3	Local	Relevant	Short-term	Reversible	Definite	Low	Negative	Very
A4	Local	Relevant	Short-term	Reversible	Definite	Low	Negative	Very
Se A	Local	Relevant	Short-term	Reversible	Definite	Low	Negative	Very
Se B	Local	Relevant	Short-term	Reversible	Definite	Low	Negative	Very
Operational Phase without Mitigation Measures								
MR	Local	Relevant	Long-term	Reversible	Definite	Low	Negative	Very
A2	Local	Relevant	Long-term	Reversible	Definite	Low	Negative	Very
A3	Local	Relevant	Long-term	Reversible	Definite	Low	Negative	Very
A4	Local	Relevant	Long-term	Reversible	Definite	Low	Negative	Very
Se A	Local	Relevant	Long-term	Reversible	Definite	Low	Negative	Very
Se B	Local	Relevant	Long-term	Reversible	Definite	Low	Negative	Very

Mitigation objective: To reduce the effects of noise that may be generated during construction and operation.

Mitigation measures:

14.30. Construction activities and vehicle movement should be restricted to daylight hours;

14.31. All vehicles and construction machinery should be maintained to a standard that prevents the noise levels causing any unnecessary and avoidable nuisance to the workforce and local communities;

14.32. During operation the transmission line must be kept in a condition that minimises any unnecessary noise emanating from the line.

Construction phase with mitigation:

- All route alternatives – The level of this impact is assessed as low prior to the application of mitigation measures consequently it is unlikely that mitigation measures will have any significant effect on this assessment.

Operational phase with mitigation:

- All route alternatives – The level of this impact is assessed as low prior to the application of mitigation measures consequently it is unlikely that mitigation measures will have any significant effect on this assessment.

SAFETY HAZARDS FOR PEOPLE AND ANIMALS

Site	Scale	Relevance	Duration	Reversibility	Probability	Significance	Status	Confidence
Construction Phase without Mitigation Measures								
MR	Local	Relevant	Short-term	Reversible	Definite	Medium	Negative	Very
A2	Local	Relevant	Short-term	Reversible	Definite	Low	Negative	Very
A3	Local	Relevant	Short-term	Reversible	Definite	Medium	Negative	Very
A4	Local	Relevant	Short-term	Reversible	Definite	Medium	Negative	Very
Se A	Local	Relevant	Short-term	Reversible	Definite	Medium	Negative	Very
Se B	Local	Relevant	Short-term	Reversible	Definite	Medium	Negative	Very
Operational Phase without Mitigation Measures								
MR	Local	Relevant	Long-term	Reversible	Definite	Low	Negative	Very
A2	Local	Relevant	Long-term	Reversible	Definite	Low	Negative	Very
A3	Local	Relevant	Long-term	Reversible	Definite	Low	Negative	Very
A4	Local	Relevant	Long-term	Reversible	Definite	Low	Negative	Very
Se A	Local	Relevant	Long-term	Reversible	Definite	Low	Negative	Very
Se B	Local	Relevant	Long-term	Reversible	Definite	Low	Negative	Very

Mitigation objective: To reduce the risk of accidents and/or fatalities associated with the project.

Mitigation measures:

14.33. Ensure that all equipment is maintained to the required standards;

14.34. Ensure that the appropriate safety procedures are in place and followed at all times during both construction and maintenance;

14.35. Fence off all construction sites to prevent people and animals straying onto the site;

14.36. Liaise with land owners prior to entering their property to ensure an understanding between contractors and property owners.

Construction phase with mitigation:

- Main Route, alternatives 3 and 4 – Mitigation is likely to result in the significance of this impact changing from medium to low.
- Alternative 2 – As the significance of this impact is rated at low prior to mitigation, mitigation is unlikely to result in any significant change in respect of this impact.

Operational phase with mitigation:

- All route alternatives – As the significance of this impact is rated at low prior to mitigation, mitigation is unlikely to result in any significant change in respect of this impact.

SERVICES AND INFRASTRUCTURE

Site	Scale	Relevance	Duration	Reversibility	Probability	Significance	Status	Confidence
Construction Phase without Mitigation Measures								
MR	Local	Relevant	Short-term	Reversible	Definite	Medium	Negative	Very
A2	Local	Relevant	Short-term	Reversible	Definite	Medium	Negative	Very
A3	Local	Relevant	Short-term	Reversible	Definite	Medium	Negative	Very
A4	Local	Relevant	Short-term	Reversible	Definite	Medium	Negative	Very
Se A	Local	Relevant	Short-term	Reversible	Definite	Medium	Negative	Very
Se B	Local	Relevant	Short-term	Reversible	Definite	Medium	Negative	Very
Operational Phase without Mitigation Measures								
MR	Local	Relevant	Long-term	Reversible	Definite	Low	Negative	Very
A2	Local	Relevant	Long-term	Reversible	Definite	Low	Negative	Very
A3	Local	Relevant	Long-term	Reversible	Definite	Low	Negative	Very
A4	Local	Relevant	Long-term	Reversible	Definite	Low	Negative	Very
Se A	Local	Relevant	Long-term	Reversible	Definite	Low	Negative	Very
Se B	Local	Relevant	Long-term	Reversible	Definite	Low	Negative	Very

Mitigation objective: To minimize any negative affect that the construction of the transmission line may have on existing infrastructure.

Mitigation measures:

14.37. Liaise with all relevant services providers such as SANRAL, Telkom, water authorities in the area as well as local and district municipalities to ensure that any disruption to existing infrastructure is limited.

14.38. Liaise with property owners to ensure that existing infrastructure is recorded and any damage repaired or compensated for.

Construction phase with mitigation:

- All route alternatives – The application of mitigation is likely to result in the significance of this impact changing from medium to low.

Operational phase with mitigation:

- All route alternatives – As the significance of this impact is assessed at low prior to mitigation it is unlikely that mitigation will lead to any significant change occurring.

SMME OPPORTUNITIES

Site	Scale	Relevance	Duration	Reversibility	Probability	Significance	Status	Confidence
Construction Phase without Optimisation Measures								
MR	Regional	Relevant	Short-term	Reversible	Definite	Low	Positive	Very
A2	Regional	Relevant	Short-term	Reversible	Definite	Low	Positive	Very
A3	Regional	Relevant	Short-term	Reversible	Definite	Low	Positive	Very
A4	Regional	Relevant	Short-term	Reversible	Definite	Low	Positive	Very
Se A	Regional	Relevant	Short-term	Reversible	Definite	Low	Positive	Very
Se B	Regional	Relevant	Short-term	Reversible	Definite	Low	Positive	Very
Operational Phase without Optimisation Measures								
MR	National	Relevant	Long-term	Reversible	Definite	Medium	Positive	Very
A2	National	Relevant	Long-term	Reversible	Definite	Medium	Positive	Very
A3	National	Relevant	Long-term	Reversible	Definite	Medium	Positive	Very
A4	National	Relevant	Long-term	Reversible	Definite	Medium	Positive	Very
Se A	National	Relevant	Long-term	Reversible	Definite	Medium	Positive	Very
Se B	National	Relevant	Long-term	Reversible	Definite	Medium	Positive	Very

Mitigation objective: To optimise the local level impact of opening and sustaining SMMEs.

Optimisation measures:

14.39. Establish a local SMME recruitment preference policy;

14.40. Implement a monitoring system to ensure that the local SMME recruitment preference policy is followed.

Construction phase with optimisation:

- All route alternatives – The application of optimisation is likely to result in the significance of this impact changing from low to medium.

Operational phase with optimisation:

- All route alternatives – Optimisation measure at a social level will not have an impact on this assessment. For more details in this regard refer to the economic assessment.

STDS, HIV AND AIDS RISK

Site	Scale	Relevance	Duration	Reversibility	Probability	Significance	Status	Confidence
Construction Phase without Mitigation Measures								
MR	Local	Moderately-Relevant	Short-term	Reversible	Unlikely	Low	Negative	Very
A2	Local	Moderately-Relevant	Short-term	Reversible	Unlikely	Low	Negative	Very
A3	Local	Moderately-Relevant	Short-term	Reversible	Unlikely	Low	Negative	Very
A4	Local	Moderately-Relevant	Short-term	Reversible	Unlikely	Low	Negative	Very
Se A	Local	Moderately-Relevant	Short-term	Reversible	Unlikely	Low	Negative	Very
Se B	Local	Moderately-Relevant	Short-term	Reversible	Unlikely	Low	Negative	Very
Operational Phase without Mitigation Measures								
MR	Local	Moderately-Relevant	Long-term	Reversible	Unlikely	Low	Negative	Very
A2	Local	Moderately-Relevant	Long-term	Reversible	Unlikely	Low	Negative	Very
A3	Local	Moderately-Relevant	Long-term	Reversible	Unlikely	Low	Negative	Very
A4	Local	Moderately-Relevant	Long-term	Reversible	Unlikely	Low	Negative	Very
Se A	Local	Moderately-Relevant	Long-term	Reversible	Unlikely	Low	Negative	Very
Se B	Local	Moderately-Relevant	Long-term	Reversible	Unlikely	Low	Negative	Very

Mitigation objective: To reduce the risk of the spread of STDs, HIV and AIDS.

Mitigation measures:

14.41. The Contractor/Operator should, in consultation with local HIV/AIDS organisations and government structures, design and implement an STD, HIV and AIDS awareness and prevention campaign for employees. This campaign should use various common practice methodologies in order to ensure social and cultural sensitivity.

14.42. The Contractor/Operator should make STD, HIV and AIDS awareness and prevention programmes a condition of contract for all suppliers and sub-contractors.

14.43. The Contractor/Operator should provide an adequate supply of free condoms to all workers. Condoms should be located in the bathrooms and other communal areas on the construction site and at the construction camps.

14.44. If viable, a voluntary counselling and testing programme should be introduced during the construction phase and continued during operations. This should be undertaken in conjunction with the existing VCT programmes within the region.

During the operational phase:

14.45. The Operator should, in association with HIV/AIDS organisations and government structures, implement an STD, HIV and AIDS awareness and prevention campaign directed at employees.

Construction phase with mitigation:

- All route alternatives – Mitigation will probably result in the risk of any increase in STDs, HIV and AIDS as a result of the project becoming highly unlikely.

Operational phase with mitigation:

- All route alternatives – Mitigation will probably result in the risk of any increase in STDs, HIV and AIDS as a result of the project becoming highly-unlikely.

SOCIAL INSTABILITY

Site	Scale	Relevance	Duration	Reversibility	Probability	Significance	Status	Confidence
Construction Phase without Mitigation Measures								
MR	Local	Moderately-Relevant	Short-term	Reversible	Unlikely	Low	Negative	Very
A2	Local	Moderately-Relevant	Short-term	Reversible	Unlikely	Low	Negative	Very
A3	Local	Moderately-Relevant	Short-term	Reversible	Unlikely	Low	Negative	Very
A4	Local	Moderately-Relevant	Short-term	Reversible	Unlikely	Low	Negative	Very
Se A	Local	Moderately-Relevant	Short-term	Reversible	Unlikely	Low	Negative	Very
Se B	Local	Moderately-Relevant	Short-term	Reversible	Unlikely	Low	Negative	Very
Operational Phase without Mitigation Measures								
MR	Local	Moderately-Relevant	Short-term	Reversible	Unlikely	Low	Negative	Very
A2	Local	Moderately-Relevant	Short-term	Reversible	Unlikely	Low	Negative	Very
A3	Local	Moderately-Relevant	Short-term	Reversible	Unlikely	Low	Negative	Very
A4	Local	Moderately-Relevant	Short-term	Reversible	Unlikely	Low	Negative	Very
Se A	Local	Moderately-Relevant	Short-term	Reversible	Unlikely	Low	Negative	Very
Se B	Local	Moderately-Relevant	Short-term	Reversible	Unlikely	Low	Negative	Very

Mitigation objective: To reduce the impact of an influx of workers and job seekers on existing family networks and social structures.

Mitigation measures:

14.46. Communication channels must be maintained between the contractor and local community structures in an effort to maximise the employment of local labour.

14.47. Make condoms readily accessible to workers.

14.48. Liaise with the South African Police Services and community structures to ensure that the workforce is controlled.

14.49. Where appropriate, workers from other area should be provided with adequate on-site temporary accommodation and amenities.

14.50. On completion of the work all temporary accommodation must be dismantled and removed to prevent the development of informal settlements.

Construction phase with mitigation:

- All route alternatives – Mitigation will probably reduce the risk of social instability to highly unlikely.

Operational phase with mitigation:

- All route alternatives – Mitigation will probably reduce the risk of social instability to highly unlikely.

VISUAL IMPACT AND DISTURBANCE OF SENSE OF PLACE

Site	Scale	Relevance	Duration	Reversibility	Probability	Significance	Status	Confidence
Construction Phase without Mitigation Measures								
MR	Local	Relevant	Long-term	Reversible	Definite	High	Negative	Very
A2	Local	Relevant	Short-term	Reversible	Definite	High	Negative	Very
A3	Local	Relevant	Short-term	Reversible	Definite	High	Negative	Very
A4	Local	Relevant	Short-term	Reversible	Definite	High	Negative	Very
Se A	Local	Relevant	Short-term	Reversible	Definite	High	Negative	Very
Se B	Local	Relevant	Short-term	Reversible	Definite	High	Negative	Very
Operational Phase without Mitigation Measures								
MR	Local	Relevant	Long-term	Reversible	Definite	High	Negative	Very
A2	Local	Relevant	Long-term	Reversible	Definite	High	Negative	Very
A3	Local	Relevant	Long-term	Reversible	Definite	High	Negative	Very
A4	Local	Relevant	Long-term	Reversible	Definite	High	Negative	Very
Se A	Local	Relevant	Long-term	Reversible	Definite	High	Negative	Very
Se B	Local	Relevant	Long-term	Reversible	Definite	High	Negative	Very

Mitigation objective: To limit the negative visual impact that the project may have on the environment and to retain the sense of place as best as possible.

Mitigation measures:

14.51. Consult with affected communities in an effort to identify and address issues relating to the visual impact and sense of place;

14.52. Reinstate the natural environment as swiftly as possible.

14.53. Where feasible, follow the recommendations of the visual impact specialist.

Construction phase with mitigation:

- All route alternatives – Consult the visual specialist's report in this regard.

Operational phase with mitigation:

- All route alternatives – Consult the visual specialist's report in this regard.

TRAFFIC DISRUPTION DURING CONSTRUCTION AND MAINTENANCE

Site	Scale	Relevance	Duration	Reversibility	Probability	Significance	Status	Confidence
Construction Phase without Mitigation Measures								
MR	Local	Relevant	Short-term	Reversible	Definite	Low	Negative	Very
A2	Local	Relevant	Short-term	Reversible	Definite	Low	Negative	Very
A3	Local	Relevant	Short-term	Reversible	Definite	Low	Negative	Very
A4	Local	Relevant	Short-term	Reversible	Definite	Low	Negative	Very
Se A	Local	Relevant	Short-term	Reversible	Definite	Low	Negative	Very
Se B	Local	Relevant	Short-term	Reversible	Definite	Low	Negative	Very
Operational Phase without Mitigation Measures								
MR	Local	Moderately-Relevant	Short-term	Reversible	Almost certain	Low	Negative	Very
A2	Local	Moderately-Relevant	Short-term	Reversible	Almost certain	Low	Negative	Very
A3	Local	Moderately-Relevant	Short-term	Reversible	Almost certain	Low	Negative	Very
A4	Local	Moderately-Relevant	Short-term	Reversible	Almost certain	Low	Negative	Very
Se A	Local	Moderately-Relevant	Short-term	Reversible	Almost certain	Low	Negative	Very
Se B	Local	Moderately-Relevant	Short-term	Reversible	Almost certain	Low	Negative	Very

Mitigation objective: To ensure the efficient and effective management of traffic disruptions.

Mitigation measures:

14.54. Carefully schedule construction activities to minimize traffic delays;

14.55. Inform the public of any envisaged disruptions.

14.56. Provide adequate traffic warning signs and traffic control measures that comply with national standards.

Construction phase with mitigation:

- All route alternatives – As the significance of this impact is assessed at low prior to mitigation it is unlikely that mitigation will lead to any significant change occurring.

Operational phase with mitigation:

- All route alternatives – As the significance of this impact is assessed at low prior to mitigation it is unlikely that mitigation will lead to any significant change occurring.

11.10 Economic Environment

The following section was extracted from the Economic Study.

11.10.1 Impact Overview

11.10.1.1 Impacts on the Eastern Cape Economy

The impacts on the provincial economy have been estimated using a macro econometric model for the province. The economic model is based on the input-output matrix where the relationships between the sectors in the regional economy are modelled. The model allows the user to assign construction values to specific economic sectors, and through a system of multiplier relationships between the sectors, determine the effect that the input has on the output of the different sectors of the regional economy. The model was developed and supplied by the Development Bank of Southern Africa.

The impact on the provincial; economy are created at three levels. The first level is the direct impact, which is the change in final demand as a result of the project, plus the first round effects. The first round effects are the changes in business activity and production occurring as a direct consequence of a project. An example would be the construction of the concrete footings for the pylons would require additional capacity to install these items. Indirect impacts measure the effect of this additional activity. The second level of impacts is the indirect effects, which are the changes in sales by suppliers to the directly affected businesses. The third level of impacts are the induced effects, which are the further shift in spending on food, shelter and other consumer goods caused by a change in the personal income of the workers on the project.

Table 45: Macro Economic Model Results for All Routes

Route Alternatives	Annual Impact on		
	GDP [R million]	Capital Utilisation [R million]	Labour [No.]
Main Route	453	1 811	683
Alternative 2	472	1 887	711
Alternative 3	468	1 870	702
Alternative 4	465	1 862	699

The annual impact on the gross domestic product of each alternative provides insight into the contribution that the alternative will make to the final market value of the goods and services produced in the Eastern Cape in a year. The bulk of this figure is for the direct impact on the electrical machinery and apparatus sector for the maintenance activities undertaken along the routes. Typically, a further 30% of indirect impact is created in sectors such as basic metal products, structural metal products, other fabricated metal products and on the building and construction sector. Other, smaller sectors of impact included the trade sector and the impact on mining.

The impact on the capital utilization quantifies the impact that the expenditure of capital amounts has on the various sectors of the economy. In every case above the greatest percentage impact has been in the electrical machinery and apparatus. The only other sectors impacted upon by this capital expenditure are basic metal products, structural metal products, other fabricated metal products and the real estate sector. The impacts on capital utilization incurred very little indirect or induced impact.

The impact on labour includes, generally, a 6% indirect impact, which has the effect of adding 6% more jobs in various sectors. The most impacted sectors are the basic metal products, structural metal products, other fabricated metal products and on the building and construction sector. Induced effects are more muted, being the addition of approximately 3% more jobs than the direct impact. Affected sectors include food products, trade, transport, communication, insurance and real estate.

The highest impacts on the economy are for Alternative 2, which is the longest route. This result is not the most economic thought, since the cheapest option, providing the same end result, will be the most economic. The resulting cost savings can be applied productively to other areas of the country. The most economic option is thus the Main Route.

11.10.1.2 Impacts of the Loss of Income Generated by Agricultural Land

The project area is generally rural, with the dominant land uses being given over to livestock raising. Livestock being produced in the area include:

- Cattle;
- Sheep;
- Goats; and
- Game.

Agricultural products from the area include meat, milk and dairy produce, wool. Eco-tourism products include trophies, live game and venison. Income from business ventures are derived from all of the above.

If the proposed project reduces the amount of agricultural land available for production, this loss will be felt through the loss of capital value and through the loss of income derived from the reduced land holdings. The loss of revenue impact is catered for under this section: “loss in income”. Hence the final routing of the transmission lines should be selected to have as little impact as possible on agricultural production.

As mentioned, employment in the agricultural sector is significant in the three smaller municipalities and employs 42% of the total active workforce along the main route. The importance of the agricultural sector to the economic wellbeing of the affected communities cannot be overstated. In general, these communities are poor, located in geographic areas where the economic is not diversified away from agriculture and are generally able to offer only manual labour to the market. Thus these communities are economically vulnerable and disruption to agricultural production will have disproportionately large impacts on those affected.

Routing Impacts upon agriculture include:

- Disruption of livestock or dryland crop raising through routings which constrain access to the fields or crop production;
- Disruption of conventionally irrigated crop raising through routings which restrict irrigation infrastructure; and
- Disruption of cattle raising through access provision during construction and operations; and
- The need to remove areas of productive agriculture out of production due to the placement of infrastructure.

11.10.1.3 Tourism and Leisure Impacts

Eco-tourism and leisure impacts through the transmission lines in the study area are generally limited to the impacts on game farms and associated accommodation and facilities. These include private game farms, private game reserves such as the Mpongo Private Game Reserve situated along Alternative Three and the Fort Pato Nature Reserve along Alternative Two.

It should be noted that the Fort Pato Nature Reserve has the potential to generate income, but the generation of this income would depend upon the custodian implementing projects to turn the venue into a tourist destination. This is projected for some time in the future and has therefore been accorded lesser weight than other, revenue generation, operations.

Game farming, when associated with tourism and leisure, derives its economic value from offering a glimpse of the natural wonders of the area, with a focus upon viewing or hunting game. This value proposition generally targets upper income earners, who place value on a rural sense of place and being in an environmental that is as close to natural as possible. When this is not being offered, the value proposition decreases and the affected game farm would have to adjust it's offering to the market to remain competitive.

Transmission lines impact upon the value proposition by bringing modern development to this natural environment, thereby reducing the rural and undeveloped sense of place.

There are other impactors, which have the same effect as that of transmission lines, these include noise from major roads, the access arrangements onto each game farm and the facilities and amenities that the game farm offers. Each of these has the ability to reduce the rural and undeveloped sense of place.

A further consideration is the market niche that the game farm operates in. The game viewing or hunting experience can range from a basic package, where the accommodation, game viewing opportunities and experience fit the budget of the tourist, to a very up market package where high prices are charged for the perfect rural (and luxurious) experience. The sensibilities of the different type of tourist are affected differently depending upon the market offering by the game farm. It is suggested that the visual impacts and physical presence of the transmission towers and lines will be more acute at the higher end of the market.

Construction phase impacts include the loss of income or reputation when construction crews come into contact with tourists seeking an unspoilt natural environment. Impacts associated with construction crew actions, resulting in the loss of stock or equipment should also be considered.

Hence the final routing, construction and maintenance of the transmission lines should be carried out to have as little impact as possible on the tourism and leisure industries.

Routing Impacts upon tourism and leisure include:

- Disruption of the rural and undeveloped sense of place for businesses where these aspects are highly valued by their clientele;
- Impacts upon game management through the need for construction or maintenance access to the transmission lines; and
- The need to impact directly upon remove tourism and leisure infrastructure due to the placement of infrastructure.

11.10.1.4 Impacts upon Land Values

The routing of transmission lines provides a very clear example of the conflict between the public good and private interests. Provisions in South African law allow the establishment of a servitude for the use of the utility, whilst still preserving the ownership of the land with the landowner. The utility thus has rights over the land that exceeds those claimed by the landowner. This trade-off is generally negotiated between the utility and the landowner and involves the payment to the landowner of a sum of money in compensation for the land rights. In the event that agreement cannot be reached, the state does have the right to expropriate the land. This power exists to ensure that landowners who are in the path of proposed public utilities do not have the power to hold the project to unreasonable ransom and to ensure that the public good trumps individual rights, in this case.

The central question therefore is the value of the compensation that is to be paid to the landowner for the servitude rights. This value depends upon:

- The area of the servitude;
- The land uses to which the servitude is put;
- The impacts that the servitude rights will have on the productive capacity of the land; and
- Intangible aspects such as the value attributed to a landscape that will be altered by the passage of the transmission line.

There are three methods for valuing a property:

- The income approach, where the income from the property in question is discounted to obtain a future value;
- A replacement cost approach where the costs to replace the land and improvements that are affected by the servitude are valued; and
- A market data or comparable sales approach.

Comparable sales are traditionally the method used for servitude valuations, where such values exist. This method will best take into account intangible factors such as the visual impacts of transmission lines.

With regards the Main Route, many of the properties along the route already have electrical servitudes registered over them. The servitude agreements were negotiated and paid for in the 1970s and are still current. Landowners that brought properties with registered electrical servitudes are considered to have been paid for the servitude through the resulting adjustment in property value at the time of purchase. In most cases, the registered servitude is not wide enough for the proposed transmission line and thus the proponent will have to negotiate with the landowner for additional rights.

With regards to land values and compensation for the use of a servitude, impacts and mitigation should take into account the following categories of concern:

- The visual impacts on lines;
- Maintenance issues during operation;
- Multiple lines on a single property;
- Larger relative impacts on small properties than on large farms;
- The public relations aspects of Eskom's business; and
- Loss of business caused by the servitude.

11.10.1.5 Impacts of Property Damage

Transmission lines are large pieces of infrastructure and require both heavy equipment to construct and periodic maintenance. They are also often constructed on in-accessible portions of land where vehicles and people do not often travel.

The scoping phase of the EIA and during site visits conducted as part of the economic study both showed that property damage during construction and maintenance is a real impact suffered by landowners. Maintenance examples include crews not closing access gates and thus allowing livestock to escape, damage of fences and gates that have to be repaired by the landowner, theft during maintenance operations, and falling lines and pylons causing fires which damage crops and grazing. Construction impacts include damage to gates and fences, damage to access roads and damage to open veld by vehicles and the wilful creation of new access roads. All of these construction impacts require rehabilitation by the landowner. Anecdotal evidence suggests the Eskom control over construction and operations crews is lacking which leads to most of the above incidents.

11.10.1.6 Impacts of Relocation

The servitude under the transmission line is required to be completely empty and devoid of any structure or habitual human activity. It is likely that this stipulation will require the relocation of structures. Anticipated relocations include directly affected cattle kraals, graves and in some cases traditional homesteads.

Although a full treatment of the impacts and mitigations of this re-location is within the preserve of the social and heritage specialist assessments, the economic study highlights the issue to ensure that any such relocation will not result in economic harm to the affected households.

In principle, every household that is affected by the relocation of structures should be compensated to the extent that it does not suffer economic harm as a result of the relocation. The economic state of the household should be the same or better as a result of the relocation, Eskom compensation policies should be designed to ensure that such compensation is fairly dispensed. This policy could include meaningful offsets should it be agreed with the household in question.

11.10.1.7 Employment and Skills Transfer

The project has the potential to positively impact upon household incomes during the construction phase.

The status quo information shows that 20% of the households along the proposed transmission line routes earn no income and that a further 73% earn less than R3 200 per month in 2001. Thirty-two percent of the workforce along the Main Route is employed, which speaks volumes about the high un-employment rate in the study area. These facts are common to all route alternatives except for Alternative Three, where average incomes are higher, less of the population earn zero income and employment rates are higher.

Thus, if the line were to be routed through either the Main Route or Alternative Two, all things being equal, the impact on poverty would be higher than if the route passed through Alternative Three. This conclusion is valid if the contractor follows local labour employment policies and uses the most labour intensive construction method possible.

At least, the contractor should be barred from bringing unskilled labour in from areas outside the immediate area of construction. The contractor should also be encouraged to employ a proportion of their semi-skilled labour requirements from the ranks of the local communities. In addition, the contractor could be obliged to employ labourers on short term contracts of three months, similar to the government sanctioned Expanded Public Works Programme contracts. This would ensure that the project components create as many work opportunities in the affected areas as possible.

The project also has the potential to positively impact upon the skills levels in local communities during the construction phase.

The status quo information shows that 44% of the people along the proposed transmission line routes had not progresses beyond primary school in 2001. This is applicable to all route alternatives except for Alternative Three, where average education levels are higher.

Thus, the impact on skills acquisition would be largest if the transmission line followed the Main Route or Alternative Two, rather than Alternative Three. This conclusion is valid if the contractor implements skills-based training programmers at the site. Unskilled workers could be taught a skill and achieve a certificate to support the skill. This would provide a degree of assistance with the worker's future search for work and allow the project to leave a lasting legacy on the economic wellbeing of the affected community.

Thus if all other aspects are ambivalent about which routing to follow, the employment and skills transfer aspect would dictate which of the routes would most benefit the affected communities. This conclusion is modified by the proviso that the employment and skills impacts are relatively small and short-term in nature and that the populations of all routes would benefit from the employment and skills transfer potential offered by the proposed project.

11.10.2 Impact Assessment

Environmental Feature	**15. Economy - Eastern Cape Economy**
Relevant Alternatives & Activities	**All alternatives**
Project life-cycle	**Pre-Construction and construction phase**
Potential Impact	**Proposed Management Objectives / Mitigation Measures**
Positive stimulus to the Eastern Cape economy from the construction phase. Improved reliability of the electricity supply to the region	15.1. The mitigation measure to increase the effectiveness of the economic impact is to select the alternative that achieves the project aims at the lowest cost. This cost would include the costs of mitigation measures to be undertaken to reduce economic and other environmental costs.

	+/- Impacts	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	+	Regional	High	Medium-Term	Almost Certain	0
After Mitigation	+	Regional	High	Medium-Term	Almost Certain	0

Environmental Feature	**16. Economy - Agricultural Land**
Relevant Alternatives & Activities	**All alternatives**
Project life-cycle	**Pre-Construction and Construction phase**
Potential Impact	**Proposed Management Objectives / Mitigation Measures**
Route selection which disrupts agricultural production, impacts on irrigation is the most difficult to mitigate.	16.1. Route selection that avoids irrigated agriculture. 16.2. The use of high pylons to minimize disruption. 16.3. Care should be taken during route selection not to interrupt access and internal roads within agricultural production units. 16.4. The use of free-standing pylons where necessary to enable farming to proceed without encumbrance from guying. Due regard should be had when implementing this measure to the higher costs of the free-standing pylons.
The cumulative impact of this project's lines adding to the existing lines on agricultural land will be higher as the number of lines increases.	16.5. If more than one line crosses agricultural land, then route selection should as far as possible, use the existing transmission line servitude in the crossing. Using a totally new routing should be avoided where possible.

	+/- Impacts	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	-	Local	Medium	Medium-Term	Likely	2
After Mitigation	-	Local	Low	Medium-Term	Moderate	1

Environmental Feature	17. Economy - Tourism and Leisure Activities
Relevant Alternatives & Activities	All alternatives
Project life-cycle	Pre- Construction and Construction phase
Potential Impact	**Proposed Management Objectives / Mitigation Measures**
• Route selection that disrupts the visual appearance of tourism and leisure facilities can have a negative impact, depending upon the target market of the facility. The higher the market niche served by the facility, the correspondingly greater will be the impact on the establishment. • Pylons placement that disrupts access to facilities.	17.1. Route selection that avoids game farms is the most ideal outcome. 17.2. Where not possible, routing should be selected to traverse low visual impact areas of the farm and areas that have low tourism values. Care should be taken during route selection not to interrupt access and internal roads within tourism and leisure facilities; 17.3. The use of visually appealing pylons, or pylons that reduce the number of structures per kilometres should be used where appropriate. 17.4. Transversal routes along farm boundaries should be used in preference to routes directly through game farms. 17.5. If more than one line crosses agricultural land, then route selection should as far as possible, use the existing transmission line servitude in the crossing. Using a totally new routing should be avoided where possible.
• Disruption of tourism and leisure facilities due to construction activities which limit access to game areas or which alter natural habitats. • Poor housekeeping by construction staff. • Stock losses due to poor construction housekeeping.	17.6. Agreement should be reached with each landowner on the construction programme and impacts on the property during construction. Where necessary construction could be scheduled during low tourist season on affected farms. Agreements made prior to construction with respect to property access, the duration of construction and the impacts on the land should be adhered to by both the landowner and the utility. 17.7. For safety reasons, hunting should halt when the transmission lines are being built. As far as possible construction should be carried out along game farms during off-peak tourism periods. 17.8. All local mitigation measures agreed to for each operation should adhered to by Eskom site staff. 17.9. Eskom compensates affected landowners for damages directly attributable to construction activities.

	+/- Impacts	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	-	Local	Medium	Medium-Term	Likely	2
After Mitigation	-	Local	Low	Medium-Term	Moderate	1

Environmental Feature	18. Economy - Tourism and Leisure Activities
Relevant Alternatives & Activities	All alternatives
Project life-cycle	Operational Phase
Potential Impact	**Proposed Management Objectives / Mitigation Measures**
• Disruption of tourism and leisure facilities due to operations and maintenance activities which limit access to game areas or which alter natural habitats. • Poor housekeeping by operations and maintenance staff. • Stock losses due to poor operations and maintenance staff housekeeping.	18.1. Operations and maintenance access should be arranged and discussed with the landowner prior to the operation being carried out. 18.2. For safety reasons, hunting should halt when the transmission lines are being maintained. Scheduled maintenance on the lines should be carried out outside of peak tourism periods. 18.3. All local mitigation measures agreed to for each operation should adhered to by Eskom site staff. 18.4. Eskom compensates affected landowners for damages directly attributable to operation and maintenance activities.

	+/- Impacts	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	-	Local	Low	Short-Term	Moderate	1
After Mitigation	-	Local	Low	Short-Term	Moderate	0

Environmental Feature	19. Economy - Land Values
Relevant Alternatives & Activities	All alternatives
Project life-cycle	Pre- Construction and Construction phase
Potential Impact	**Proposed Management Objectives / Mitigation Measures**
The negative financial impact of having a servitude, or further servitude, registered over a property.	19.1. Compensation should be paid by the utility for the right of use over the servitude. This value should be set via negotiation with affected landowners and take into account current norms and practice with regards compensation. As a last option, the use of the power to expropriate land should not be excluded from consideration, given the wider public good that the transmission lines serve. 19.2. Mitigation could also take the form of off-sets resulting from the project. Examples include improving access roads utilised by the Contractor during the construction process.

	+/- Impacts	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	-	Local	Medium	Medium-Term	Likely	2
After Mitigation	-	Local	Low	Short-Term	Moderate	1

Environmental Feature	20. Economy - Property Damage
Relevant Alternatives & Activities	All alternatives
Project life-cycle	Pre-Construction, Construction & Operation phases
Potential Impact	**Proposed Management Objectives / Mitigation Measures**
• Damage to fences, gates, roads and all other farms infrastructure by construction / maintenance crews. • Damage to agricultural land through fires caused by construction / maintenance crews	20.1. Agreement should be reached with each landowner on the construction programme and impacts on the property during construction. Agreements made prior to construction with respect to property access, the duration of construction and the impacts on the land should be adhered to by both the landowner and the utility.. 20.2. Eskom compensates affected landowners at a market-related rate for damage to property, directly attributable to construction activities. This includes for the value of crops or grazing affected by fires related to construction activities. 20.3. The establishment of a contractor environmental management system, staffed by a full-time environmental officer to monitor and control contractor activities in this regard.

	+/- Impacts	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	-	Local	Medium	Short-Term	Moderate	1
After Mitigation	-	Local	Low	Short-Term	Unlikely	0

Environmental Feature	21. Economy - Relocation
Relevant Alternatives & Activities	All alternatives
Project life-cycle	Pre-Construction and Construction phase
Potential Impact	**Proposed Management Objectives / Mitigation Measures**
Household level economic losses through relocation of structures such as kraal and homesteads	21.1. Agreement should be reached with each householder on the nature and timing of the relocation. 21.2. The default relocation strategy should be that Eskom carries out the relocation and reinstates the structure to the same or better condition than it was before the re-location became necessary. If it involves the demolition of the structure, an equivalent structure should be constructed within a reasonably short distance from the original structure. Should this not be feasible, and with the agreement of the landowner, monetary compensation should be considered. This strategy relieves the householder from the burden and costs of having to physically carry out the relocation. These costs are generally invisible and should not be imposed on householders.

	+/- Impacts	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	-	Local	High	Medium-Term	Likely	2
After Mitigation	-	Local	Low	Short-Term	Unlikely	0

Environmental Feature	22. Economy - Employment and Skills Transfer
Relevant Alternatives & Activities	All alternatives
Project life-cycle	Pre-Construction and Construction phase
Potential Impact	**Proposed Management Objectives / Mitigation Measures**
Route selection that runs through or near areas of poverty will greatly enhance opportunities for the use of local labour during construction.	22.1. Route selection to benefit more poverty affected areas, whilst taking into account the larger benefit of choosing the most cost efficient line will outweigh any local poverty alleviation benefits. 22.2. Compelling the contractor to use 100% local labour in the unskilled category of employment. 22.3. Compelling the contractor to use as much as possible local labour in the semi-skilled category of employment. 22.4. The use of three month long employment contracts to ensure that the maximum numbers of work opportunities are created in the area.
Route selection that runs through or near areas of poverty will greatly enhance opportunities for a formal skills training programme to be implemented for the local labour force.	22.5. Route selection to benefit areas with a higher education deficit, whilst taking into account the larger benefit of choosing the most cost efficient line will outweigh any skills training benefits. 22.6. Compelling the contractor to implement a skills training programme for the local labour force.

	+/- Impacts	Extent	Magnitude	Duration	Probability	Significance
Before Mitigation	+	Local	Low	Short-Term	Unlikely	0
After Mitigation	+	Local	Low	Short-Term	Likely	1

11.11 Cumulative Impacts

Box 4:	What is a "Cumulative Impact"?
According to GN No. R. 385 (2006), ***"cumulative impact"***, in relation to an activity, means the impact of an activity that in itself may not be significant but may become significant when added to the existing and potential impacts eventuating from similar or diverse activities or undertakings in the area.	

Cumulative impacts can be identified by combining the potential environmental implications of the project with the impacts of projects that have occurred in the past, are currently occurring, or are proposed in the future within the proposed corridor.

These are no known substantial linear projects that are planned within the corridor, which could exacerbate impacts associated with the construction phase of the project (e.g. erosion, vegetation clearing, disruption of game farming activities). Heavy vehicle construction traffic for the delivery of material and the transportation of construction workers will lead to an increase in traffic on the regional transportation network. Due to the scale of the project, the size of the construction crews and the nature of material to be delivered, significant cumulative impacts are not anticipated.

Rehabilitation and eradication of alien and invasive vegetation along the corridor is regarded as a crucial management measure, as other smaller linear of localised projects could compound the proliferation of problematic floral species.

A common method for mitigating impacts related to new power lines is corridor sharing, and thereby increasing the footprints of existing linear developments (e.g. roads, power lines, railway lines). Alternative 4 runs alongside the existing Pembroke-Poseidon 1 transmission line for approximately 70km. Alternatives 2 and 3 also run adjacent to the existing Buffalo-Pembroke transmission line for approximately 3km and 7.5km, respectively. Alternative 2 runs alongside the Buffalo-Neptune transmission line for approximately 2.5km before it ties in with the Neptune Substation.

Corridor sharing with existing facilities is usually encouraged because it minimises impacts by concentrating linear land uses and reducing the number of new corridors and by creating an incremental, rather than a new impact. The adoption of a development corridor aims to lessen the impacts to environmental features such as visual quality, flora, fauna, socio-economic aspects, heritage resources, especially when considered from a macro scale.

Corridor sharing can also have drawbacks. For example, where utility corridors run cross-country for long distances without crossing roadways, additional access roads could be required. If the corridor crosses environmentally sensitive areas, an expanded utility corridor would have additional impacts to the natural resources of the area. On smaller properties, the combined visual and economic impacts of an expanded corridor are also more severe. The corridor would also require a larger area to be cleared of vegetation. Landowners who already have a linear development on their property may feel unfairly burdened by the addition of another facility that further limits their rights and use of their property, or increases the impact of the existing facility (e.g. game farms).

Cumulative effects in terms of the EMF may occur as a result of aligning Alternative 4 and Alternative 4 Segment B alongside the existing high-voltage power line. Although it is anticipated that the EMF are mainly associated with localised influences within the servitude width, the cumulative impact is not quantified within the EIA report.

In general, the soils in the project areas are highly erodible. Any previous disturbance (including grazing) will be aggravated by the construction activities if this impact is not properly managed.

The project was initiated due to increasing demands being placed on electricity supply within the Southern Grid. These demands, which are estimated to have surpassed 500MW in 2009/2010, will result in the Southern Grid becoming increasingly unstable which, in turn is likely to have both a regional and macro-economic impact. It is intended for the Neptune-Poseidon project to improve the reliability of supply within both the southern and eastern electricity supply grids. In turn, this will have a positive impact on the macro economy.

In the central part of the project area, the Main Route must be located sufficiently north of the Bisho Airport to avoid any impacts to the operations of the airport. Cumulative impacts of these two facilities would relate to their combined adverse effects to the visual quality of the area. However, due to the existence of the airport, it is believed that the sense of place in the immediate area will not suffer a significant impact with the new transmission line (depending on its final alignment in this area).

12 ANALYSIS OF ALTERNATIVES

Alternatives are the different ways in which the project can be executed to ultimately achieve its objectives. Examples could include carrying out a different type of action, choosing an alternative location or adopting a different technology or design for the project. This section explores the evolution in the identification and refinement of alternatives that occurred during the execution of the EIA process,.

The section is concluded with the appraisal of all the environmental and technical considerations associated with the various alternatives through a comparative analysis to eventually distil the Best Practicable Environmental Option (BPEO). Münster (2005) defines the BPEO as the alternative that "*provides the most benefit or causes the least damage to the environment as a whole, at a cost acceptable to society, in the long term as well as in the short term*".

12.1 Overview of Alternatives

Of the various alternatives considered and discussed below, note that only the options pertaining to the alignments and tower structures were deemed feasible. In order to provide a point of reference for assessing the other alternatives, the "no go" option was also considered in the EIA.

12.1.1 Alignment Options

Through the EIA process, the following alignment alternatives were identified (refer to **Section 8.1**):

- **Main Route –** Approximately 191km, runs in an east to west direction from the Neptune to the Poseidon substation.
- **Alternative 2 –** Deviation from Main Route, which entails an arch of approximately 40km to the south and reconnects to the Main Route at Rini.

- **Alternative 3 –** Deviation from Main Route, which entails an arch of approximately 39km to the north and reconnects to the Main Route at Hillcrest.
- **Alternative 4 –** Deviation from Main Route, where the power line (approximately 65km) runs in a west to east direction from the Poseidon substation to the south of the Main Route alongside the existing Eskom 220kV Pembroke-Poseidon 1 transmission line. Alternative 4 connects to the Main Route via the following two options -
  - Segment A - approximate 6km in length and connects to the Main Route close to Klu Klu, south of Fort Beaufort.
  - Segment B continues alongside the existing Eskom 220kV Pembroke-Poseidon 1 transmission line for ± 17km and then continues in a north-easterly direction for another ± 8km to connect to the Main Route.

Should authorisation for the final alignment be granted by DEA, and following the negotiations with landowners, the final positions of the towers and the centre line for the Neptune-Poseidon 400 kV Transmission line and coordinates of each bend in the line will be determined through a walk-down survey to be conducted by surveyors and the relevant environmental specialists.

12.1.2 Tower Structures

The various tower types for a 400 kV transmission line are discussed in **Section 8.4**.

Should authorisation for the final alignment be granted by DEA, and following the negotiations with landowners, optimal tower sizes and positions will be identified and verified using a ground survey in terms of the EMP requirements.

Due to the constant endeavour to enhance tower design to minimise adverse environmental impacts in a technical and economically viable manner, the tower types available at the actual time of construction may differ from those currently available.

12.1.3 Alternatives suggested by I&APs

The following alternatives were suggested by I&APs up to the finalisation of the draft EIA Report:

- Upgrading of an existing power line, as raised by R. Hockley (Hammonds 148), L. King (Portion 12 of the Farm 600), M. Mangold (Agri Eastern Cape), B.D. Mkobeni. See discussion in this matter contained in **Section 12.1.4**.
- Placing the transmission line underground, as raised by A. Brodie (Portion 2 of the Farm 600), M. Dankwerts (Farm 147). See discussion on this matter contained in **Section 12.1.5**.
- Possibility of building a new substation L. King (Portion 12 of the Farm 600);
- Route deviation, as raised by J. Egelhof (Portion 11 of the Farm 600), T. Danckwerts (Farm 147), Mpongo Game Reserve, M. Dankwerts (Farm 147), H. Ballantyne (Hammonds 148), A. Brodie (Portion 2 of the Farm 600), Brian and Lee-Ann Mildenhall (Farms 203 and 204). See discussion on route refinement contained in **Section 12.5**.

12.1.4 Upgrading Existing Transmission Lines

The problems associated with the upgrading of the existing Pembroke-Poseidon 220 kV transmission line (or other existing power lines), which runs to the south of the route, include:

1. Larger pylons would be required as the existing towers would not be tall or strong enough to carry larger conductors carrying a higher voltage than what they were designed for; and
2. The upgrade would require the shutting down of the existing line for a significant period of time to carry out the necessary works. Such a shutdown would not be possible as all the existing lines are needed at any one time to meet current power needs of the greater PE area.

This option was not considered to be feasible and was disregarded following the Scoping phase.

12.1.5 Placing the Transmission Line Underground

There are currently no underground transmission lines of this capacity in South Africa and currently there are no plans to consider this option by Eskom Transmission.

It currently costs in the region of R1 million/km to construct an overhead 400 kV transmission line, whilst placing the equivalent line underground costs approximately 10 times more (i.e. R10 million/km). It is thus not economically viable to place a transmission line of this voltage underground.

In addition to financial considerations, the environmental impact of placing such a line underground is high. This is mainly due to the large area needed for installation to ensure sufficient spacing of the conductors, as they generate high heat and are not naturally cooled. Apart from certain grass types, no vegetation is allowed to grow on top of these underground lines. There are also severe restrictions in terms of land use, to allow for maintenance of the lines.

This option was not considered to be feasible and was disregarded following the Scoping phase.

12.1.6 "No Go" Option

As standard practice, the "no-go" option was included in the evaluation of the project alternatives.

The implications of the "no go" option are as follows:
- Inability to supply additional Transmission load;
- Poor Transmission reliability and Distribution quality of supply; and
- Possible shedding of Distribution load in the local East London area under N-1 Transmission contingencies involving Delphi – Neptune 400kV line.

This alternative is not supported, as failure to provide the necessary electrical infrastructure could potentially hamper economic activity in the Eastern Cape Province.

In contrast, should the Neptune-Poseidon 400 kV project not go ahead, the negative impacts associated with the project highlighted in **Section 11** would be irrelevant and the environmental status quo would not be affected.

12.2 Specialist Studies

In the sub-sections to follow the findings of the various specialists in terms of their respective preferences to the alternative routes are provided.

12.2.1 Faunal, Floral and Avifaunal Ecological Surveys

This sub-section was extracted from the Faunal, Floral and Avifaunal Ecological Surveys (Enviross, 2011), which is contained in ***Appendix F1***.

The preferred choice for the power line route is based on the following main points:

- Avoids impacts on untransformed and ecologically sensitive habitat;
- Takes into consideration impacts on CBA's (terrestrial and aquatic);
- Will not create undue impacts on conserved areas;
- Is associated with similar existing infrastructure;
- Is associated with a greater proportion of already ecologically degraded areas;
- Avoid the greatest amounts of avifaunal migratory routes and will therefore require the least amount of mitigation; and
- Where proposed mitigation measures will potentially have the greatest success in abating negative ecological impacts.

All of the route alternatives are presented in a comparison of overall ecological impact. Scores (out of 10) are based upon the impacts on the given criteria. These ratings are summarized in the table to follow.

Table 46: Impact scores relating to the various Neptune-Poseidon route alternatives. The lower number indicates the lesser overall ecological impacts (Enviross, 2011)

Option	Flora		Avifauna		Mammals	Herpeto-fauna	Impacts on wetlands	Impacts on natural or protected areas	Total (Ave)
	RDL Flora conservation	Vegetation unit conservation	Avifaunal impacts: Displacement	Avifaunal impacts: Collisions					
Western Region									
Main Route	1	3	4	3	3	2	1	3	2.50
Alt 4	1	3	4	3	2	3	1	1	2.25
Alt 4A	1	1	1	1	1	1	1	1	1.00
Alt 4B	1	2	2	2	2	2	1	1	1.63
Eastern Region									
Main Route	2	2	3	2	2	3	2	1	2.13
Alt 2	4	3	5	5	4	5	2	6	4.25
Alt 3	3	2	6	4	5	4	2	5	3.88
Central Region									
Main Route	3	3	3	3	1	5	3	1	2.75
Turn-in line									
Turn-in	1	1	1	1	1	1	1	1	1.00

It should be noted that the preferred Main Route is compared on more than one occasion wherein it is compared to Alternative 4 (in the western area) and then again when compared to Alternative 2 and Alternative 3 (within the eastern area). These route alternatives are deviations of the Main Route within the respective areas. Where the Main Route is the only alternative (within the central regions), no comparisons are offered. The proposed line alignment is divided into the western, central and eastern regions for comparison purposes of the various alternatives within these areas. The proposed alignment, based on the route that would comparatively have the least overall ecological impacts is presented in **Table 46**.

Western Region

The western region incorporates the alternatives of the Main Route and Alternative 4 (together with segments 4A and 4B). The proposed Main Route within this area was given an overall ecological impact rating of 2.50, whereas Alternative 4 was given a rating of 2.25. These two routes are very similar in nature. They traverse similar habitat types and topographical features. However, the proposed Main Route will go through a protected area, namely Kingsdale Game Farm. This protected area is one of the very few which protects the vegetation type of *Bedford Dry Grassland* (Mucina & Rutherford, 2006) and is therefore thought to be ecologically significant. In a region with few protected areas, it is recommended that the route of Alternative 4 be followed in this area.

The alternatives of Alternative 4A and 4B within the western region are also similar in nature, although 4A was designated an impact rating of 1.00, whereas 4B was designated a rating of 1.63. The higher rating for 4B is purely due to it being a longer alternative that 4A. The choice of a preferred route in this area is based on what alternative between the Main Route and Alternative 4 within the eastern section is chosen as the most suitable alignment route.

Central Region

The central region has only one alternative – that of the proposed Main Route. This route was designated an overall ecological impact rating of 2.75. Higher scores were designated to this route alternative due to it traversing an area with the highest amphibian diversity, an impact on wetlands within this area, crosses over a prominent rocky ridge and that it traverses an area where the greatest numbers of RDL floral species have been recorded. These are not thought to be largely significant as this area also includes the largest proportion of *degraded* habitat.

Eastern Region

The eastern region proposes two alternatives further than the proposed Main Route, namely Alternative 2 (in the south) and Alternative 3 (in the north). Alternative 2, 3 and the Main Route were designated overall ecological impact ratings of 4.25, 3.88 and 2.13, respectively. The proposed Main Route scored relatively lower mainly due to it not being associated with any protected (formal or informal) areas. It is also associated with the least amount of river crossings. It is therefore proposed that the Main Route be chosen as the preferred alternative within this area.

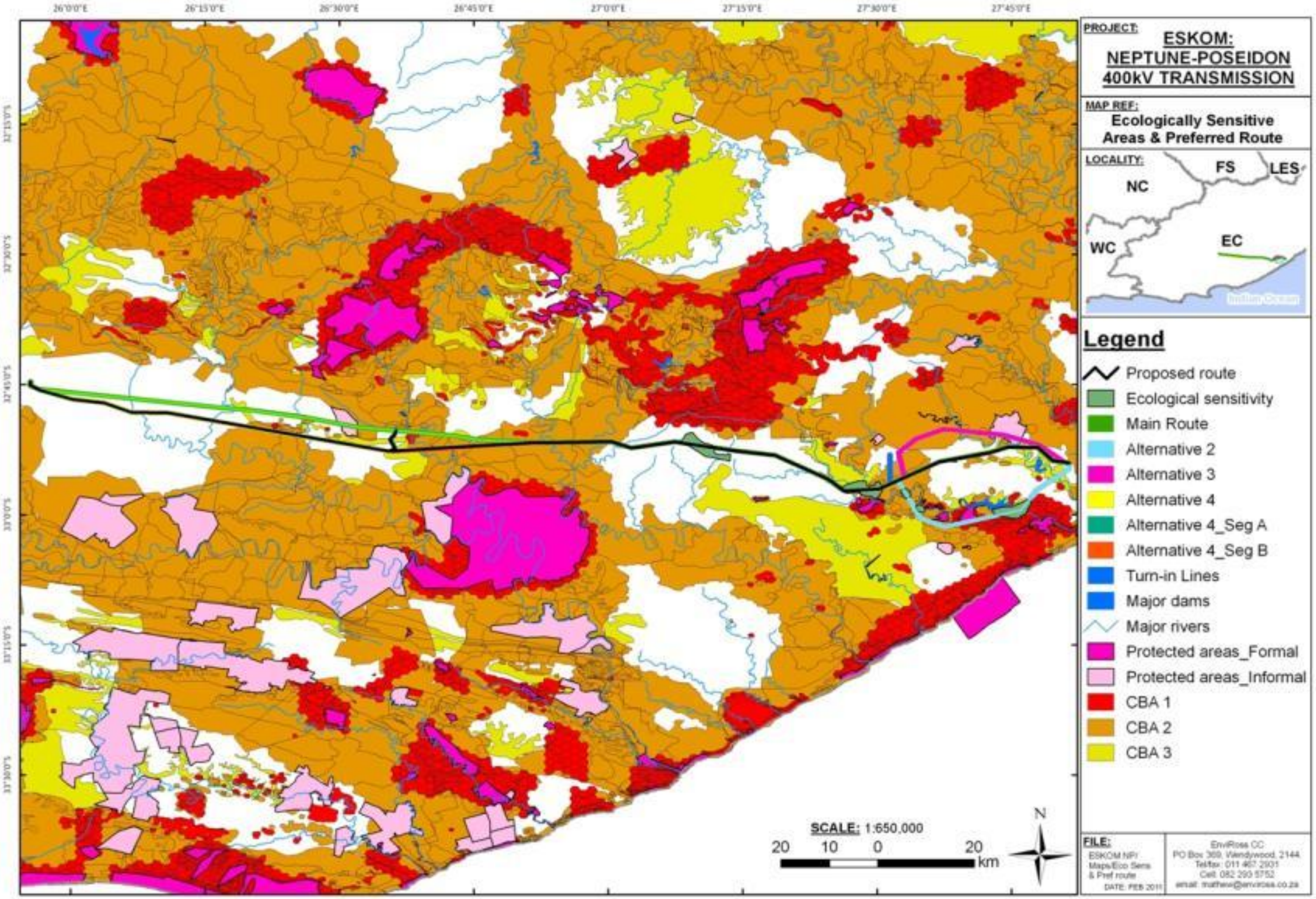


Figure 69: The proposed preferred route that would impose the least overall ecological impacts (Enviross, 2011)

12.2.2 Heritage Impact Assessment

Based on the Heritage Impact Assessment (J van Schalkwyk, 2011), as contained in ***Appendix F2***, it is concluded that from a heritage perspective any of the alternative routes would be suitable for development as the physical impact on heritage sites would be low and this can also be mitigated if necessary.

12.2.3 Agricultural Potential Assessment

Although the agricultural potential along Alternative 2 is slightly better than along the other routes (indicated by the increase in forestry activities towards the east), this study did not provide a preference to any of the alignment options.

12.2.4 Visual Impact Assessment

This sub-section was extracted from the Visual Impact Assessment (Axis Landscape Architecture, 2011), which is contained in ***Appendix F4***.

The four alternative alignments have been evaluated against international accepted criteria to determine the impact they will have on the landscape character and the viewers that have been identified in the study area.

The alternatives are rated according to preference by using a four-point rating system in **Table 47**, one (1) being the most preferred, to four (4) being the least preferred. The two Segments of Alternative 4 will be rated as a or b, where (a) being the most preferred. The preference rating is informed by the findings of the impact assessment and the overall performance of each alternative with regards to the impact on the landscape character and the identified viewers.

Alternative 4 with Segment B is regarded as the most preferred alternative between the Main Route and Alternative 4 in the western section of the proposed alignment. The Main route is the preferred alternative in the eastern section of the proposed alignment. Its location and position in the landscape is considered to cause the least impact on the landscape character due to the reduced sensitivity of the landscape along the servitudes and the local roads.

Table 47: Evaluation of alternative alignments (Axis Landscape Architecture, 2011)

Alternatives	Preference Rating
Main Route	2
Alternative 2	4
Alternative 3	3
Alternative 4	1
Alternative 4 Segment A	b
Alternative 4 Segment B	a

The impact of Alternative 4 with Segment B and Main Route on visual receptors varies between residents, tourists and motorists. The advantages associated with Alternative 4 and Main Route lies in the less significant landscape and visual impact on motorists and residents as compared to the other alternatives.

12.2.5 Economic Study

In addition to route alternatives, there is the No-Go Option of not building the transmission line. The economic impact of the project will be to secure adequate and reliable electricity supplies to the region. This will directly affect households and business in the area, allowing them to continue and to develop economic opportunities. In a modern economy, such as that in the study area, the positive economic impacts of this are manifest. Thus the No-Go Alternative is not a realistic option.

For the Economic Study, the choice between the alternatives will be the alternative that has the lowest economic impacts. Owing to the largely qualitative nature of the study, the determination of the route with the lowest economic impact will thus contain a degree of subjectivity. A more precise determination could be carried out if the costs for the project, including that for the acquisition of servitudes, were obtained and were available.

The determination will be carried out with reference to the following impacts:

- Economic benefits of improved electricity supply at the lowest cost;
- Loss of income from agricultural land;

- Loss of income from tourism and leisure;
- Loss of property value;
- The economic impacts of relocation; and
- Employment and skills transfer during the construction phase.

These impacts were identified earlier in the study and do not include the positive impact of increased and more reliable electricity supply to the region. This impact is common, and equal, for all routes and can therefore be removed from consideration. The economic requirement of lowest cost for the same quality of product is included in the evaluation criteria. The impact of damage to property has been excluded from the evaluation criteria owing to it being common to all routes. Although the costs to repair damage may be higher on higher value land, this is not certain, and may indeed be equal to the costs on lower value land.

Eastern Portion of Study Area

	Advantages	Disadvantages	Priority* (1/2/3)
Main Route	✓ Lowest Cost Alternative ✓ Servitudes already purchased, additional width is however required.	× Passes through high value land × Higher potential loss of income due to agricultural activities	2
Alternative 2	✓ Passes through relatively low value land ✓ Highest potential benefit to population during construction phase	× Highest Cost Alternative × Passes through potential eco-tourism business – Fort Pato Nature Reserve	1
Alternative 3	✓	× Passes through high value land × Passes through large eco-tourism business – Mapongo Private Game Reserve × Highest loss of income from eco-tourism × Higher potential loss of income due to agricultural activities	3

** Order of preference for route alignments, based on Economic Study*

In arriving at this determination, the impacts of the cost of servitude acquisition, the loss of income from agricultural and disruption to eco-tourism along the Main Route and Alternative Three are estimated to be higher than the additional costs of constructing the longer, and thus more expensive, Alternative Two. A higher weight is placed upon actual economic losses, rather than on potential losses. This comment is made with reference to the Fort Pato Nature Reserve. The routing of alternative Two would be improved if the Fort Pato Nature Reserve was not affected.

Western Portion of Study Area

		Advantages	Disadvantages	Priority (1/2)
	Main Route	✓ Lowest Cost Alternative ✓ Servitudes already purchased, additional width is however required.	× Passes through high value land × Higher potential loss of income due to agricultural activities × Potential disruption to eco-tourism businesses	2
	Alternative 4	✓ Follows an existing transmission line servitude	× Passes through high value land × Higher potential loss of income due to agricultural activities × Potential disruption to eco-tourism businesses	1

** Order of preference for route alignments, based on Economic Study*

Alternative Four has been favoured since it presents the least disruption to existing agricultural activity and eco-tourism businesses since it follows existing transmission line servitudes. The impact is lessened by not bisecting the area again.

12.2.6 Social Impact Assessment

Having considered all 4 alternatives it is clear that, on a social basis, there is no obvious fatal flaw in any of the routes although there are mitigation measures that would need to be applied with regard to most impacts in respect of all 4 route alternatives. However, in comparing all route alternatives it is also clear that a preferred route alternative does emerge.

The socially preferred route, moving from the Neptune Substation near East London in the east in a westerly direction towards a point between the N2 and R347, is the Main Route over Alternative 2 and Alternative 3. In respect of all three of these alternatives, all will to a similar degree, impact the communities through which they are plotted. The major difference being that the Main Route is situated within an existing vacant Eskom servitude while Alternative 2 and Alternative 3 are not.

Continuing towards the west, from a point west of the R67 to the Poseidon Sub-station near Cookhouse, the socially preferred route is Alternative 4. Although this alternative deviates from the existing vacant Eskom servitude it does follow the Eskom 220kV Pembroke-Poseidon line and, from a social perspective, it would be preferable if an existing corridor was used so as to limit any potential impact on the social environment as far as is possible. However, it is most important to note that this must be considered in conjunction with a health assessment as to the effects of routing a number of high voltage transmission lines within a common corridor in respect of electromagnetic fields.

In summary, the socially preferred route on leaving the Neptune Substation is the Main Route until it joins Alternative 4. From that point on the preferred route becomes Alternative 4 until it reaches the Poseidon Sub-station, provided this does not conflict with a health assessment of the route.

12.2.7 Summary

For comparative purposes, the project areas was divided into a western, central and eastern section, as shown in **Figure 70**.

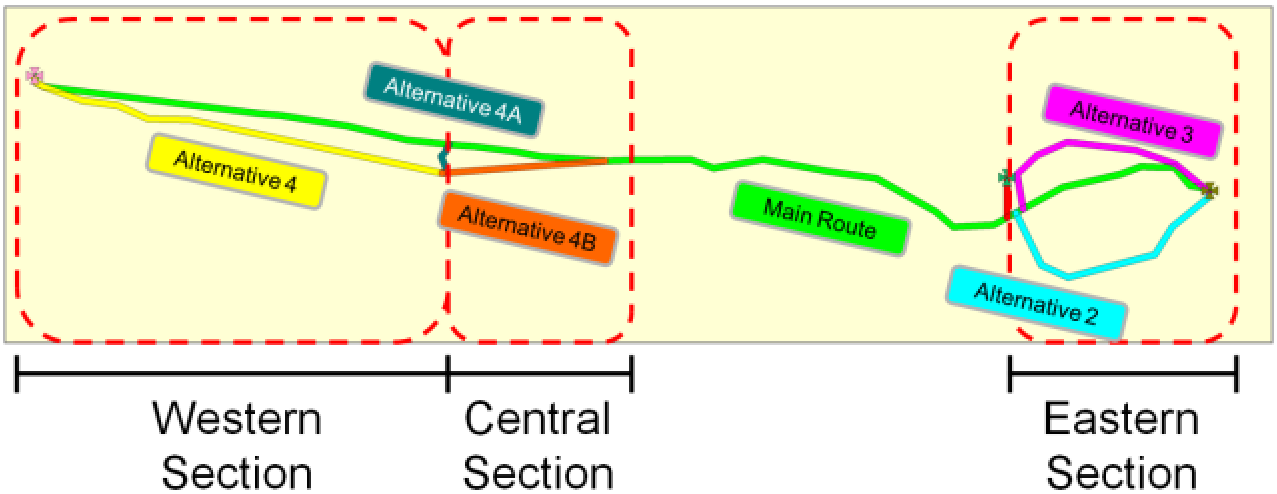


Figure 70: Layout of Neptune-Poseidon 400kV alignment alternatives

Note that Alternative 4 Segment A is not included in the comparison of alternatives as this route option will apply by default if Alternative 4 is preferred above the Main Route in the western section and the Main Route is favoured above Alternative 4 Segment B in the central section.

Apart from the Main Route, no alternative alignment exists in the area between the Central and Eastern sections (see **Section 4.5.4**). Hence, this portion is excluded from the comparative analysis.

A summary of the preferred alternatives, as recommended by the respective specialists, is tabulated below.

Table 48: Summary of Preferred Options recommended by Specialists

WESTERN SECTION			
Specialist Study	**Main Route**	**Alternative 4**	**No-Go Option**
Faunal, Floral and Avifaunal Ecological Surveys		✓	
Heritage Impact Assessment	No preference		
Agricultural Potential Assessment	No preference		
Visual Impact Assessment		✓	
Social Impact Assessment		✓	
Economic Study		✓	

CENTRAL SECTION			
Specialist Study	**Main Route**	**Alternative 4 Segment B**	**No-Go Option**
Faunal, Floral and Avifaunal Ecological Surveys		✓	
Heritage Impact Assessment	No preference		
Agricultural Potential Assessment	No preference		
Visual Impact Assessment		✓	
Social Impact Assessment		✓	
Economic Study		✓	

EASTERN SECTION				
Specialist Study	**Main Route**	**Alternative 2**	**Alternative 3**	**No-Go Option**
Faunal, Floral and Avifaunal Ecological Surveys	✓			
Heritage Impact Assessment	No preference			
Agricultural Potential Assessment	No preference			
Visual Impact Assessment	✓			
Social Impact Assessment	✓			
Economic Study		✓		

Note that for the central section Alternative 4 Segment B is indicated as the favoured option in terms of the Social Impact Assessment and Economic Study, as the reasons for selecting Alternative 4 as the preferred route in the western section will also apply in this instance.

12.3 Comparative Impacts of Alternative Routes

The table to follow compares the various route alternatives (broken up into the western, central and eastern sections) based on the receiving environment and the outcome of the impact assessment (**Section 11**).

Table 49: Comparative Impacts of Alternative Routes

(Note: Blocks highlighted in grey indicate the preferred option for each environmental feature; where no blocks are highlighted, no obvious preference exists)

WESTERN SECTION			
Environmental Feature / Attribute	**Main Route**	**Alternative 4**	**No-Go Option**
Topography	Route traverses hills and lowlands. In general, this route is aligned in higher lying areas. The Main Route crosses more major landforms, including watercourses and hills (e.g. Mount Prospect)	Route traverses hills and lowlands.	No impact
Watercourses	Major river crossing includes the Koonap River.	Major river crossing includes the Koonap River.	No impact
Soil	Soil erosion due to soil disturbance (construction, surface disturbances). Route less favourable due to steeper slopes.	Soil erosion due to soil disturbance (construction, surface disturbances).	No impact
Flora	Crosses Bedford Dry Grassland.	Follows existing power line - cumulative impact to vegetation.	No impact
Fauna	Route crosses Kingsdale Game Farm.	Follows existing power line - cumulative impact to fauna.	No impact
Conservation	Route crosses Kingsdale Game Farm.	No impact to conservation areas.	No impact
Agriculture	Low agricultural potential. Mostly traverses grazing land. Notable cultivated land along route is found at crossing of Koonap River.*	Low agricultural potential. Mostly traverses grazing land. Notable cultivated land along route is found at crossing of Koonap River.* Follows existing power line - cumulative impact to agriculture.	No impact
Heritage resources	Mostly greenfield land, with higher possibility of identifying heritage resources.	Runs alongside existing route, associated with previous linear disturbance. Follows existing power line - cumulative impact to heritage resources.	No impact
Social aspects	Route follows existing vacant servitude. Similar degree of social impacts for all alternatives.	Route follows existing power line. Cumulative impacts to social environment. Similar degree of social impacts for all alternatives.	Future development may be compromised if Eastern Grid is not strengthened
Economic aspects	Lowest Cost Alternative. Servitudes already purchased, additional width is however required. Passes through high value land. Higher potential loss of income due to agricultural activities.	Follows an existing transmission line servitude. Passes through high value land. Higher potential loss of income due to agricultural activities. Potential disruption to eco-tourism	Future economic development may be compromised if Eastern Grid is not strengthened

WESTERN SECTION			
Environmental Feature / Attribute	**Main Route**	**Alternative 4**	**No-Go Option**
	Potential disruption to eco-tourism businesses.	businesses.	
Planning aspects	Predominantly private land used for grazing and game farming purposes. New power line will adversely affect eco-tourism. Route follows existing vacant servitude.	Predominantly private land used for grazing and game farming purposes. Proposed route follows existing power line, with reduced overall land use impacts. Cumulative impact to individual landowners.	Insignificant impact
Transportation	Crosses the following arterial and main roads: R344 and R350. Crosses five secondary roads. Route follows existing vacant servitude.	Crosses the following arterial and main roads: R344 and R350. Crosses six secondary roads. Follows existing power line.	No impact
Visual quality	Significant impacts to visual quality.	Less significant landscape and visual impact on motorists and residents as compared to the other alternatives. Follows existing power line - cumulative impact to visual quality.	No impact

CENTRAL SECTION			
Environmental Feature / Attribute	**Main Route**	**Alternative 4 Segment B**	**No-Go Option**
Topography	Route traverses hills and lowlands. In general, this route is aligned in higher lying areas. The Main Route crosses more major landforms, including watercourses and hills.	Route traverses hills and lowlands.	No impact
Watercourses	Major river crossing includes the Kat River.	Major river crossing includes the Kat River.	No impact
Soil	Soil erosion due to soil disturbance (construction, surface disturbances). Route less favourable due to steeper slopes.	Soil erosion due to soil disturbance (construction, surface disturbances).	No impact
Flora	Highest impact to vegetation unit conservation.	Lower impact to vegetation unit conservation. Follows existing power line - cumulative impact to vegetation.	No impact
Fauna	Highest impact to avifaunal impacts in terms of displacement and collision potential.	Follows existing power line - cumulative impact to fauna.	No impact
Conservation	Crosses CBA area. No impact to protected areas.	Crosses CBA area. No impact to protected areas.	No impact

CENTRAL SECTION			
Environmental Feature / Attribute	**Main Route**	**Alternative 4 Segment B**	**No-Go Option**
Agriculture	Low agricultural potential. Mostly traverses grazing land.	Low agricultural potential. Mostly traverses grazing land. Follows existing power line - cumulative impact to agriculture.	No impact
Heritage resources	Mostly greenfield land, with higher possibility of identifying heritage resources.	Runs alongside existing route, associated with previous linear disturbance. Follows existing power line - cumulative impact to heritage resources.	No impact
Social aspects	Route follows existing vacant servitude. Similar degree of social impacts for all alternatives.	Route follows existing power line. Cumulative impacts to social environment. Similar degree of social impacts for all alternatives.	Future development may be compromised if Eastern Grid is not strengthened
Economic aspects	Lowest Cost Alternative. Servitudes already purchased, additional width is however required. Passes through high value land. Higher potential loss of income due to agricultural activities. Potential disruption to eco-tourism businesses.	Follows an existing transmission line servitude. Passes through high value land. Higher potential loss of income due to agricultural activities. Potential disruption to eco-tourism businesses.	Future economic development may be compromised if Eastern Grid is not strengthened
Planning context	Predominantly private land used for grazing and game farming purposes. New power line will adversely affect eco-tourism. Route follows existing vacant servitude.	Predominantly private land used for grazing and game farming purposes. Proposed route follows existing power line, with reduced overall land use impacts. Cumulative impact to individual landowners.	Insignificant impact to planning aspects.
Transportation	Crosses the following arterial and main roads: R345 and R67. Crosses a secondary road twice. Route follows existing vacant servitude.	Crosses the following arterial and main roads: R345 and R67. Follows existing power line.	No impact
Visual quality		Less significant landscape and visual impact on motorists and residents as compared to the other alternatives. Follows existing power line - cumulative impact to visual quality.	No impact

EASTERN SECTION				
Environmental Feature / Attribute	**Main Route**	**Alternative 2**	**Alternative 3**	**No-Go Option**
Topography	Route predominantly traverses strongly undulating plains, and to a lesser extent highly dissected hills.	Route traverses highly dissected hills, and accordingly crosses the most ridges.	Route predominantly traverses strongly undulating plains, and to a lesser extent highly dissected hills. The route crosses the second most ridges.	No impact
Watercourses	Major river crossing includes the Nahoon River.	Major river crossings include the Nahoon River and Buffalo River (twice). This route also crosses the most of the non-perennial watercourses.	Major river crossings include the Nahoon River and Tshabo River.	No impact
Soil	Soil erosion due to soil disturbance (construction, surface disturbances).	Soil erosion due to soil disturbance (construction, surface disturbances). Due to steep gradient, this route holds a higher possibility of soil erosion.	Soil erosion due to soil disturbance (construction, surface disturbances). Higher possibility of erosion than Main Route due to steeper terrain.	No impact
Flora	Shortest crossing of Buffels Thicket (vulnerable) in this section. Lowest impact to RDL flora conservation.	Longest crossing of Buffels Thicket (vulnerable) in this section. Highest impact to RDL flora conservation.	Second longest crossing of Buffels Thicket (vulnerable) in this section. Second highest impact to RDL flora conservation.	No impact
Fauna	Not associated with any protected (formal or informal) areas	Highest impact to avifaunal impacts in terms of displacement collision potential.	Highest impact to avifaunal impacts in terms of displacement.	No impact
Conservation	Not associated with any protected (formal or informal) areas	Route crosses the Fort Pato Nature Reserve and a section of the Bridle Drift Dam Nature Reserve. Highest impact to vegetation unit conservation.	Route traverses the Mpongo Private Game Reserve.	No impact
Agriculture	Crosses notable cultivated land north of Dongwe, at Rocklands, Sebastopol, Kingsdale, east of KwaMpundu and in the Newlands area.*	Crosses notable cultivated land in the Entunja, Lovadale and Msundulo areas, south of Bridle Drift Dam, north of Reeston and in the Mount Pleasant area.* Traverses forestry areas. Agricultural potential slightly higher. Route least preferred.	Crosses notable cultivated land north of Rini, at the crossing point of the Nahoon River, and in the Newlands area.*	No impact
Heritage resources	Similar degree of social impacts for all alternatives.	Similar degree of social impacts for all alternatives.	Similar degree of social impacts for all alternatives.	No impact
Social aspects	Similar degree of social impacts for all alternatives. Route follows existing vacant servitude.	Similar degree of social impacts for all alternatives.	Similar degree of social impacts for all alternatives.	Future development may be compromised if Eastern Grid is not strengthened
Economic aspects	Lowest Cost Alternative.	Passes through relatively low value	Passes through high value land.	Future economic

EASTERN SECTION				
Environmental Feature / Attribute	**Main Route**	**Alternative 2**	**Alternative 3**	**No-Go Option**
	Servitudes already purchased, additional width is however required. Passes through high value land. Higher potential loss of income due to agricultural activities	land. Highest potential benefit to population during construction phase. Highest Cost Alternative. Passes through potential eco-tourism business – Fort Pato Nature Reserve.	Passes through large eco-tourism business – Mapongo Private Game Reserve. Highest loss of income from eco-tourism. Higher potential loss of income due to agricultural activities.	development may be compromised if Eastern Grid is not strengthened.
Planning context	Possible future peri-urban development in Thorn Park area. Route follows existing vacant servitude.	Possible future expansion of Mdantsane and Reeston – corridor encroachment. Conflict with some of the main areas of the Open Space System / Environmental Network	Possible future expansion of Ilitha and Berlin – corridor encroachment.	Future development may be compromised if Eastern Grid is not strengthened.
Transportation	Crosses the railway line. Crosses the following arterial and main roads: N2, R102. Crosses 3 secondary roads. Route follows existing vacant servitude.	Crosses the railway line. Crosses the following arterial and main roads: N2, R102, M6, R346 (twice) and R347. Crosses 1 secondary road. Least preferred option.	Crosses the railway line. Crosses the following roads: N2, R102. Crosses 4 secondary roads.	No impact
Visual quality	Location and position in the landscape is considered to cause the least impact on the landscape character.			No impact

**Based on desktop appraisal of topographical maps and Google Earth imagery (listing may not be exhaustive)*

12.4 BPEO Selection

Based on the recommendations of the specialists and the comparison of the impacts associated with the various alignments, the following options are considered to be the preferred alternatives:

- **Western section:**
  The specialists were in agreement that Alternative 4 is the preferred option, which primarily stems from the route's alignment adjacent to an existing transmission line. This selection was confirmed when considering the impacts of each route.

- **Central section:**
  Consensus was reached between the specialists and the comparative impact evaluation that Alternative 4 Segment B was the favoured route, which again related to its positioning alongside the existing power line.

- **Eastern section:**
  The Main Route emerged as the preferred option in the eastern part of the project area, due to the existing vacant servitude and the related impacts to the receiving environment that were deemed to be the least significant when compared to the other alternatives. The only deviation from this finding was the Economic Study, which favoured Alternative 2. Regardless, the overall findings were sufficiently compelling to select the Main Route as the BPEO.

12.5 Route Refinement

Within the 1km corridor and through the spanning of the line the following sensitive features and areas need to be avoided as far as possible:

- Human settlements;
- Any conservation or protected areas;
- Active clay soil, marshy or flooding areas;

- Aerodrome statutory safety zones;
- Sugar cane fields, plantations;
- Irrigated land, windmills, boreholes;
- Open cast mining;
- Rugged terrain, extensive rock outcrops;
- Potential unstable side-slope terrain;
- Eroded and unstable areas;
- Railway lines/major roads angle of crossing (60º to 90º) because of interference to telecommunication system; and
- Railway lines telecommunication safety zone (when running parallel to them).

Taking into consideration the above-mentioned features as well as the environmental context of the project area, potentially significant environmental issues and suggestions made by the I&APs and EIA team, the route of the BPEO can be refined. The majority of the route refinement will take place during the walk-down survey, as well as through the negotiation process for the servitude registration.

During the refinement of the route through interaction with the landowners, it should be noted that various I&APs raised concerns pertaining to the impact of the transmission line to existing structures and features on their properties, for example:

- H. Ballantyne (Hammonds 148) indicated that he was concerned that a staff house is currently located close to the vacant servitude (i.e. Main Route);
- J. Egelhof (Portion 11 of the Farm 600) noted that Main Route passes very close to the dwellings and outbuildings;
- J.B. du Preez (Farm 209) provided a copy of the Eskom Servitude deed, and drew attention to the stipulations with regard to the orchard and dam on his property;
- T. Danckwerts (Farm 147) noted that his house and dairy are in close proximity to the proposed line and requested whether the line could be moved to the south on his farm;
- L. King (Portion 12 of the Farm 600) noted that the proposed Main Route is planned very close to where the available and suitable site for a homestead will be. In addition, he also indicated that the only access road onto his farm is through his garden and

yard, where in excess of 400 indigenous trees have been planted, which will be at risk of damage;

- A. Levey (Portion 9 of the Farm 600) indicated that he has a letter from Eskom stating that indigenous trees will not be cut down on his property;
- Mpongo Private Game Reserve indicated that Alternative 3 would virtually run over the day centre which incorporates the Huberta restaurant, (Nyala and Mvubu Conference Centres), Huberta lodge and Predator camps. It is also in very close proximity to the 5 star River lodge and the Wilderness Camp situated on the Nahoon River; and
- C. Abdo (Portion 7 of the Farm 272) indicated that the corridor for the Main Route passes over the southern portion of the farm, which will affect the use of the existing pastures and will prevent the intended installation of pivot irrigation.

13 PUBLIC PARTICIPATION – EIA PHASE

The purpose of public participation includes:

1. Providing I&APs with an opportunity to obtain information about the project;
2. Allowing I&APs to present their views, issues and concerns with regard to the project;
3. Granting I&APs an opportunity to recommend measures to avoid or reduce adverse impacts and enhance positive impacts associated with the project; and
4. Enabling Eskom and the project team to incorporate the needs, concerns and recommendations of I&APs into the project.

Box 3:	**What is an "I&AP"?**
According to Government Notice GN No. R. 385 (2006), "*Interested and Affected Party*" (I&AP) means an party contemplated in section 24(4)(d) of the NEMA, and which in terms of that section includes – (a) any person, group of persons or organisation interested in or affected by an activity; and (b) any organ of state that may have jurisdiction over any aspect of the activity.	

The public participation process that was followed for Neptune-Poseidon Project is governed by NEMA and GN No. R. 385. The Plan of Study for the EIA stipulates the activities to be undertaken as part of the public participation for the Neptune-Poseidon project, in accordance with regulatory requirements, which forms the basis of the discussions to follow. Note that the public participation conducted for the Scoping phase will not receive attention in this section as it was comprehensively discussed in the Scoping Report and the Extended Scoping Report. Emphases will thus primarily be placed on the EIA public participation process.

Figure 71 outlines the key milestones in the public participation process undertaken for the Scoping and EIA phases for the proposed Neptune-Poseidon 400 kV transmission line.

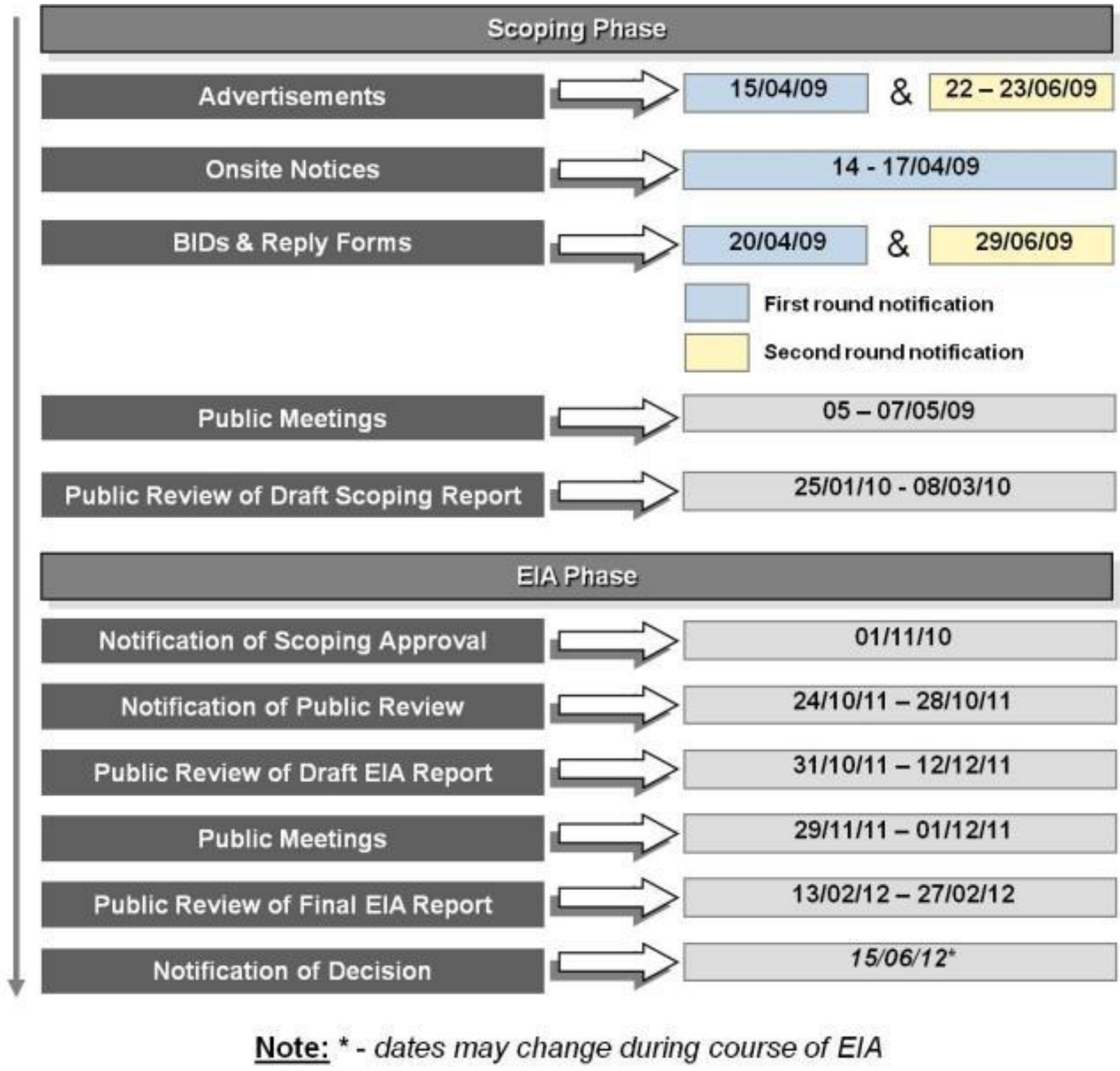


Figure 71: Public Participation Process for Neptune-Poseidon 400 kV transmission line

13.1 Maintenance of the I&AP Database

The database of I&APs (refer to ***Appendix I***), which contains particulars of *inter alia* authorities, stakeholders, landowners and members of the general public, was maintained during the EIA phase.

Directly affected landowners along the Main Route were identified *inter alia* by using the information provided by Eskom for their existing servitude. The remainder of the details for directly affected landowners along the Main Route as well as on Alternatives 2, 3 and 4 were identified through a deed search on affected properties within the 1 km corridor (i.e. 500 m on either side of the servitude centre line), and through discussions held with the Agricultural Sector, municipal planning departments, Department of Land Affairs: Deeds Registration and known landowners.

13.2 Notification – Approval of Scoping Report

Advertisements were placed in the following newspapers as notification that the Scoping Report had been approved by DEA (refer to copies of the newspaper advertisements contained in ***Appendix J***):

- Die Burger (Afrikaans) – 03 November 2010;
- The Herald (English) – 05 November 2010; and
- Daily Dispatch (English) – 03 November 2010.

In addition, all I&APs on the database were notified of the approval of the Scoping Report and commencement of the EIA phase via fax, email or registered mail.

13.3 Comments and Response Report

The correspondence received from I&APs during the EIA phase is included in ***Appendix K***. The EIA Comments and Response Report (contained in ***Appendix L***) provides a comprehensive summary of comments, issues and queries received from I&APs during the EIA phase. This Report also attempts to addresses the comments through input from the project team.

Note that all comments received following the public review of the Draft EIA Report were included in the final EIA Comments and Response Report.

13.4 Review of Draft EIA Report

13.4.1 Notification

I&APs were notified as follows of the opportunity to review the Draft EIA Report:

1. A notification letter of the Draft EIA Report was forwarded to I&APs; and
2. Newspaper advertisements were placed as notification in October 2011 in the following newspapers:
    - Die Burger (Afrikaans);
    - The Herald (English);
    - The Eastern Cape Voice (English);
    - Daily Sun (English); and
    - Daily Dispatch (English).

13.4.2 Lodging and Distribution of Draft EIA Report

The Draft EIA Report was placed at the locations provided in **Table 50** to allow the I&APs to review the document. A fourty-day review period (from 31 October 2011 until 12 December 2011) was granted.

Table 50: Locations for review of Draft EIA Report

Copy	Location	Address	Tel. No.
1.	Adelaide Public Library	Market Square, Adelaide	046 684 0034
2.	Bedford Public Library	Van Riebeeck St, Bedford	046 685 0187/0076
3.	Buffalo City Municipal Library	Corner Gladstone and Oxford St, East London	043 722 4991
4.	Fort Beaufort Public Library	Campbell Street, Fort Beaufort	046 645 1656
5.	King Williams Town Public Library	Ayliff Street, King William's Town	043 642 3391

Copies of the Draft EIA Report were provided to the DEA, DEAET, Eastern Cape Parks, SAHRA, Eastern Cape Department of Agriculture and the various municipalities that are traversed by the Main Route and Alternative Routes. Copies of the document were also provided to the following farmers associations:

- Agri Eastern Cape;
- Thornpark Farmers Association;
- Adelaide Farmers Association; and
- Fort Beaufort Farmers Association.

The Draft EIA Report was also placed on the Eskom website (www.eskom*.co.za/eia*).

13.4.3 Public Meetings

Public meetings were held between 30 November 2011 and 01 December 2011 to present the Neptune-Poseidon Draft EIA Report, as per **Table 51**.

Table 51: Details of public meetings held to present the Draft EIA Report

Date	Area	Time	Venue
30 Nov 2011	Thorn Park	09h00 – 10h30	Thorn Park Trading Store
	Nqonqweni / Rini	14h00 – 16h30	Mafigogane Primary School, Ndevana
01 Dec 2011	Fort Beaufort	09h00 – 10h30	Savoy Hotel, Fort Beaufort
	Adelaide	13h00 – 14h30	Midgley's Hotel, Market Square
	Bedford	17h00 – 18h30	Beford Town Hall, Donkin Street

I&APs were notified via email, fax or post regarding the details of the meetings. The advertisements discussed in **Section 13.4.1** also contained the particulars of the abovementioned public meetings.

The aims of the public meetings included the following:

- To present the project details (i.e. alternative routes considered);
- To present the findings of the specialist studies;
- To address key issues raised during the Scoping phase, Extended Scoping phase and the EIA phase;
- To elaborate on the potential environmental impacts (qualitative and quantitative), and the proposed mitigation of these impacts;
- To present the findings of the comparative analysis of the alternatives;
- To explain the EIA process; and
- To allow for queries and concerns to be raised, and for the project team to respond.

13.4.4 Meetings with Traditional Leaders

The following meetings were held with Traditional Leaders along the alternative alignments to present the Draft EIA Report:

Table 52: Details of meetings held with Traditional Leaders to present the Draft EIA Report

Date	Area	Time
29 Nov 2011	Amandlambe, Berlin	10h00 – 11h00
	Village 1, Ncera	12h00 – 13h00

Arrangements for the meetings were made with the respective Traditional Leaders.

13.5 Review of Final EIA Report

The Final EIA Report was lodged in the public domain for a two week period to grant I&APs and opportunity to review the document. Copies of the document were lodged at the same places listed in **Table 50** from **13 - 27 February 2012** and it was placed on the Eskom website (www.eskom.*co.za/eia*). All attendees of the public meetings were notified of the review process.

13.6 Notification of DEA Decision

All I&APs will be notified via email, fax or post within 10 days after having received written notice from DEA on the final decision for the Neptune-Poseidon EIA Report. Advertisements will also be placed in local and regional newspapers regarding the Department's decision. These notifications will include the appeal procedure to the decision and key reasons for the decision. A copy of the decision would be provided to I&APs on request.

13.7 Landowner Consent

In terms of regulation 16(1) of GN No. R. 385 of 21 April 2006, landowner consent is required if the applicant (i.e. ESKOM) is not the owner of the land on which the proposed activity is to be undertaken. According to regulation 16(3), this stipulation does not apply to a linear activity provided the applicant "has given notice of the proposed activity to the owners of the land on which the activity is to be undertaken as soon as the proposed route or route alternatives have been identified”. The last mentioned provision was attended to during public participation. Landowner consent will thus not be sought for the linear components of the Neptune-Poseidon Project.

14 EIA CONCLUSIONS AND RECOMMENDATIONS

14.1 Sensitive Environmental Features

Should authorisation for the final alignment be granted by DEA, and following the negotiations with landowners, the final position of the towers and the centre line for the Neptune-Poseidon 400 kV transmission line and coordinates of each bend in the line will be determined by the surveyors and environmental specialists.

Within the context of the project area, cognisance must be taken of the following sensitive environmental features, attributes and aspects, for which mitigation measures are included in the EIA Report and EMP:

- The project area is dominated by shallow and duplex soils on moderate to steep slopes in undulating and hilly terrain. Erosion control measures are deemed to be crucial, as the soils are highly erodible and unstable, especially once the surface soil, vegetation and plant cover has been compromised.
- The encroachment of the construction activities (transmission line, access roads construction camp) into the regulated areas of watercourses (i.e. 1:100 year floodline or delineated riparian / wetland habitats, whichever is greatest) could adversely affect resource quality by altering flow, reducing water quality, altering habitat and impacting on aquatic biota. These impacts could be exacerbated during the rainy season, if suitable mitigation measures are not in place. Accepting that the objectives and measures included in the EMP pertaining to reinstatement and rehabilitation of the watercourses are adopted and implemented and that the regulated areas of watercourses will be avoided, the potential impacts should be temporary and restricted to the construction phase. Specific management requirements and measures are listed in the EMP to address the construction-related impacts to the resource quality of the affected watercourses.
- Although much of the project area is utilised for grazing and other land uses that has caused land degradation, all route alternatives incorporate habitat units that would

support a variety of faunal and floral species biodiversity to a greater or lesser extent – many of which are RDL. Sensitive ecological features include:

- All protected areas;
- Rocky ridges;
- Wetlands, aquatic habitat and riparian areas;
- Areas that have retained natural ecological features and are not suffering degradation are considered ecologically sensitive; and
- Forest areas, due to the restricted distribution of this habitat unit.

- Impacts to avifauna from collision with the power line require specific attention, and the recommendations included in this report need to be implemented.
- The potential occurrence of heritage sites with a Grade I significance will demand that the development activities be drastically altered in order to retain these sites in their original state. For Grade II and Grade III sites, the application of mitigation measures would allow the development activities to continue.
- In the tribal areas, I&APs requested that their cattle kraals be avoided due to the cultural significance associated with the features.
- Animals on game farms require specific measures to ensure that risks and disturbances are adequately managed during the project life-cycle.
- Special care should be exercised to minimise traffic disruptions along the national, arterial, main and secondary roads, as well as the railway line. The final alignment of the transmission line should ensure that the Bisho Airport is not affected.
- The project area is characterised by a rolling, undulating landscape with high topographic variation. This affords a high visual quality to the region, which needs to be taken into consideration during the final placement of the towers. The EMP includes measures to impacts to the aesthetic value of the project area.
- From a socio-economic perspective, the management of impacts to landowners during the construction and operation phases need to be strictly controlled through the mitigation measures recommended by the specialist studies and the EMP.
- Human and animal health risks associated with EMFs need to be closely monitored.

14.2 Environmental Impact Statement

With the selection of the BPEO for the transmission line route, the adoption of the mitigation measures include in the EIA Report and the dedicated implementation of the EMP, it is believed that the significant environmental aspects and impact associated with this project can be suitably mitigated. With the aforementioned in mind, it can be concluded that there are no fatal flaws associated with the project and that authorisation can be issued, based on the findings of the specialists and the impact assessment, through the compliance with the identified environmental management provisions.

14.3 Key Recommendations

The following key recommendations accompany the EIA for the Neptune-Poseidon 400kV transmission line:

a) From the comparative analysis, which included concurrence by the specialists, Alternative 4 (western section), Alternative 4 Segment B (central section) and the Main Route alternative (eastern section) are supported as the preferred options to minimise impacts to the environment.

14.4 Conditions for Authorisation

The following conditions are regarded as critical mitigation measures emanating from the EIA:

- On-going communication with the affected landowners and during the implementation of the project.
- Prior to any construction, undertake necessary negotiations with directly affected landowners and establish requirements for access, fencing, game requirements, existing services, etc.
- Diligent compliance monitoring of the EMP, environmental authorisation and other relevant environmental legislation by an Independent Environmental Control Officer (ECO) is crucial to ensure compliance with the stipulated management measures.

- Areas affected by construction activities need to be suitably stabilised due to the high soil erodibility in the project area. Suitable stormwater management measures are also required for access roads to manage erosion.
- Protected flora species are to be relocated prior to vegetation clearance, should avoidance not be possible. Permits need to be obtained under National Forests Act (Act No. 84 of 1998) if protected trees are to be cut, disturbed, damaged, destroyed or removed.
- A walk-down survey is to be undertaken, which includes the relevant environmental specialists, to determine the exact locations of the towers to ensure the safeguarding of sensitive environmental features within the corridor.
- The Construction EMP should be updated to include the findings of the walk-down survey and should be submitted to DEA for approval.
- All access roads and construction camps need to be identified prior to construction and the final EMP should make provision for suitable mitigation measures to manage these project components.
- Suitable fencing and access control required to protect animals on game farms.
- Strict security measures to be implemented.
- Although the primary objective is to ensure that no heritage resources are adversely affected by the project, permits will be obtained from SAHRA under the National Heritage Resources Act (Act No. 25 of 1999) if they are to be impacted on.

15 REFERENCES

ACER (Africa) Environmental Management Consultants. 2006. Proposed Gamma-Grassridge 765 kV Transmission Lines (x 2). EIA: 12/12/20/801. Draft Scoping Report. Eskom Transmission, Johannesburg.

Axis Landscape Architecture. 2011. Proposed Neptune – Poseidon Southern Strengthening Project Eastern Cape Province. Visual Impact Assessment. EIA Specialist Report.

Amahlathi Municipality. 2007. Integrated Development Plan 2007/08 – 2011/12.

Amathole District Municipality. 2009. Draft Integrated Development Plan Review. 2009-2010.

Barnes K. 1998. The Important Bird Areas of Southern Africa. BirdLife South Africa, Johannesburg.

Blue Crane Route Municipality. 2009. Intergrated Development Plan Review 2009/2013.

Buffalo City Municipality, 2010. Integrated Development Plan Review 2010/2011.

Cacadu District Municipality. 2010. Integrated Development Plan Review 2007/2012.

DEAT. 2005a. Guideline 3: General Guide to the Environmental Impact Assessment Regulations, 2005. Integrated Environmental Management Guideline Series. Department of Environmental Affairs and Tourism (DEAT), Pretoria.

DEAT. 2005b. Guideline 4: Public Participation, in terms of the EIA Regulations. Integrated Environmental Management Guideline Series. Department of Environmental Affairs and Tourism (DEAT), Pretoria.

DEA&DP. 2006. Guideline on Alternatives, NEMA EIA Regulations Guideline and Information Document Series. Western Cape Department of Environmental Affairs & Development Planning (DEA&DP).

DEA&DP. 2009. Guideline on Need and Desirability, NEMA EIA Regulations Guideline and Information Document Series. Western Cape Department of Environmental Affairs & Development Planning (DEA&DP).

Dr Neville Bews & Associates. 2011. Neptune-Poseidon 400kV Power Line. Draft Social Impact Assessment Report. EIA Specialist Report.

Enviross. 2011. Proposed Neptune-Poseidon 400 kV Overhead Powerline Development. Proposed Route Alternatives Faunal, Floral & Avifaunal Ecological Surveys. EIA Specialist Report.

Fort Hare Institute of Social and Economic Research. 2008. Final Report of Baseline Study on the Communal Land Rights (CLaRA) in the Eastern Cape Province. Submitted to Department of Land Affairs Monitoring and Evaluation Directorate.

Keatimilwe, K. and Ashton, P.J. 2005. Guideline for the review of specialist input in EIA processes: Edition 1. CSIR Report No ENV-S-C 2005 053 B. Republic of South Africa, Provincial Government of the Western Cape, Department of Environmental Affairs & Development Planning, Cape Town.

Minter, L. R., Burger, M., Harrison, J. A., Braack, H. H., Bishop, P. J. and Kloepfer, D. (Eds). 2004. Atlas and red data book of the frogs of South Africa, Lesotho and Swaziland. SI/MAB Series #9. Smithsonian Institute, Washington, DC.

Mucina, L. and Rutherford, M.C. 2006. The Vegetation of South Africa, Lesotho and Swaziland. Strelitzia 19. South African National Biodiversity Institute, Pretoria.

Münster, F. 2005. Guideline for determining the scope of specialist involvement in EIA processes: Edition 1. CSIR Report No ENV-S-C 2005 053 A. Republic of South Africa, Provincial Government of the Western Cape, Department of Environmental Affairs & Development Planning, Cape Town.

Ngqushwa Local Municipality. 2011. Integrated Development Plan Review 2011/2012.

Nkonkobe Local Municipality, 2008. Integrated Development Plan Review 2008/2009.

Nxuba Local Municipality. 2009. Integrated Development Plan Review 2009/2010.

Terra Soil Science. 2011. Agricultural Potential Assessment: Neptune-Poseidon 400kV Power Line, Eastern Cape Province. EIA Specialist Report.

van Schalkwyk. J. 2011. Heritage impact assessment for the proposed Eskom 400 kV Electricity Transmission Line, Neptune to Poseidon Substations, East London to Cookhouse, Eastern Cape Province. EIA Specialist Report.

APPENDIX A

LOCALITY MAP

APPENDIX B

DEA APPROVAL OF SCOPING REPORT

APPENDIX C

SERVITUDE NEGOTIATION AND THE EIA PROCESS

APPENDIX D

CURRICULA VITAE OF EAPs

APPENDIX E

CADASTRAL MAPS OF ROUTES

APPENDIX F

SPECIALIST STUDIES

APPENDIX F1

FAUNAL, FLORAL AND AVIFAUNAL ECOLOGICAL SURVEY

APPENDIX F2

HERITAGE IMPACT ASSESSMENT

APPENDIX F3

AGRICULTURAL POTENTIAL ASSESSMENT

APPENDIX F4

VISUAL IMPACT ASSESSMENT

APPENDIX F5

ECONOMIC IMPACT ASSESSMENT

APPENDIX F6

SOCIAL IMPACT ASSESSMENT

APPENDIX G

ELECTRIC AND MAGNETIC FIELDS FROM OVERHEAD POWER LINES

APPENDIX H

ENVIRONMENTAL MANAGEMENT PLAN
(DRAFT)

APPENDIX I

I&APs DATABASE

APPENDIX J

NEWSPAPER ADVERTISEMENTS – SCOPING APPROVAL

APPENDIX K

CORRESPONDENCE RECEIVED FROM I&APS

APPENDIX K1

SCOPING PHASE

APPENDIX K2

EIA PHASE

APPENDIX L

COMMENTS AND RESPONSE REPORT

APPENDIX M

COMMENT SHEETS