FINAL SCOPING REPORT for

KUDU INTEGRATION PROJECT FOR TRANSMISSION POWER-LINES AND SUBSTATIONS

Prepared for:

Eskom Transmission
PO Box 1091
Johannesburg
2157
Tel: (011) 800 2465
Fax: (011) 800 3917
E-mail: john.geeringh@eskom.co.za

Prepared by:
PD Naidoo & Associates
in association with
Strategic Environmental Focus (Pty) Ltd
P.O. Box 74785
LYNNWOOD RIDGE
0040
Tel. No.: (012) 349-1307
Fax. No.: (012) 349-1229
e-mail: sef@sefsa.co.za

23 May 2006

CHANGES TO THE DRAFT SCOPING REPORT

The only major change which has been made to the draft scoping report is the inclusion of a further alternative route, designated route E. This route was proposed in the authority meeting of 5 May 2006. The preliminary findings of the specialists pertaining to the alternative routes are presented in section 5.6, and recommendations following their findings are made in section 5.8.

These, and other minor changes have been made in the following sections:

Section	Page
1.3	iii
1.6	ix
1.7	x
2.2	16
2.3	17
4.2.3	23
5.5.5	41
5.6	41-45
5.8	46-47
7.2	51

In order to simplify the process of locating the changed sections and reviewing the report, all alterations have been made in *italics.*

EXECUTIVE SUMMARY

1.1 INTRODUCTION

P.D. Naidoo & Associates (PDNA) in association with Strategic Environmental Focus (SEF), as independent consultants, were appointed by Eskom Transmission to undertake the appropriate environmental process for the proposed development of a 400 kV line for the provision of bulk power supply from the Kudu Combined Cycle Gas Turbine (CCGT) power station in Namibia to the Western Cape. This power station will supply power to the Eskom and the Namibian (NamPower) grids. The process that was followed complies with Sections 21 and 26 of the Environment Conservation Act, 1989 (Act No. 73 of 1989).

1.2 PROJECT MOTIVATION

Most of the power supply to the greater Cape area is provided by the coal-fired power stations on the Highveld, mainly in Mpumalanga. As a result, a Transmission network from Mpumalanga to the Cape has grown over the years as demand has increased. Much of this network is now over two decades old and is approaching its peak operational capacity. In addition to the natural growth in electricity demand in the Greater Cape Region, a 'step load' (ie a rapid jump in electricity demand) is anticipated by May 2009 for the planned steel and aluminium smelters in the Coega Industrial Development Zone (IDZ) near Port Elizabeth in the Eastern Cape.

In order to meet the increasing demand as the South African population and its need for electricity grows, Eskom proposes to import power from Namibia from the 800MW Kudu CCGT power station at Uubvlei, 15km north of Oranjemond. The 800MW Kudu CCGT power station will supply 200MW to Namibia and the balance will be available for integration into the South African grid.

1.3 GENERAL PROJECT DESCRIPTION

Eskom proposes to integrate the power from the Kudu CCGT power station into the South African grid via Transmission power-lines from the Namibian border. A number of alternative integration options and routes have been proposed to connect to the Western Grid of Eskom and supply the increasing demand in the Cape. This Transmission power-line will boost the supply to the Western Cape, which has been plagued by outages in the last number of months.

Various alternatives with regards to how the power will be integrated into the South African grid have been proposed. These alternatives – fully discussed in section 5 – will involve constructing one Transmission power-line from the Namibian border to Gromis substation, parallel to an existing 220kV servitude. From Gromis the Transmission power-line will be constructed along a new servitude to connect to the Western Grid at Juno substation near Vredendal in the Western Cape.

Within this integration option*, five* route alternatives have been proposed. Four of these alternatives have been determined through the involvement of key stakeholders, including *SANParks*, *CapeNature* and other conservation NGO's. *The preliminary reports of the specialists have indicated that alternative routes A, C and D are not suitable for the construction of a transmission line and as such routes B and E will be investigated during the EIA phase.* The specific details of the route to be followed will be determined in the EIA phase of the study.

Refer to sections 1.6 and section 5 for a broader discussion of the available integration and route alternatives.

The second Transmission power-line will run from the Namibian border directly to Oranjemund substation, where minor adjustments need to be effected to the substation itself for construction of the line bays to accommodate the new line.

Construction will last approximately 15 months. The 400kV Transmission power-line will provide power to the Western Grid for the entire operational lifespan of the Kudu CCGT power station.

1.4 PUBLIC PARTICIPATION

Public participation plays an important role in the compilation of a Scoping Report as well as the planning, design and implementation of the project.

Public participation is a process leading to informed decision-making, through joint effort by the:

- Proponent; Technical experts; Governmental authorities; and Interested and Affected Parties (I&APs)

Public participation is a vehicle for public input, which achieves the following:

- Facilitates negotiated outcomes;
- Creates trust and partnership;
- Minimises negative effects;
- Maximises positive effects; and
- Provides an indication of issues

Through the public participation process, SEF endeavoured to involve potential I&APs. The issues arising from the public participation process have been incorporated into the draft Scoping Report and used in determining mitigation measures for the project.

I&APs were identified and notified of the proposed development, in accordance with legislation. Comments / concerns received were incorporated and addressed in this Scoping Report.

Assessing the comments / concerns received during the public participation process, it is evident that the main concerns are:

- Environmental effects of the proposed Transmission power-line, specifically on the Knersvlakte;
- Benefits to local communities in the affected area; and
- Visual effects with regards to tourism in the area.

These concerns have been carefully considered and appropriate mitigation measures are suggested to address these concerns.

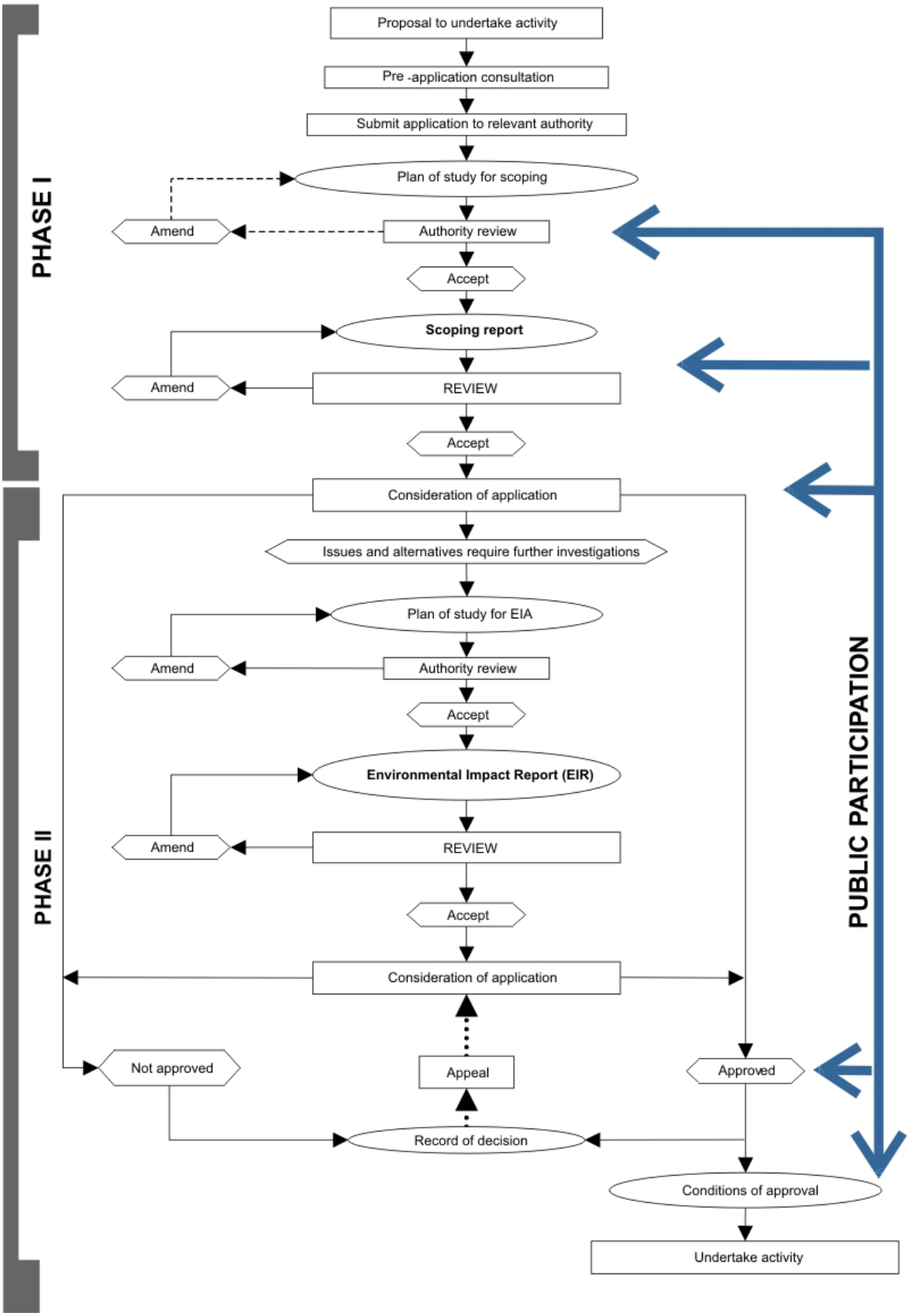


Figure 1: Application procedure as prescribed by the Department of Environmental Affairs and Tourism

1.5 KEY IMPACTS

Site visits conducted by SEF identified a number of key issues for the purposes of the Scoping Report. These key issues will be explored and investigated further in the final Environmental Impact Report.

Key issue 1: The physical and biological environment

The issues identified here are based on an overview of the entire study area that was obtained from the site visit. This entailed an assessment by a team of specialists that were commissioned to assess the environment and the likely impacts that the Transmission power-line could have on it. In this regard, the chosen Route will need to bear in mind key impacts such as:

- Visual intrusion;
- Floral impacts in a highly sensitive area, where tourism is dependent upon the annual blooms of desert ephemerals;
- Wind erosion;
- Water erosion;
- Loss of high potential arable land;
- Habitat destruction and disturbance;
- Faunal impacts, the most significant being bird impacts such as, electrocutions, collisions, habitat destruction and disturbance; and
- Destruction of heritage/historical sites.

Key issue 2: The social environment

It must be ensured that the environment surrounding the development is safe and secure, and in all respects acceptable to the affected I&AP's. In this regard the social issues flagged during the site visit, (including and especially the tourism issues) as well as the concerns raised in the public consultation process must be taken into account.

1.6 ALTERNATIVES

The IEM procedure stipulates that an environmental investigation needs to consider feasible alternatives for any proposed development. Therefore, DEAT requires that a number of possible proposals or alternatives for accomplishing the same objectives be considered. Alternatives can be categorised into the following: Strategic, Scheduling and Location alternatives, further divided into integration and route alternatives. These alternatives are fully discussed in Section 5, but primary attention will be given to the location alternatives.

Three integration alternatives exist:

Direct link from Kudu to Aggeneis substation

This option will link into the Eskom grid via a direct Transmission power-line from the Namibian border to the Aggeneis substation near Kenhardt in the Northern Cape. The existing Aggeneis-Aries 400kV line ensures connection into the Cape network. Power could be distributed from Aries into the network, either towards Kronos or towards Helios, depending on the generation pattern and load profile.

Oranjemond to Gromis substation and Juno substation

This option will link into the Eskom grid at the Juno substation near Vredendal. It will involve constructing a Transmission power-line from the Namibian border close to Oranjemond substation and follow an existing 220kV line to Gromis substation. The Transmission power-line would then be constructed along a new servitude to link with the Cape network at Juno substation. This is the preferred option due to the benefits of linking the supply more directly to the load centre of Cape Town.

Oranjemond to Gromis substation and Aggeneis substation

This option will also link into the Eskom grid at Aggeneis from the Namibian border, but will follow the existing Oranjemond-Gromis-Nama 220kV line. The existing Aggeneis-Aries 400kV line ensures connection into the Cape network. Power could be distributed from Aries into the network, either towards Kronos or towards Helios, depending on the generation pattern and load profile.

Five route alternatives have been identified:

Within the preferred Integration Alternative, *five* Route Alternatives were proposed, designated Alternative routes A - E. These Alternative Routes are given on the locality map (see figure 1)

The preferred route alignment will be determined based on:

- Consultation with key stakeholders, including CapeNature and SANParks,
- the opinion of the public, ascertained through the public consultation process;
- specialists' recommendations;
- environmental characteristics; and
- techno-economic cost-benefit analyses.

At this stage of the Scoping exercise, based on a preliminary identification of physical, biological and social constraints of the plausible options, involving the public participation process, several criteria support the selection of Route 2 as the preferred alignment.

Start point at Orange River Northbank: 28,5301°S, 16,5948°E

End point at Juno substation: 31.608°S, 18,443199°E

It should be mentioned however, that the comprehensive impact assessment phase will specifically assess the likely impacts of the final alignment of the line. Only at the end of this phase can the exact alignment of the servitude be determined.

Within option 2, the northern section of the line follow a proposed route parallel to the existing 220kV servitude from the Oranjemond substation to the Gromis substation in the vicinity of Kleinzee. From there, *five* different alternative routes have been proposed. All of these alternatives are merely proposals, and do not intend to provide high levels of detail.

A: Direct

This option will involve a by-and-large straight line with the minimum number of turns from Gromis to Juno substations, crossing the Namaqua National Park.

B: West

The line will deviate to the west of the existing borders of the Namaqua NP, but will traverse through the proposed westward expansion of the park at the narrowest point, following the road leading to Hondeklipbaai. South of the park, the Transmission power-line will be constructed on the sandy soil – which rehabilitates more rapidly – and follow the Nuwerus-Lutzville road to Juno.

C: N7

The line will follow the existing 220kV servitude between Gromis and Nama substations. At the southernmost point of this servitude, it will deviate to the east and follow the National Route 7 (N7) around the Namaqua National Park, all the way to Juno.

D: Boesmanland

The line will follow the existing 220kV servitude between Gromis and Nama substations, and cross over the mountains east of Springbok. From there the line will run through Boesmanland, turning west to cross the Hardeveld to Juno.

E: Combined A & B

As proposed during the authority meeting of 5 May 2006, the route alternative B has been amended to follow a section of route alternative A. From Gromis the line will run to the west of the Namaqua National Park. From the Spoeg River, the line will deviate to the east and follow the first alternative. In the vicinity of the Groot Goerap River, the line will deviate to the west of alternative A and follow the same route alternative B to Juno.

1.7 CONCLUSIONS AND RECOMMENDATIONS

Having reviewed the possible impacts of the development for all three integration options, all five proposed route alternatives and after a preliminary identification of potential impacts by specialists, integration option 2 is proposed as the most suitable means to integrate the power into the Eskom grid. This is because it presents the smallest number of technical challenges and has been shown to be the most feasible from an electricity supply perspective.

To ensure the design of the most viable solution from an environmental, social and economic perspective, preliminary studies on alternative routes A-E were conducted to obtain an overview of the likely impacts the line could have on the environment. Route E appears to be the alternative that will have the least physical, biological and social impacts. Building the Transmission power-line along routes A, C or D will have more severe environmental impacts on the environment, as the former runs through the middle of the Namaqua National Park and the latter two through the quartzite of the Knersvlakte. After consultation with the stakeholders and interested and affected parties, it is clear that the Hardeveld section of the Knersvlakte is not an option for the construction of the line, as this area cannot be rehabilitated. These impacts can be minimised if alignment B or E (as motivated in this document) is chosen as the preferred route for the 400 kV Transmission power-line, by avoiding the Hardeveld entirely. Alternative E, as discussed during the authority meeting of 5 May 2006, however, crosses through an area which is not very sensitive and is also shorter, improving the transmission capability of the line. Furthermore, the impacts on vegetation decreases if Alternative E is followed instead of Alternative B.

Large parts of this route are currently being used as grazing farmlands, with a number of surrounding land-uses ranging from game farms to nature reserves. The area has a major tourism potential, based on its rugged beauty and the sense of wilderness. The visual impacts of the development cannot be entirely mitigated, bearing in mind that the tourism is based on landscape beauty. The faunal and floral impacts can, however, be mitigated to a larger degree, considering the small tower footprint. The visual impact is unavoidable given the location of the Kudu CCGT power station, the location of the demand centre relative to this and the strategic importance of power Transmission for economic growth. However, the selected alignment will ensure that the environmental impacts are minimised. Ultimately, a servitude will be required for the Transmission power-line, with the attendant floral and faunal impacts. The proposed alignment and tower selection limits these impacts to an acceptable level. It is thus recommended that the proposed development be permitted to proceed to a detailed impact evaluation phase that would further assess these impacts and provide feasible mitigation measures.

TABLE OF CONTENTS

GLOSSARY OF TERMS

Alien species: A plant or animal species introduced from elsewhere: neither endemic nor indigenous.

Alternative Route: Refers to a specific route with local re-alignment along the route to avoid sensitive sites.

Applicant: Any person who applies for an authorisation to undertake an activity or to cause such activity to be undertaken as contemplated in section 22 (1) of the Environment Conservation Act, 1989.

Arable potential: Land with soil, slope and climate components where the production of cultivated crops is economical and practical.

CCGT: Combined Cycle Gas Turbine

Compensation: A sum of money paid by Eskom to a landowner as agreed in a document specifying that he or she grants rights in favour of Eskom's servitude.

Ecology: The study of the interrelationships between organisms and their environments.

Environment: all physical, chemical and biological factors and conditions that influence an object.

Environmental Impact Assessment: assessment of the effects of a development on the environment.

Environmental Management Plan: A working document on environmental and socio-economic mitigation measures that must be implemented by several responsible parties during all the phases of the proposed project.

Local relief: The difference between the highest and lowest points in a landscape. For this study, it is based on 1:50 000 scale.

Proposed servitude: Refers to the proposed final route that the Transmission power-line should follow.

Servitude: A strip of land within which Eskom will construct and maintain the Transmission power-line. The right to use this piece of land is obtained through negotiation with the landowners.

Study area: Refers to the entire study area encompassing all the alternative routes as indicated on the study area map.

Succession: The natural restoration process of vegetation after disturbance.

SECTION 1: INTRODUCTION

1.1 INTRODUCTION

In terms of the Environment Conservation Act (Act 73 of 1989), developments which fall within the ambit of the activities listed in Schedule 1 of Regulation 1182 of 1997 are subject to an environmental impact assessment (EIA). The first phase of the EIA is the Scoping Report. The Act identifies the proposed development as an activity which may have significant detrimental effects on the environment, (Section 26: Listed Activity Schedule 1 cl 1(a), the construction or upgrading of facilities for commercial electricity generation and supply).

The purpose of this study is to assess the impact of the proposed development on the surrounding environment, conduct relevant specialist studies and to determine the issues or concerns of relevant authorities as well as interested and/or affected parties. This report considers the environmental constraints and relevant alternatives to address these constraints. It should be noted, that although this report gives recommendations regarding this development, the Department of Environmental Affairs and Tourism (DEAT) will make the final decision as to whether the proposed project should proceed. The relevant provincial authorities – Department of Environmental Affairs and Development Planning (DEA&DP) in the Western Cape and the Department of Agriculture, Conservation and Environment (DACE) in the Northern Cape Province – will act as commenting authorities and provide comment prior to the approval by DEAT.

P.D. Naidoo & Associates (PDNA) in association with Strategic Environmental Focus (SEF), as independent consultants, were appointed by Eskom Transmission to undertake the environmental impact assessment for the proposed development of a 400 kV line for the provision of bulk power supply from the Kudu Combined Cycle Gas Turbine (CCGT) power station in Namibia to the Western Cape. This power station will supply power both to the Eskom and NamPower grids. The process that was followed complies with Sections 21 and 26 of the Environment Conservation Act, 1989 (Act No. 73 of 1989). An identification of the major issues associated with the development was undertaken along the *five* proposed Alternative routes A to E as shown on the map of the study area. The need and justification for the proposed Transmission power-line are outlined in section 0.

1.2 TERMS OF REFERENCE

Eskom Transmission requested that an Environmental Impact Assessment (EIA) for the proposed 400 kV Transmission power-line be carried out. The Environmental Impact Assessment together with the public consultation had to be undertaken in accordance with the EIA Regulations (Government Notice No's 1182, 1183 and 1184 of 5 September 1997, as amended) as per Sections 21, 22 and 26 of the Environment Conservation Act, 1989. (Act no. 73 of 1989)

It is the intention of Eskom Transmission to secure servitude rights for the proposed line in the short term and, in the medium to long term, to obtain a Record of Decision to proceed with the proposed construction of the 400 kV Transmission power-line.

As part of the environmental process, a Scoping exercise was conducted to determine the issues or concerns of the relevant authorities as well as interested and / or affected parties (I&AP's). Strategic Environmental Focus, as independent environmental consultants, undertook to facilitate the implementation of the Integrated Environmental Management process by adopting the following terms of reference:

- Registering the project with the relevant environmental authorities;
- Compiling a plan of study for Scoping;
- Undertaking a preliminary evaluation of the study area facilitated by a site visit with several specialists and a desk top analysis;
- Identifying the possible interested and affected parties (I&AP's);
- Co-ordinating the necessary Public Participation Process. This entailed preparing the Background Information Document (BID), advertising and requesting that I&AP's register their concerns;
- Identifying the issues, impacts and alternatives, and determining specific guidelines for the Impact Assessment phase; and
- Compiling a detailed Scoping Report.

The Scoping Report includes a description of the environment as well as the possible issues and impacts that may arise from the proposed development. Consultation with the I&AP's and the relevant authorities was used to identify issues that are of particular concern. Furthermore, the experience SEF has gained through working on similar applications required that the following issues be assessed:

- Ecological impacts;
- Social impacts;
- Service provision; and
- Cumulative impacts.

1.3 STUDY APPROACH

The EIA regulations stipulate that a Scoping Study should be undertaken as the first step in applying for authorisation to proceed with the proposed activity. The objectives of the Scoping study are:

- To provide an opportunity for the proponent, the relevant authorities and I&AP's to exchange information and express their views and concerns regarding a proposal before an Impact Assessment is undertaken;
- To focus the study on reasonable alternatives and relevant issues to ensure that the resulting impact assessment is useful to the decision-maker and addresses the concerns of I&AP's; and

- To facilitate an efficient assessment process that saves time and resources and reduces costly delays which could arise were consultation not to take place.

1.4 AIMS OF THE SCOPING REPORT

The purpose of this Scoping Report is threefold, namely:

- To present the results of the Scoping phase of the EIA process to the Interested and Affected Parties (I&AP's). The Scoping Report documents the main issues associated with the proposed Kudu integration project, which require attention and potential management and mitigation measures.
- To give I&AP's the opportunity to confirm that their concerns and suggestions have been adequately documented for consideration in the Impact Assessment stage of the EIA.
- To invite comments on the proposed guidelines for the Impact Assessment phase of the study, which are based on the results of the Scoping exercise.

1.5 ASSUMPTIONS AND LIMITATIONS

1.5.1 Stage of Project

Adequate timing has been allowed for the Scoping exercise. Particular note should however be made of the fact that this Scoping Report has been compiled during the conceptual stages of development. The report has considered a number of alternative route alignments that were proposed. Site selection was based on a careful examination of the pros and cons of each alignment. The choice of a preferred Route had not been made at the time of appointment and thus, references to *five* different alignments are made. The technical details of the design components had however, been determined before this report was compiled. These technical details were used to make the decision regarding how integration was to take place.

SECTION 2: DEVELOPMENT PROPOSAL

2.1 PROPOSED ACTIVITY

Electrical supply constitutes a complex system of generation facilities, substations and Transmission power-lines. The system operates on a demand-supply structure. The power is generated and transmitted at the moment it is needed. As electricity cannot be stored it must be generated and delivered –often over long distances – at the very instant it is needed. In South Africa, thousands of kilometres of high voltage lines transmit power, mainly from the power stations located at the coal fields in the Mpumalanga Province, to major substations at different locations in the country, where the voltage is reduced for distribution to industry, businesses, homes and farms all over the country.

The proposed development ("the development") is the construction of a 400 kV Transmission power-line, approximately 390 km long, between the Namibian border and Oranjemond substation in the Northern Cape and Juno substation near Vredendal in the Western Cape. The servitude required for the development is an area of about 2145ha in extent, 55m across and 390 km in length. Eskom suggested a number of possible integration options (1-3) of which one has been identified as being technically the most feasible. Within this integration option, *five* Alternative Routes for the corridor of the Transmission power-line have been identified. These alternative alignments *(Routes A-E)* run through or skirt around the Namaqua National Park, extending the study area to the east and west. These various options are fully discussed in Section 4.

2.2 THE SITE

2.2.1 Site Description

The proposed development falls within the Northern and Western Cape provinces. The Transmission power-line will run from the north bank of the Orange River, close to Oranjemond substation, via Gromis substation to Juno substation. Small changes need to be effected to Oranjemund substation to accommodate the 220kV transmission line. Oranjemond substation is situated on the banks of the Orange River, and is linked to Gromis substation in the south via a 220kV Transmission power-line in an existing servitude. Gromis substation is in the vicinity of Kleinzee, and small alterations to this substation also need to be effected to accommodate the necessary line bays. There is no direct link at this point in time between Gromis and Juno substations. Juno substation is in the vicinity of Vredendal. From Juno substation there are existing 400kV lines to the load centre in Cape Town. All alterations to the Juno substation will occur within the existing Eskom property, adjacent to the existing bays.

Between the border and Gromis, the line will cross or pass in close proximity of the towns of Alexander Bay and Port Nolloth. South of Gromis substation, where the line will be constructed along a new servitude, the line will then cross or pass in close proximity of the towns of Springbok, Fonteintjie, Koiingnaas, Garies, Hondeklipbaai, Bitterfontein, Brand se Baai, Nuwerus and Lutzville, depending on the final alignment.

The Municipalities which will be affected include:

Northern Cape: Richtersveld Kamiesberg

Western Cape:Hantam Matzikama

In the northern part of the study area a large amount of the land on the coastal plain has been disturbed by diamond mining activities to the west. Nature conservation initiatives include the Richtersveld National Park to the east of the study area and the Alexander Bay Lichen Hill Heritage Site, immediately south of Alexander Bay. To the south of Gromis, between the proposed route alternatives, the land is largely used for extensive stock farming. Nature conservation initiatives include the Namaqua National Park, Skilpad Flower Reserve and a proposed reserve in the Knersvlakte. There is arable land in the vicinity of the Olifants River Valley and Lutzville.

The point at which the transmission power-line will start on the northern bank of the Orange River is: 28.5301°S, 16.5948°E. The transmission power-line will link with the Western Grid at Juno substation: 31.608°S, 18.443199°E.

2.3 PROJECT DESCRIPTION

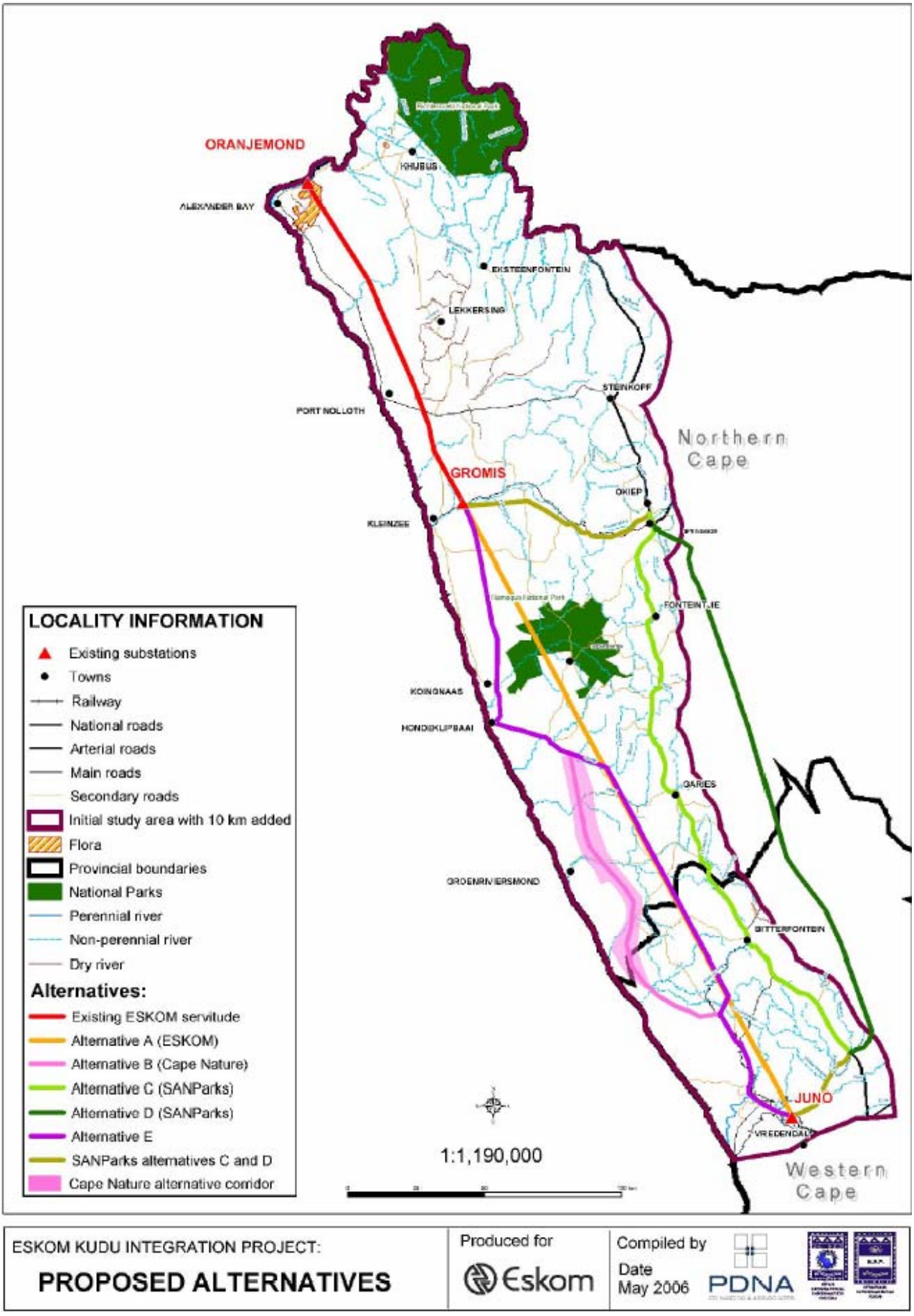
2.3.1 Timing

The project involves a number of major activities that will span over a period of fifteen months. The initial activities entail pre-construction procedures such as the environmental impact study, negotiations for the servitude to determine the final route – in view of special conditions stipulated by landowners etc. This stage also requires an application to be made for the granting of a servitude to accommodate the Transmission power-line. These activities will take about twelve months to complete, while the construction activities will take fifteen months. The final inspection for the release of the Contractors' guarantee is scheduled for one year after completion of the project. The line will be in operation immediately after completion of the project and will stay operational for the lifetime of the Kudu CCGT power station. Subsequent maintenance and refurbishment would normally occur during the operational lifetime of the line.

Accordingly, construction of the line is planned for the year 2007 and the commissioning of the line is planned for 2008 (i.e. fifteen months after construction commences). Various factors need to be considered in the execution of the environmental investigation at present, namely:

- Firstly, the reliability of the existing power supply to the Western Cape is under increasing pressure, which means that a new line will contribute to strengthening of this supply.
- Secondly, the prediction for the growth in demand for additional electricity in the Western Cape shows that the current system – where power is fed from the coal-fired stations in Mpumalanga – will not be able to cope with the predicted demands, especially when the proposed Coega development in the Eastern Cape commences in near future.
- Thirdly, Eskom Transmission aims to develop the national electricity grid in such a manner as to secure uninterrupted power supply to different parts of the country. This requires that the national grid should be based on a system whereby the supply to a specific area comes through more than one route.

Figure 1: Locality map and alternatives



2.3.2 Construction activities

This phase refers to all construction and construction-related activities that will occur within the servitude area until the project is completed. The construction activities will take approximately 15 months. The construction process will involve:

- Contractor site establishment;
- Survey and pegging of tower positions;
- Access road negotiation and construction;
- Gate installation;
- Vegetation clearing for pylon bases;
- Foundation excavation and installation;
- Tower assembly and erection;
- Conductor stringing and tensioning; and
- Servitude clean-up and rehabilitation.

The construction phase will be treated as an integrated whole as dictated by the nature of the activities and impacts under discussion.

2.3.3 Operational activities

This phase will commence once the Transmission power-line has been commissioned and is fully operational. All post-construction activities, including the operation and maintenance of the proposed development are included here. Such activities will require routine maintenance work that necessitates using access roads that will be built along the servitude of the Transmission power-line.

2.3.4 Technical Details of the Transmission power-line

Details of the 400 kV Transmission power-line, including the architectural and structural information as well as the electromagnetic fields (EMF) that will be generated around the power line are discussed below.

2.3.4.1 Types of Towers / Pylons

The following types of towers may be used on this project:

- Cross-rope suspension;
- Compact cross-rope;
- Guyed suspension;
- Self-supporting; and
- Self-supporting strain tower.

2.3.4.2 Architectural Details of the 400 kV Transmission power-line

- Tower spacing 420 m
- Tower height 25-50m
- Conductor attachment height 18-33 m
- Conductor type Typically 3 Tern to 3 Beresfort.
- Minimum ground clearance 8.1 m.

2.3.4.3 Servitude Required for Proposed Transmission power-line

For the purpose of this report a servitude should be understood as: the area demarcated for the Transmission power-line itself, including the areas required for routine maintenance activities that are carried out on it, for instance an access road. Construction will be limited to the 55m servitude in which the line will be constructed. Any extra space outside the servitude shall be negotiated with the relevant landowner and approved by Eskom. All areas marked as no-go areas inside the servitude shall be treated with the utmost care and responsibility.

2.3.4.4 ELECTROMAGNETIC FIELDS OF THE TRANSMISSION POWER-LINE

The environmental effects of the prospective Kudu 400 kV Transmission power-line are linked to the possible physiological or biological effects of low frequency electric and magnetic fields produced by the power lines. The electric and magnetic fields involve rather abstract concepts. Two of these notions are ionising and non-ionising radiation. Electric and magnetic fields have a non-ionising effect on the surrounding environment because of their relatively low intensity.

Table1: Electric fields for Transmission power-lines

Voltage (kV)	Max. E-field (kV/m)	E-field at servitude boundary	Servitude width from centreline
765	7,0	2,5	40,0
400	4,7	1,5	27,5
275	3,0	0,5	23,5
132	1,3	0,5	15,5
88	0,8	0,3	15,5

Table2: Magnetic fields for Transmission power-lines

Voltage (kV)	Current (A)	Max M-Field (uT)	M-Field at Servitude Boundary (uT)	Servitude width from centreline
765	560	6,0	1,5	40,0
400	650	10,5	2,5	27,5
275	350	6,0	1,0	23,5
132	150	4,0	1,0	15,5
88	60	1,3	0,2	15,5

2.3.4.5 Road Access for Maintenance of Transmission power-line

Road access will be required as part of the servitude along the power line for annual inspections and maintenance / repair of the Transmission power-line. The road will not be any more than a jeep track. Access will be obtained to the servitude through existing roads. No new roads will be constructed to obtain access to the servitude. The final alignment of the road will be the same as for the Transmission power-line and will be included in the final EIR report.

2.4 PROJECT MOTIVATION

The motivation and acceptability of the project need to be evaluated taking into account the demographic profile, the surrounding economic centres and their projected growth as well as current power demand and use patterns.

In terms of the need for the Transmission power-line, studies have shown, based on a variety of sources, that the project is needed for a number of reasons, the most significant of which are:

- Current scarcity of power in the Western Cape;
- Future growth in the Greater Cape region will further stimulate the *demand* for more uninterrupted electrical power; and
- Diversification of supply of electricity from alternative generation sources.

The foregoing reasons are corroborated by considering the great demand and corresponding supply problems encountered in the Western Cape as of late.

Electricity needs to be transported over long distances from the few locations where it is generated. Hundreds of kilometres of 765 kV and 400 kV Transmission power-lines feed electricity from the Mpumalanga Region, where most of the coal-powered generation plants are found, to Transmission substations in the Greater Cape Region. Only two 765kV and three 400kV Transmission power-lines feed electricity to the Greater Cape Region south of Bloemfontein. These Transmission power-lines are becoming heavily loaded and are already reaching their transfer capacity, over and above being over two decades old.

Although Eskom does have an electricity surplus in the northern reaches of the country, the Transmission power-lines from Mpumalanga to the Greater Cape Region are approaching their peak operational capacity. Therefore sufficient electricity is currently not available in the Western Cape to supply the expected increases in load demand in the Region, exacerbated by the problems experienced at Koeberg power station of late. It is also problematic to carry out routine maintenance on these power-lines due to the fact that it is very difficult to manage the frequent outages. Furthermore, the condition of these power-lines can deteriorate and this will result in poor Transmission power-line performance.

The Western Cape has suffered a great number of power outages in the last number of months. In November 2005 Jacob Maroga, the Eskom MD for Transmission, stated that rolling blackouts or selective power cuts could be with the Western Cape and Eastern Cape until end 2007, at least until a R1,1bn project to upgrade Transmission power-lines from Mpumalanga to Koeberg is finished. The Cape Times, on 28 November 2005, wrote that measures would have to be taken in "…helping to fend off the type of crisis that the Koeberg blackouts seem to suggest will, sooner or later, inevitably become a routine part of life in the province." Therefore, the present situation in the Western Cape is clearly untenable from an electricity perspective, both for the user and the supplier.

The natural growth for electricity demand has increased at a steady 2% per annum average load growth for the area to Greater Cape Region south of Bloemfontein. Compounding this growth, a 'step load' (ie a rapid jump in electricity demand) is anticipated by May 2009 for the planned aluminium and steel smelter plants in the Coega Industrial Development Zone (IDZ) near Port Elizabeth in the Eastern Cape. The steel smelter will consist of three arc furnaces, steel mills and a steel beneficiary plant. When fully operational the steel smelter is expected to consume about 500 megawatts of electricity. In so far as the aluminium smelter is concerned, aluminium smelting is a very energy-intensive process. On average, it takes some 15.7 kWh of electricity to produce one kilogram of aluminium from alumina (www.world-aluminium.org 2006). The Coega Smelter Project is expected to produce up to 660kt of aluminium per annum (www.alcan.inc 2006), roughly translating to a demand of $1,04 \times 10^7$MWh per annum for the aluminium smelter alone, excluding other industries and the predicted growth for the area.

As such, it is expected that the demand for power in South Africa will exceed supply in 2009, which has obvious implications for the entire Cape region and for the South African economy as a whole. The economic cost to the Greater Cape region as a whole could amount to millions of Rands should there be deterioration in the quality and reliability of the electricity supply. It is also Eskom's intention to provide more reliable power supply to the Western Cape by providing an alternative Transmission power-line to the province. At this stage, all the power from Mpumalanga to the Western and Northern Cape runs through the Hydra substation near De Aar.

In order to meet these needs, Eskom proposes to import power from the 800MW Kudu CCGT (Combined Cycle Gas Turbine) power station at Uubvlei, 15km north of Oranjemond in Namibia. NamPower will only require 200MW to secure their domestic supply, of which the balance will be made available to Eskom for integration. It is proposed that the power from the Kudu CCGT power station will be integrated into the Eskom grid via a 400kV Transmission power-line from the Namibian border to Oranjemond, Gromis and Juno substations to supply the increasing demand in the Western Cape. As such, it is clear that a new Transmission power-line will be needed in order to exploit the power supply now available. This power produced by the Kudu CCGT power station will increase the reliability of power supply in the Western Grid, which encompasses substantial portions of the Northern and Western Cape Provinces and reduce the sensitivity of the Koeberg power station. The new Transmission power-line will be brought into operation at the time when the Kudu power station becomes operational. It is, however, required to secure the necessary servitudes beforehand to ensure this will be possible.

SECTION 3: STATUS QUO OF THE ENVIRONMENT

3.1 PHYSICAL ENVIRONMENT

3.1.1 Geology

The geology of Namaqualand is extremely complex (Meadows and Watkeys *in press* in www.gouritz.com). The Richtersveld comprises a varied sequence of rocks that were extensively intruded by granite and gneiss of the Namaqua Metamorphic Province.

The escarpment zone to the south is almost entirely composed of the majestic bornhardts, nubbins and castle koppies derived from the erosion of these metamorphic rocks. This region is locally known as the Hardeveld.

Sedimentary rocks deposited in a proto-South Atlantic Ocean basin after continental rifting are extensively exposed in the south. Here they form the wide floor of the palaeo-Orange River delta where weathering of quartz veins has deposited large expanses of white pebbles in an area known as the Knersvlakte. The Orange, southern Africa's largest river, now enters the sea several hundred kilometers to the north where it forms the border between Namibia and South Africa. The valuable load of gem diamonds carried in the ancient river was transported northwards by the Benguela Current and deposited in marine terraces along the coast. These terraces are now the source of Namaqualand's diamond wealth.

The level coastal plain (the Sandveld) consists of a complex sequence of marine and wind-blown sands ranging from weathered and fine-grained deposits of late Tertiary age to the recent white sands of the coastal margin.

The rocks of the Southern Karoo are younger than those of Namaqualand. Karroid vegetation occurs on the finer-grained shales of the bottomlands; fynbos grows on the resistant sandstone of the wetter mountains. Conglomerates and mudstones have accumulated in faulted basins adjacent to the mountains.

The Tanqua Karoo is undelain by rocks of the Mesozoic Karoo Sequence. The escarpment zone of the Western Mountain Karoo is structured by erosion-resistant dolerite and Karoo sandstone.

(source: www.gouritz.com)

3.1.2 Soils

The soils in the study area are characteristic of the soils of the Succulent Karoo Biome: lime-rich and weakly developed soils on rock (Low & Rebelo 1998). Due to the very low rainfall, this area has a limited agricultural potential. In the vicinity of Lutzville, though, the soils are of high arable potential and the Transmission power-line must be located away from these areas.

3.1.3 Topography

Namaqualand is generally characterised by flat to gently undulating topography. The ground slope is gentle (<5°) over the majority of the study area. In the vicinity of Kamieskroon, however, the coastal plain gives way to broken granite ridges and outcrops with large granite boulders dotting the landscape. Certain slopes exceed 20% in this area. The study area varies from 50m in the west to 1000m above mean sea level in the east.

3.1.4 Hydrology

The area is bounded by the perennial Orange and Olifants rivers in the north and south respectively. There are few perennial rivers within the study area, but water from the Droërivier is used for irrigation purposes. Within the study area there are a plethora of small non-perennial rivers, including the Arkoep, Augabies, Bitter, Bloubos, Brand, Doring, Droëkraal se Leegte, Eenklipbok, Eselsfontein, Goerap, Haas, Holgat, Horees, Kamma, Komaggas, Kys, Outeep, Rooiberg, Sannagas, Skaap, Sout, Stinkfontein, Stry, Swartdoring, Swartlintjies, Wolwepoort and Rivers. The larger non-perennial rivers that reach the Atlantic Ocean in the west include the Buffels, Spoeg, Groen rivers.

3.1.5 Climate

3.1.5.1 Temperature & Precipitation

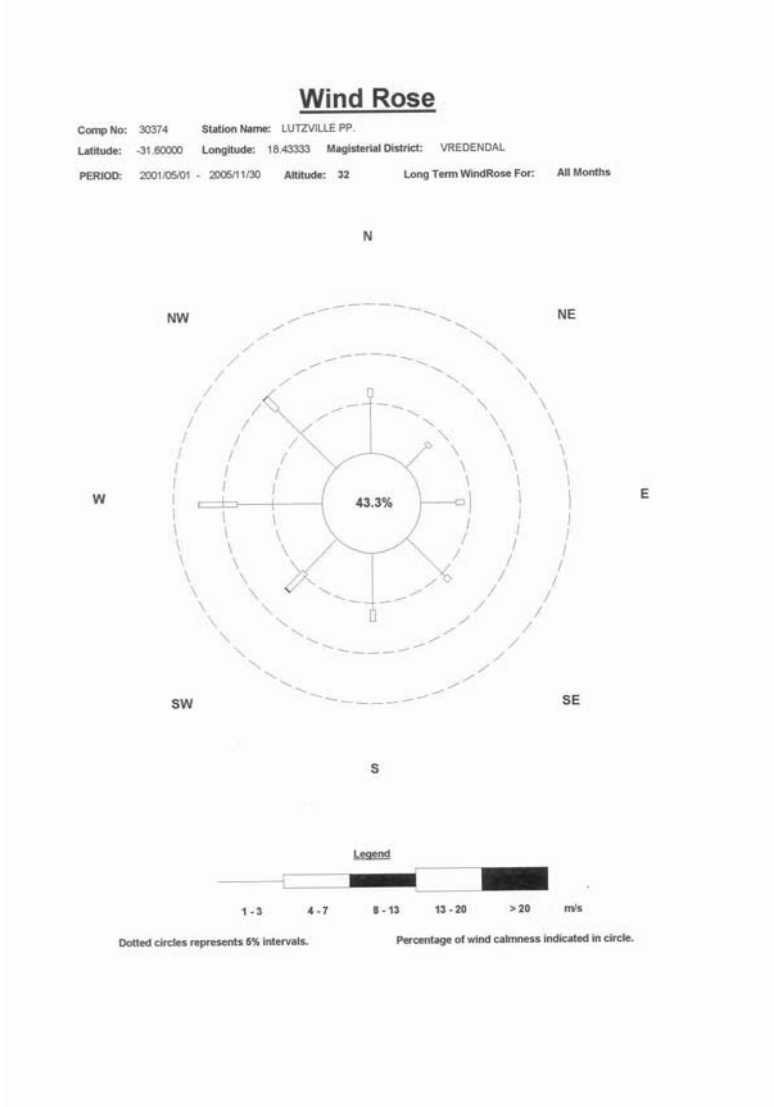
The Succulent Karoo – where most of the proposed development will take place – is determined by low winter rainfall and extreme summer aridity. Rainfall throughout the study area is of a cyclonic nature, and as such has far less erosive power than rain in similarly arid areas where rain falls in summer. Rainfall varies between 20 and 290mm per year. Summer temperatures in excess of 40ºC are common. Fog is common near the coast – upon which many plants depend for water – and frost is infrequent. Desiccating, hot Berg winds may occur throughout the year. Upland Succulent Karoo is characterised by rainfall of 150 to 300mm p/a, and Lowland Succulent Karoo 50 to 200mm p/a.

Renosterveld is part of the Fynbos biome, characterised by rainfall between 250 and 600mm of rain per year, of which 30% falls in winter. The rainfall of North-Western Mountain Renosterveld, specifically, varies from 250 to 350mm and above per year where Fynbos becomes dominant (Low & Rebelo 1998).

3.1.5.2 Wind

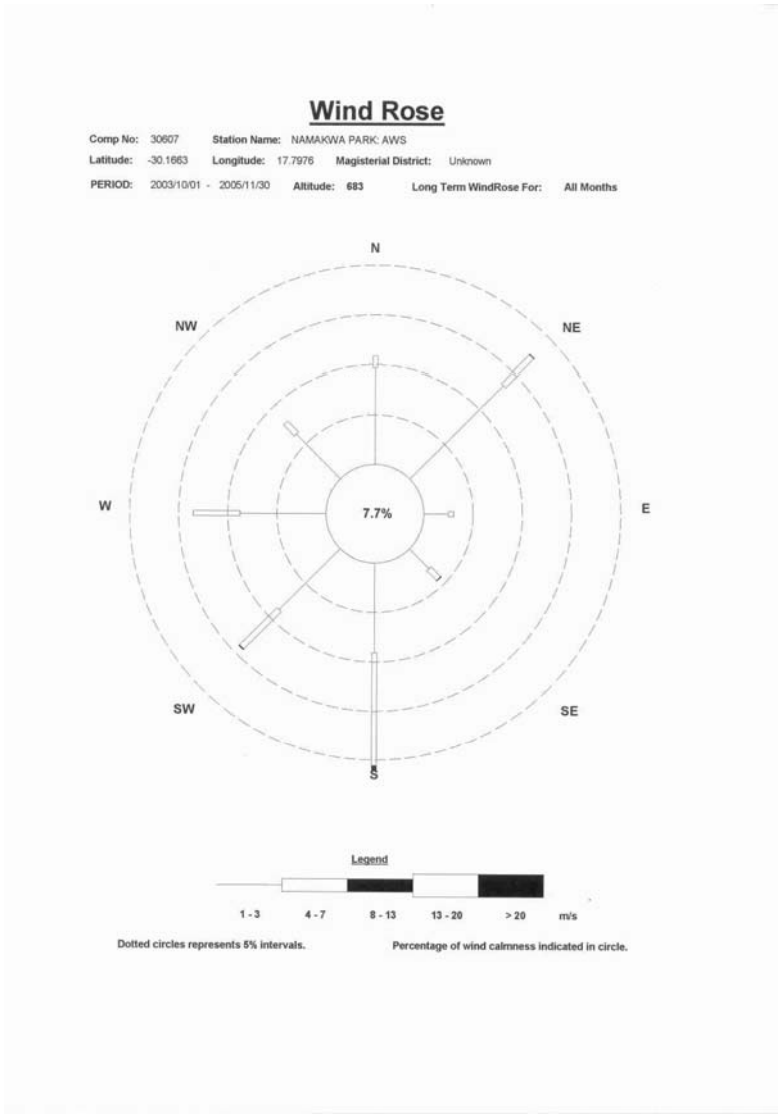
Wind roses are provided for 2 weather stations, one in the south at Lutzville and one in the centre of the proposed development at Namaqua National Park.

Figure 2: Wind rose for Lutzville



As can be seen on the wind rose, the wind blows in a westerly to north-westerly direction for most of the year, with there being little to no wind 43.3% of the time.

Figure 3: Wind rose for Namakwa National Park



As can be seen on the wind rose, the wind direction varies greatly, from north-easterly to southerly to south-westerly. There is no wind for 7.7% of the year.

3.1.6 Land Use

Due to the size of the study area, there are a range of current land uses, ranging from mining practices in the north and west (Alexcor, De Beers, Namakwa Sands) to agriculture in the south, with the bulk of the area being used for extensive stock farming. There is also a range of nature conservation activities, most notably the Namaqua National Park in the centre of the study area.

3.2 BIOLOGICAL ENVIRONMENT

3.2.1 Flora

Namaqualand is a winter-rainfall desert of some 60 000km^2 extent, where most areas receive less than 150 mm of actual rain per year. Plant geographers define Namaqualand

as that part of southern Africa's Succulent Karoo that is strongly influenced by winter rainfall and fog. The region is conveniently and naturally divided into five subregions. To the south lies the Knersvlakte, a vast, undulating plain that formed the swampy delta of an ancient river. The predominant vegetation is vygieveld, a dwarf shrubland dominated by leaf-succulent shrubs, mostly mesembs (these are known locally as vygies or small figs). The hallmark of the Knersvlakte is the extensive patches of white quartz gravel. The region is a recognized centre of endemism, harbouring at least 150 endemic species – with frequent new discoveries being made – including all ten species of *Argyroderma* and all three species of *Oophytum*, both miniature mesemb genera (Cowling & Pierce 2000).

To the north of the Knersvlakte lies the Hardeveld, a broken granite landscape. The Hardeveld represents the south-western sector of Southern Africa's Great Escarpment, an arc of mountainous terrain that separates the elevated inland plateau, or highveld, from the coastal forelands. Owing to the higher rainfall and cooler conditions experienced in these uplands, the vegetation is more luxuriant than on the lower-lying areas. Here the matrix of succulent shrubs is broken by scattered trees, principally species of *Rhus, Ozoroa* (both Anacardiaceae) and *Ficus* (Moraceae), as well as the quiver tree (*Aloe dichotoma*, Asphodelaceae) (Cowling & Pierce 2000).

The highest part of this escarpment zone comprises a cluster of massive granite domes, rising to over 1700 m and known as the Kamiesberg. Here the rainfall on the coast-facing slopes is sufficient to support fynbos, the vegetation that is typical of the Cape Floral Kingdom. Elsewhere evergreen shrubs, mostly members of the daisy family represented by *Tripteris, Euryops, Elytropappus, Eriocephalus, Berkheya* and *Didelta*, dominate the plant life. Succulents, especially miniatures, are largely restricted to fissures in the granite bedrock (Cowling & Pierce 2000).

Like the Knersvlakte, the Kamiesberg is also a recognised centre of plant endemism. No fewer than 86 species are endemic to the region. Most are bulbs, especially irids in the genera *Babiana, Moraea, Romulaea* and *Lapeirousia*. The area also has its share of dwarf succulent endemics, including species of Cheiridopsis and Conophytum (Cowling & Pierce 2000).

The western margin of Namaqualand, bounded by the cold Atlantic Ocean, comprises an extensive coastal plain, the Sandveld. The most widespread vegetation is strandveld, a tallish shrubland of leaf-succulent and summer-deciduous shrubs associated with sands of marine origin. The wind-blown acid sands of the Sandveld – derived from river-borne sediments – support a very dry form of fynbos, remote from the Cape Floral Kingdom stronghold (Cowling & Pierce 2000).

There are a number of aspects regarding the flora of Namaqualand that have to be emphasised. Firstly, the diversity of species is unparalleled. Namaqualand has a flora of about 3000 species distributed among 648 genera and 107 families. This is a very large number of species, at least four times richer than for similar-sized areas of winter-rainfall deserts elsewhere. The region also has an extraordinarily high level of endemism, with about half of its plant species found nowhere else. Another noteworthy aspect of Namaqualand's flora is the extraordinarily high number of succulents, especially leaf succulents. There are about 1000 succulent species in the region, comprising about one third of the flora and 10% of the world's succulents. A third feature is the diversity of tiny, often contracted miniature perennials, less than 10 cm tall. There are at least 250

miniatures in the Namaqualand flora, most mesembs but also crassulas and euphorbias, as well as bulbous plants. Fourthly, Namaqualand has, for a desert, a uniquely rich bulb flora. The region is home to 480 species, distributed across 100 genera and 19 families. This tally represents about 16% of the total flora, five to ten times more than any other winter rainfall desert. Finally, the feature most commonly associated with Namaqualand is the colourful floral display that begins in autumn and peaks in early spring. What is peculiar about Namaqualand is that these blooms of desert ephemerals appear, at least somewhere, every year (Cowling & Pierce 2000).

Along the coast in the north of the study area there are large areas that have been disturbed by mining practices. Further inland, however, the vegetation is largely undisturbed, especially within the Namaqua National Park and Skilpad Flower Reserve. Despite these initiatives, much of Namaqualand's biodiversity will remain unconserved. It has been estimated that some two-thirds of the region is needed to protect at least one population of each of Namaqualand's 456 Red Data Book plant species (Cowling & Pierce 2000).

The Transmission power-line will cross through Lowland and Upland Succulent Karoo in the Succulent Karoo Biome and – depending upon the exact placing of the line – North-Western Mountain Renosterveld, which is part of the Fynbos biome (Low & Rebelo 1996).

3.2.2 Fauna

The Succulent Karoo does not support a large biomass of terrestrial fauna, Unlike the summer rainfall karroid areas of southern Africa, the fauna of the Succulent Karoo is rich in endemics, especially among arachnids, hopliniid beetles, aculeate hymenoptera and reptiles (Vernon in press in www.gouritz.com).

The predictable rainfall appears to have selected for resident forms of invertebrates and small vertebrates, thus resulting in isolation and speciation. There are 78 mammals in the Succulent Karoo of which four are endemic. At 269 species, the bird fauna of the Succulent Karoo is not especially rich. It does, however, include 24 arid-adapted species (also occurring in adjacent arid biomes) and one endemic (the recently described Barlow's lark *Certhilauda barlowi*). The reptile fauna is particularly speciose. 60% of the herpetofauna from Namaqualand are endemic to the area (Loubser, Mouton and Nel, 2001). Thirty of the 72 species of lizard are endemic (the genus *Cordylis* is especially rich with seven endemics). Six of the world's 40 tortoise species are found in the Succulent Karoo, including the endemic speckled padloper (*Homopus signatus*). There are four endemic snakes (out of a total of 38 spp.) and four endemic frogs (out of 10). Among the invertebrates, 22 of the 50 scorpions in the Succulent Karoo are endemic (Vernon in press in www.gouritz.com). Monkey beetles (Rutelinae: Hopliini), a group largely endemic to southern Africa, are concentrated in the Succulent Karoo where some genera are important pollinators of daisies and mesembs (Aizoaceae: Mesembryanthema). Hymenoptera are important pollinators during the short spring-flowering season. Masarine wasps as well as colletid, fideliid and melittid bees all have centers of diversity and endemism in the region. Among the last-mentioned are species of *Redviva*, oil-collecting bees which pollinate species of *Nemesia* and *Diascia*. All of these pollinators have played an important role in shaping flower morphology and hence, driving speciation in the

Succulent Karoo. The endemic fauna of the Succulent Karoo is mostly inconspicuous. Girdled lizards (*Cordylis spp.*) of which seven are endemic to the Succulent Karoo, are characteristic of the region and readily observed (Lovegrove 1993 in www.gouritz.com). The armadillo girdled lizard *Cordylis cataphractus,* an inhabitant of Namaqualand's rocky outcrops, has a well-armored body and spiny tail. It is renowned for its defensive habit of rolling into a tight ball.

Two large and conspicuous birds, both endemic to southern Africa, are most commonly seen in the Succulent Karoo. The Black Harrier *Circus maurus*, with its distinctive black-and-white plumage, has the most restricted range of the world's 13 harrier species (Harrison et al. 1997 in www.gouritz.com). This striking bird is frequently observed hunting over the Namaqualand plains. The black korhaan *Eupodotis afra* is a near-endemic to the Succulent Karoo; its range extends marginally into the drier areas of the adjacent Cape region. It is especially common in the arid Sandveld of the Namaqualand coastal plain.

(source: www.gouritz.com)

3.3 VISUAL QUALITY

On a macro-scale, the area is characterised by the largely flat coastal plain in the west which ends at the foothills of the Kamiesberg Mountains in the East. These broken granite hills and ridges give way to the inland plateau and Great Karoo further to the east. On a micro-scale the area is characterised by the low succulent vegetation, with substrates varying from quartz pebbles to dark ilmenite streaks in red sand to bare granite. The lack of trees throughout most of the study area implies that the area receives its vertical definition from the hills and mountains. Keystone visual stimuli include the distinctive kokerboom (Aloe dichotoma) and the annual colourful blooms of desert ephemerals. The general lack of infrastructure in the area has as result that the area is characterised by its sense of openness and wilderness.

3.4 HERITAGE RESOURCES

Since the proposed route covers a variety of landscapes between the Gariep River (Oranjemond substation) and Vredendal (Juno substation), the specialist team was shown the area from the air. The findings of this study are therefore extrapolated from aerial observations, prior experience, work of colleagues and others. While the coastal areas and to some extent the Kamiesberg Mountains are relatively well understood in terms of heritage, no work has taken place on the coastal plains.

While no specific preferences are given in terms of the corridor, it is suggested that rocky outcrops, low hills and ridges be avoided as this is where the predominant heritage of the area (archaeological sites) are likely to occur. It will also be necessary (where appropriate) to consult with Nama communities where the route passes close to their grazing lands. It is also suggested that the route be kept away from the N7 so as not to impact its visual amenity value.

Impacts to heritage are likely to low due to the sparse nature of human settlement away from the coast. It is recommended that the route be ground-proofed (and mitigation applied through minor adjustment or recording and sampling) once other environmental and economic considerations allow for design of a proposed route.

3.5 SOCIO-ECONOMIC ENVIRONMENT

Unemployment is prevalent throughout the study area and remains a strong interest amongst interested and affected parties regarding potential job creation and economic spin-offs that the project might bring about. Unfortunately most of the work that needs to be done is of a skilled nature and is, as such, not a great source of employment.

Although official figures were not available at the time of writing this report, HIV is prevalent in the study area and I&AP's expressed concerns about the potential risk of exposure that could result from the presence of construction camps.

Directly affected landowners raised concerns regarding the negotiation and compensation for land and infrastructure, as well as the impact of the Transmission power-line on the future development of land-based enterprises, such as game and tourism operations.

The Kudu integration project is not intended for nor does it propose to provide power for the many towns in the study area. This, in conjunction with the fact that the Northern Cape and the northern reaches of the Western Cape are sparsely populated, the long-term effects on the socio-economic environment are less than would have been the case for a distribution project. The greatest beneficiaries of the project are remote from the study area, namely the inhabitants and businesses in the Western Cape and, to a lesser degree, the Coega development in the Eastern Cape.

Tourism in the region is largely based upon the seasonal blooms of desert ephemeral flowers. 6152 tourists visited the Namaqua National Park during the 1999 season (05/08/99 - 26/09/99)

SECTION 4: PUBLIC PARTICIPATION

4.1 INTRODUCTION

Public participation plays an important role in the compilation of a Scoping Report as well as the planning, design and implementation of the project.

Public participation is a process leading to informed decision-making, through joint effort by the:

- Proponent;
- Technical experts;
- Governmental authorities; and
- Interested and Affected Parties (I&APs)

Public participation is a vehicle for public input, which achieves the following:

- Facilitates negotiated outcomes;
- Creates trust and partnership;
- Minimises negative effects;
- Maximises positive effects;
- Provides an indication of issues, which may
    - Prevent the project continuing;
    - Cause costly delays later; and
    - Result in enhance and shared benefits.

Through the public participation process, SEF endeavoured to involve potential I&APs. The issues arising from the public participation process have been incorporated into the draft Scoping Report and used in determining mitigation measures for the project.

4.2 PROCESS FOLLOWED

The following process was undertaken to facilitate the public participation for the proposed project, which commenced on **23 January 2006**.

4.2.1 Newspaper Advertisement

An advertisement, notifying the public of the EIA process and requesting I&AP's to register their comments with SEF, was placed in Die Burger on **24 January 2006** and Ons Kontrei and Volksblad on **27 January 2006**.

4.2.2 Site notices, information pamphlets and Background Information Documents (BIDs)

In order to inform surrounding communities and immediately adjacent landowners of the proposed development; site notices were erected at visible locations within towns throughout the area of the proposed Transmission power-line from the 24 – 27 January 2006. The number of site notices erected within each town is tabulated in Table 3, as well as the number of packages containing information pamphlets (IPs) and BIDs that were placed within each town.

Table 3: Number of site notices, information pamphlets (IPs) and background information packages (BIDs) placed within each town throughout the proposed area in which Eskom may erect Transmission power-lines.

TOWN NAME	NUMBER OF SITE NOTICES[1]	NUMBER OF IP & BID PACKAGES[2]
Vanrhynsdorp	2	30
Nuwerus	2	20
Bitterfontein	1	20
Garies	2	40
Kammieskroon	1	20
Springbok	4	90[3]
Nababeep	1	20
Okiep	1	20
Steinkopf	1	20
Eksteenfontein	1	20
Kuboes	1	20
Alexanderbaai	2	40
Port Nolloth	4	50
Kleinzee	1	20
Gromis	1	0
Buffelsrivier	2	40
Kommagas	1	20
Soebatsfontein	1	20
Koiingnaas	1	20
Hondeklipbaai	1	30
Koekenaap	1	30

TOWN NAME	NUMBER OF SITE NOTICES[1]	NUMBER OF IP & BID PACKAGES[2]
Lutzville	1	30
Vredendal	2	40[4]
TOTAL 23 towns	35 Site notices	660 BID's

[1]Site notices were put up in sets consisting of one English & one Afrikaans notice.
[2]IP & BID packages were placed at Post Offices within each town.
[3]Packages in Springbok were divided into three lots of 30 placed at the NamaKhoi Municipality, Namakwa District Municipality and the Post Office.
[4]Packages were placed at the local Kentucky Fried Chicken (KFC) outlet.

4.2.3 Direct Notification of Identified I&AP's

Key stakeholders, who included the following sectors, were directly informed of the proposed development by e-mail, post and fax on 23-27January 2006.

- Authorities;
- Service providers;
- Residential Associations; and
- Non-governmental organizations.

Registered I&APs were informed of the fifth alternative – designated E – proposed during the authority briefing meeting of 5 May 2006 by fax, post and e-mail on 25 May 2006. The period for comment for this alternative extends to 9 June 2006.

4.2.4 Key Stakeholder Meetings

The main key stakeholders involved in the public consultation process include SANParks and CapeNature. The first round of key stakeholder meetings was held in Port Nolloth on 7 February 2006 and in Garies on 9 February 2006. The second round of key stakeholder workshops took place on 7 March 2006 in Kamieskroon in the afternoon and Vanrhynsdorp in the evening. The specific aim of these meetings was to inform the key stakeholders of Eskom's intention to construct the Transmission power-line and to obtain their input regarding the route that line is to follow.

Accordingly, construction of the line is planned for the year 2007 and the commissioning of the line is planned for 2008 (i.e. fifteen months after construction commences). Various factors need to be considered in the execution of the environmental investigation at present, namely:

- Firstly, the reliability of the existing power supply to the Western Cape is under increasing demand, which means that a new line will contribute to strengthening of this supply.
- Secondly, the prediction for the growth in demand for additional electricity in the Western Cape shows that the current system – where power is fed from the coal-fired stations in Mpumalanga – will not be able to cope with the predicted demands, especially when the proposed Coega development in the Eastern Cape commences in near future.
- Thirdly, Eskom Transmission aims to develop the national electricity grid in such a manner as to secure uninterrupted power supply to different parts of the country. This requires that the national grid should be based on a system whereby the supply to a specific area comes through more than one route.

The key stakeholders raised two main concerns regarding the erection of the Transmission power-line. Firstly, that no construction is to take place within the Knersvlakte due to the highly sensitive nature of this area, and secondly that the Transmission power-lines be erected along or near sites that are already disturbed such as major tarred roads (e.g. the N7). In order of preference, the proposed alternatives are:

- Transmission power-lines should be erected along the coast and cross through the Namaqua National Park along the Rondeklip road and then directly south.
- Transmission power-lines should be erected through the Boesmanland area via Springbok and Vaalputs, along existing power-lines/ railway lines.
- Transmission power-lines should be erected along the N7.

Detail with regards to these different alternatives will be given in Section 5: Alternatives

4.2.5 Public Open Day Meetings

Public open day meetings were held to allow the surrounding communities to voice their opinions and concerns regarding the Kudu-Eskom project. Details of the project were presented to those who attended and the public were given an opportunity to respond. Main concerns raised within these meetings were the following:

- The sensitivity of the Knersvlakte ecosystem and the refusal to see this biome disturbed.
- That the local communities would not benefit from the Transmission power-lines erected. This was viewed as grossly unfair in that their landscape will be visually scared to provide another area (i.e. Cape Town) with more electricity.
- The effect Transmission power-lines would have on the tourism industry in the area, especially with regards to the coastal and N7 alternatives proposed by SANParks.

In essence the public understood the need for the Transmission power-line and agreed that developments such as these would take place in the future. However, they also

argueD the need for Eskom to benefit the communities living in the area of the proposed Transmission power-line; the following were put forward for consideration by Eskom: subsidised or free electricity for farmers and surrounding towns; employment of locally skilled and unskilled people during the construction phase as well as capacity building and empowerment of local communities.

I&AP's were given 30 days to comment and or raise issues of concern regarding the proposed development. The period for comment expired on **22 February 2006**.

Interested and affected parties registered by completing registration forms, sending comments by email, fax, post, telephonically and attending project meetings.

The minutes of the meetings are summarised in Appendix 3. Identified and registered I&APs were entered into an electronic database, summarised in Appendix 4. The Issues and Responses Report are included in Appendix 5. The site notices and background information document follow in Appendices 6 and 7 respectively.

4.3 DRAFT SCOPING REPORT FOR REVIEW

On 8 April 2006 the draft Scoping Report was made available for public review. It was placed at easily accessible venues in the project area, as well as on SEF's website. The Report was available for a 30-day period and all registered I&APs were directly informed of the availability of the draft Report. No comments were received on the draft scoping report.

4.4 CONCLUSION

I&APs were identified and notified of the proposed development, in accordance with legislation. Comments / concerns received were incorporated and addressed in this Scoping Report.

Assessing the comments / concerns received during the public participation process, it is evident that the main concerns are:

- Environmental effects of the proposed Transmission power-line, specifically on the Knersvlakte;
- Benefits to local communities in the affected area; and
- Visual effects with regards to tourism in the area.

These concerns have been carefully considered and appropriate mitigation measures are suggested to address these concerns.

SECTION 5: ALTERNATIVES

5.1 INTRODUCTION

The IEM procedure stipulates that an environmental investigation needs to consider feasible alternatives for any proposed development. Therefore, DEAT requires that a number of possible proposals or alternatives for accomplishing the same objectives be considered. Alternatives can be categorised into the following: Strategic, Scheduling and Location (divided into integration and route alternatives) alternatives.

In order for the integration to be successful, the Transmission system must to meet the following criteria:

- Meet expected future increases in load demand;
- Satisfy the firm supply requirements of the future industrial development projects in the region;
- Maintain existing levels of reliability and quality of supply;
- Minimise cost; and
- Minimise any adverse environmental impacts.

These alternatives – and the No-Go option – are discussed briefly below.

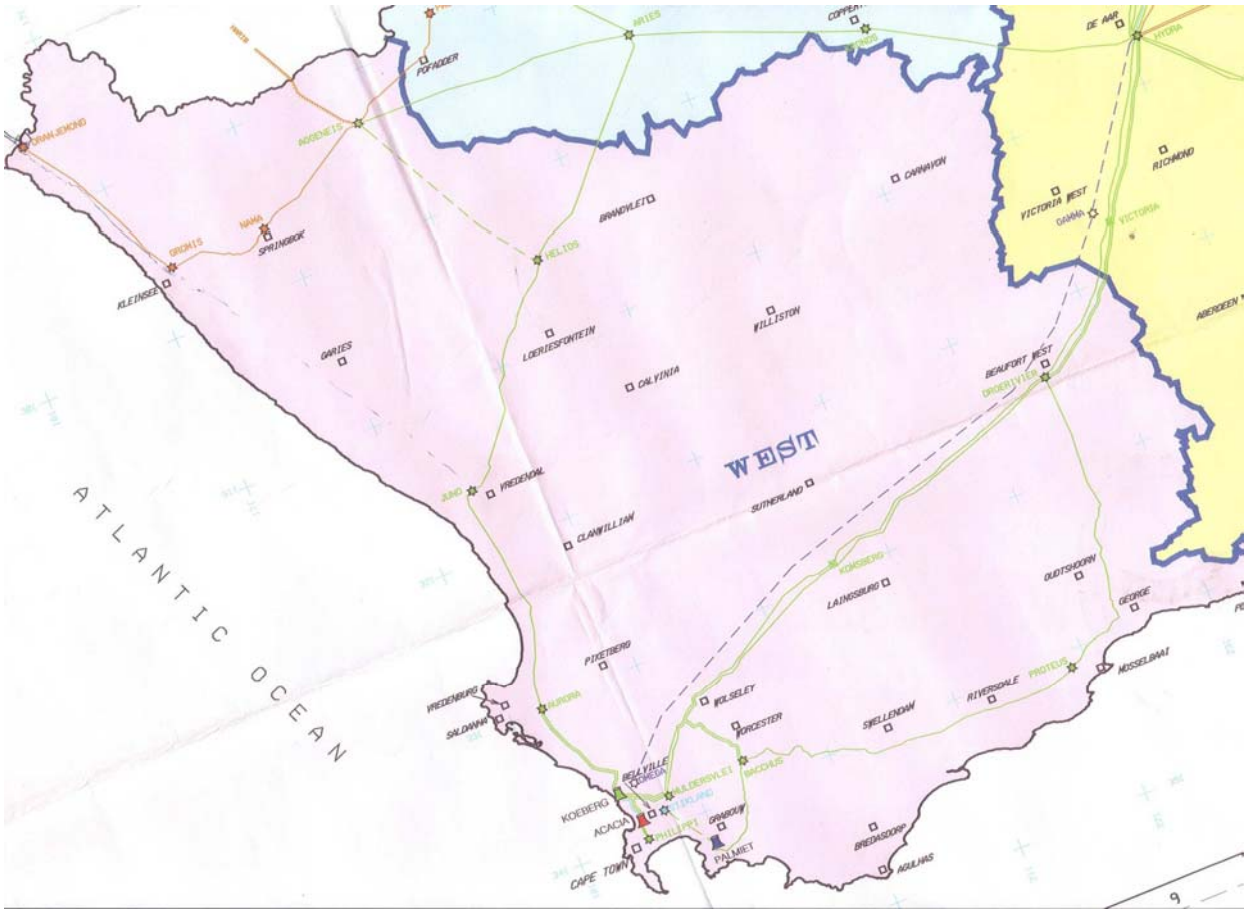
5.2 STRATEGIC ALTERNATIVES TO THE PROPOSED TRANSMISSION LINE

The alternatives, listed below, for satisfying the need for more reliable and / or increased power supply to the Greater Cape Region were investigated by Eskom. These alternatives are to be examined in conjunction with the national grid system map (refer to figure 4).

5.2.1 Demand-side Management

Demand Side Management (DSM) can generally be defined as the activities performed by the electricity supply utility, which are designed to encourage the reduction of the amount of electricity used during peak time through influencing customer usage of electricity and to reduce overall demand by more efficient use. These efforts are intended to produce a flat load duration curve to ensure the most efficient use of installed network capacity. By reducing peak demand and shifting load from high load to low load periods, reductions in capital expenditure (for network capacity expansion) and operating costs can be achieved. One of the basic tools is the price differentiation (such as time of use tariffs) between peak demand time and low demand time. This option is practiced to a certain extent, but is currently not considered feasible for expansion in this particular region. However,

Figure 4: Eskom Western Grid



the large concentration of industrial users in the end-user group makes this a very difficult option to pursue. Eskom has taken measures to optimise the existing Transmission system so that the construction of the new 400 kV line will occur only when needed. These measures include re-calculation of the thermal loading capability of the Transmission power-lines into to Greater Cape Region south of Bloemfontein based on the measured ambient temperatures in the area. The lines can now be loaded more heavily during cold days when the lines cool down and they do not sag as much.

5.2.2 New generation systems

A new coal-fired or nuclear generation plant could be commissioned close to the load centres. This option is not considered feasible since Eskom has surplus generating capacity and is therefore reluctant to commit to new capacity while existing power stations are "mothballed" and not yielding a return on investment. Even if the new plant enhanced generating capacity, the increase would have to be large enough (<200 MW) to make it economically feasible for Eskom to invest in such a plant. Additional Transmission power-lines would have to be built to connect the power station to the electricity grid and to transmit the electricity onwards. As the

Kudu CCGT station will provide power in order to satisfy the demand in the Western Cape, it is not feasible to construct power stations when power is already available.

Another alternative is to establish a number of nuclear pebble-bed modular reactors close to the load centres. These units are small enough to be able to supply the required local load demand without the need to transmit excess electricity to other geographic locations. This technology, however, is still in the early stages of development. A project is currently underway to establish a demonstration plant in the Western Cape Province, close to Koeberg Power Station. It is expected that it will take a number of years before this technology can be made commercially available at a competitive cost. The option of a nuclear pebble-bed reactor can therefore not meet the short to medium term load requirements in the Greater Cape Region.

5.2.3 Upgrade Existing Transmission power-lines by using Bigger Conductors

The physical load on the existing towers would increase substantially and the towers would be inadequate. Furthermore, it would not be possible to remove one 400 kV line from service to perform the upgrading work, as the remaining line would not be able to supply the electrical loads in the region. This option would not optimise the existing infrastructure.

5.3 SCHEDULING ALTERNATIVES

There is a definite need to overcome the current and future problems on the existing Transmission power-lines. The forecasted growth in demand over the next few years urgently requires Eskom to plan and execute goals well in advance, bearing in mind the severe problems regarding electricity supply experienced in the Western Cape and especially in Cape Town in the last number of months. The expected step-load in 2009 – when the Coega aluminium and steel smelters become operational, which will draw more power from the Mpumalanga coal-fired power stations – is a further and no less serious consideration. It is therefore necessary to ensure extra supply capacity into the Western Cape area in the medium to long-term.

The new Transmission power-line will be brought into operation simultaneously when the Kudu power station becomes operational and when the load growth and demand require it. It is however necessary to secure the necessary servitudes before hand, to ensure that the region's long-term needs can be met.

5.4 INTEGRATION ALTERNATIVES

A detailed location alternative analysis was undertaken for the development, with obvious limitations being placed by the location of the Kudu CCGT power station and the region where the additional power is needed. The proponent considered three possible means of integrating the power from the Kudu power station into the South African grid.

The three alternatives were proposed by Eskom prior to embarking on the EIA process in terms of how the power generated from the NamPower Kudu station would be integrated with the Eskom grid are as follows:

5.4.1 Kudu-Aggeneis

This option will link into the Eskom grid via a direct Transmission power-line from the Namibian border to the Aggeneis substation near Kenhardt in the Northern Cape. The existing Aggeneis-Aries 400kV line ensures connection into the Cape network. Power could be distributed from Aries into the network, either towards Kronos or towards Helios, depending on the generation pattern and load profile. The line length to Juno substation would be approximately 550km within the RSA border.

5.4.2 Oranjemond-Gromis-Juno

This option will link into the Eskom grid at the Juno substation near Vredendal. It will involve constructing a Transmission power-line from the Namibian border to Oranjemond substation and follow an existing 220kV line to Gromis substation. The Transmission power-line would then be extended to link with the Cape network at Juno substation. The line length would be approximately 390km within the RSA border.

5.4.3 Oranjemond-Gromis-Aggeneis

This option will also link into the Eskom grid at Aggeneis from the Namibian border, but will follow the existing Oranjemond-Gromis-Nama 220kV line. The existing Aggeneis-Aries 400kV line ensures connection into the Cape network. Power could be distributed from Aries into the network, either towards Kronos or towards Helios, depending on the generation pattern and load profile. The line length to Juno substation would be approximately 600km within the RSA border.

Results for all options, as determined by the Pre-Engineering Transmission Integration study steady-state analysis conducted by Eskom, indicates that with system healthy all the generated power can be absorbed into the Transmission network. No continuous thermal limits of lines or series capacitors are exceeded. All substation voltages remain within acceptable limits.

Results for all options further indicate that with an n-1 condition all the generated power can be absorbed into the Transmission network. No continuous thermal limits of lines or series capacitors are exceeded. All substation voltages remain within acceptable limits.

Table 4: comparison of impacts of different integration options. Preferred options shaded in blue. Red indicates a significant impact.

Factor	Impact	Affected party	Option1	Option2	Option3
Line length	Cost	Eskom	+ 550 km	390km	+ 600km
Stability of integration	Operational security, cost	Eskom, users	Low	High	Low
Electrical distance	Operational security, cost	Eskom, users	Medium distance	Closest to Cape network.	Furthest from Cape network
Line overload	Operational security	Eskom, users	Uses existing servitudes.	Avoids heavily loaded and isolated Aggeneis substation -	Uses existing servitudes.
Servitudes	Acquisition of new land	Landowners, environment	Runs parallel to existing servitude	Parallel to existing servitude up to Gromis. New servitudes to be acquired to south	Runs parallel to existing servitude
Sensitivity of area	Specific floral/faunal communities	Environment, tourists	Boesmanland: sensitive	Namakwaland / Potential to cross Knersvlakte: highly sensitive	Boesmanland: sensitive

Of the three alternatives, option 2 is favoured, for the following reasons:

- The impact (increased power flow on existing network) of option 2 is less on the existing network compared to option 1 and 3.
- Aries substation is fairly remote. If something happens at the substation, it can take time to have people on site to attend to the problem. All connection to NamPower runs through Aries for option 1 and 3. This is a risk for option 1 and 3, which does not exist for option 2, which provides a second main route to the NamPower network.
- Provision of a second route increases the operational security of the network, which is a major advantage for option 2.The network stability will also increase due to a firmer interconnection, as the power station will be electrically closer to the load centre in Cape Town and at Aurora substation.
- Option 2 is the preferred option in terms of savings in losses.
- Option 2 would be most reliable, providing best operational security.
- Option 2 would provide better network stability during loss of equipment on the Kudu side, due to Namibian integration into more than just Aries at 400kV.

Therefore, based on the load flows studied by Eskom during the Pre-Engineering Transmission Integration study steady-state analysis, option 2 is preferred.

5.5 ROUTE ALIGNMENT

Within the preferred Integration Alternative option 2, five Route Alternatives have been proposed, designated Alternative routes A - E. These Alternative Routes are given on the locality map.

The preferred route alignment will be determined based on:

- Consultation with stakeholders;
- the opinion of the public, ascertained through the public consultation process;
- specialists' recommendations;
- environmental characteristics; and
- techno-economic cost-benefit analyses.

At this stage of the Scoping exercise, based on a preliminary identification of physical, biological and social constraints (involving the public participation process) of the plausible options several criteria support the selection of route E as the preferred alignment. It should be mentioned however, that the comprehensive impact assessment phase will specifically assess the likely impacts of the final alignment of the line. Only at the end of this phase can the exact alignment of the servitude be determined.

Within option 2, the northern section of the line will fall within the existing 220kV servitude from the Oranjemond substation to the Gromis substation in the vicinity of Kleinzee. From there, *five* different alternative routes are proposed, as determined through engineering analyses and consultation with stakeholders and interested and affected parties:

5.5.1 A: Direct

This option will involve a by-and-large straight line with the minimum number of turns from Gromis to Juno substations, crossing the Namaqua National Park.

5.5.2 B: West

The line will deviate to the west of the existing borders of the Namaqua NP, but will traverse through the proposed westward expansion of the park at the narrowest point, following the Hondeklipbaai-road. South of the park, the Transmission power-line will stay on the sandy soil – which rehabilitates more rapidly – and follow the Nuwerus-Lutzville road to Juno. This option avoids the very sensitive quartzite section of the Knersvlakte.

5.5.3 C: N7

The line will follow the existing 220kV servitude between Gromis and Nama substations. At the southernmost point of this servitude, it will deviate to the east and follow the National Route 7 (N7) around the Namaqua National Park, all the way to Juno. This alternative is not ideal, considering the large number of turns required and the fact that the line will have to cross the Hardeveld.

5.5.4 D: Boesmanland

The line will follow the existing 220kV servitude between Gromis and Nama substations, and cross over the mountains east of Springbok. From there the line will run through Boesmanland, turning west to cross the Hardeveld to Juno. Objections for this alternative are the same as for alternative C.

5.5.5 E: Combined B & A

As proposed during the authority meeting of 5 May 2006, the route alternative B has been amended to follow a section of route alternative A. From Gromis the line will run to the west of the Namaqua National Park. From the Spoeg River, the line will deviate to the east and follow the first alternative. In the vicinity of the Groot Goerap River, the line will deviate to the west of alternative A and follow the same route as alternative B to Juno.

5.6 STRATEGIC COMPARISON OF ALTERNATIVES

During the scoping phase, several route alternatives were proposed. In order to facilitate the environmental impact assessment process, the specialists have conducted preliminary assessments of the impacts on the different alternative routes. This will enable the EIA team to focus on a manageable number of alternatives for more detailed specialist investigation during the EIA phase.

To this end, the specialists conducted preliminary studies, comparing impacts of each of the five proposed routes at a strategic level. These impacts are discussed in Table 5.

Table 5: Strategic comparison of impacts on different routes. Alternative/s not recommended by specialists red, recommended alternative/s in green.

	Alternative A	***Alternative B***	***Alternative C***	***Alternative D***	***Alternative E***
Route description *(refer to section 5.5 for full description)*	Straight line from Gromis to Juno	Deviates to west of Namaqua National Park from Gromis, towards Hondeklipbaai, and crosses through the Sandveld to Juno	From Gromis to Springbok parallel to an existing Eskom servitude, to Juno along the N7	From Gromis to Springbok parallel to an existing Eskom servitude, across the Kamiesberge, through Boesmanland and Knersvlakte	As for Alternative B, but follows route A from the Spoeg River to the Groot Goerap River, whereafter it rejoins route B.
Heritage	Overall, a low impact is expected irrespective of the route selected due to the sparse distribution of heritage sites in the study area.				
	Recommended: avoids sands and granite outcrops	Low-moderate impact: archaeologically rich sands	Low-moderate impact: granite hills	Low-moderate impact: granite hills	Low impact: avoids sands and granite outcrops
Vegetation	Not recommended: crosses the Riethuis - Oubees Quartz Vygieveld within the Namaqua National Park	Moderate impact: primary area of concern the Knersvlakte Quartz Vygieveld	Not recommended: traverses large parts of the sensitive Knersvlakte and Kamiesberg	Not recommended: traverses large parts of the sensitive Knersvlakte and Kamiesberg	Recommended. However, crosses Namaqualand Heuweltjieveld
Soils and agriculture	Medium agricultural suitability, therefore moderate-low impact on agriculture	Not recommended: Best agricultural suitability, therefore moderate-low impact on agriculture	Recommended: Low agricultural suitability, therefore low impact on agriculture	Recommended: Low agricultural suitability, therefore low impact on agriculture	Lower suitability than B but higher than A, therefore low-moderate impact on agriculture
Visual	Not recommended: High impact in crossing Namaqua National Park:	Not recommended: High impact in crossing Namaqua National Park:	Recommended, due to high visual absorption capacity.	Moderate impact expected, due to medium visual absorption capacity.	Not recommended: High impact in crossing Namaqua National Park:
Geotech	Recommended route: similar to E	Medium suitability: costs intermediate to C/D and A/E.	Not recommended: uneconomical due to numerous bends through	Not recommended: uneconomical due to numerous bends through	Recommended route: similar to A. Preferred.

			Kamiesberge	Kamiesberge	
Avian	Second-highest impact on avifauna	Not recommended: Highest impact on avifauna	Recommended: Lowest impact on avifauna	Tied second lowest impact on avifauna	Tied second lowest impact on avifauna
Social and Tourism	Not recommended: Crosses through a large section of the Namaqua National Park	Not recommended: crosses through proposed expansion of NNP	Recommended: Less impact on communities due to higher resilience of communities to negative effects of infrastructure development	Not recommended: no community consultation has taken place.	Not recommended: crosses through proposed expansion of NNP

5.6.1 Synopsis of the preliminary findings of the specialists:

5.6.1.1 Heritage

The expected heritage impacts of the proposed line construction are very low, due to the sparse nature of human settlement away from the coast. It is recommended that the route be ground-proofed (and mitigation applied through minor adjustment or recording and sampling) once other environmental and economic considerations allow for design of a proposed route. While no specific preferences are given in terms of the corridor, it is suggested that rocky outcrops, low hills and ridges be avoided as this is where the predominant heritage of the area (archaeological sites) are likely to occur. As such, this would imply that alternative routes C and D are not recommended due to the hilly nature of the terrain in that area. Hilly terrain is, however, not restricted to those alternatives.

5.6.1.2 Avifauna

Ludwig's Bustard was used as an indicator species in evaluating the alternatives in terms of their sensitivity for large terrestrial bird collisions. Ludwig's Bustard is almost certainly the species of most concern for this study due to its vulnerability to collision with overhead wires. In addition, this bird has arguably the most consistently high report rates across the study area of all the species likely to be impacted through collision. Using report rates as a measure of abundance for the Ludwig's Bustard for each quarter degree square (1:50 000 map unit) that was crossed by the alternatives, the sensitivity of the route in terms of its impact on avifauna was calculated. The alternative route which is expected to have the lowest impact on avifauna, and as such the most suited for construction of the line is alternative route C. This is followed, in descending order of suitability, by routes D and E, followed by A and finally B. Alternative route B is expected to have the highest impact by a rather significant margin, and is therefore not recommended from an avifaunal perspective.

5.6.1.3Visual Impacts

The preliminary visual impact opinion considered the sensitivities of the various visual receptors and the sensitivity of the landscape character. The western section of the study area is highly appreciated by tourists and unique in its sense of place due to the uncluttered and mostly vacant landscape character. The inherent appreciation of the quality of the landscape makes these visual

receptors highly susceptible to any negative visual impacts that may detract from the landscape character. As such, route alternative C is recommended as it would not affect these designated scenic landscapes. Alignments with existing linear infrastructure (i.e. road and other transmission lines) are visually more acceptable than those requiring introduction of transmission lines across pristine landscapes. In addition, the visual absorption capacity (VAC) is higher in the mountainous eastern part of the study area as opposed to the low-lying landscapes on the coastal front. The hilly terrain provides the opportunity of aligning the transmission line along valleys and utilising the natural screening capacity of the landscape. Alternative D is the second most preferred option, as Boesmanland is primarily utilised for livestock-agricultural purposes rather than tourism purposes. Due to the fact that alternatives A, B and E cross the (Namaqua National Park) NNP as well as the proposed expansion area of the NNP, it is recommended that these alternatives not be considered further. The tourism potential is very high in these areas, and the presence of a transmission line will visually intrude on the pristine landscape.

5.6.1.4 Soil and agricultural potential

The weighted average dry land arable agricultural and grazing suitability of the corridor was used as an indicator of impact on agricultural production or potential. Note that the variables included in this estimation include soil type, depth, clay content, local relief and percentage level land. Rainfall is not included in the estimation. Based on these factors, alternative routes C and D have the lowest dry land arable agricultural potential and are, therefore, the most suitable alternatives for the construction of the transmission line. These alternative routes may have a higher grazing potential, however, due to the higher rainfall. The alternative routes with the highest impact on agricultural potential are routes A, E and B. Alternative B is the least suited for construction of the transmission line, due to the relatively high agricultural potential along this route.

5.6.1.5 Geotechnical impact

The preliminary geotechnical investigation compared the different alternative routes in terms of:

- Topography,
- Proximity of the steel towers to the corrosive environment of the coastline,
- Location and design of service roads in relation to the powerline with access roads off provincial and national routes,
- Straightness of route i.e. minimisation of bends, or changes in direction, in the route which are relatively uneconomical, and
- Impact of geotechnical issues on costs of construction with respect to :
    - Earthworks associated with tower construction
    - Materials usage for road construction
    - Tower foundations, and
    - Tensioned ground anchors.

Based on this comparison the routes most suited for construction of the transmission line are alternatives A and E, with preference for the latter. Route B is slightly less suited for the purpose than the former two alternatives, as routes A and E are far straighter, minimising construction costs. Alternative routes C and D, due to the high costs expected to be incurred from construction in the rugged terrain, are not recommended.

5.6.1.6 Vegetation

Alternatives A, C and D are expected to have a high impact due to the presence of numerous endemic species within the very sensitive Riethuis-Oubees Quartz Vygieveld (close to Koiingnaas) and the Knersvlakte Quartz Vygieveld which includes the core area of the proposed Knersvlakte Biosphere Reserve.

Alternatives B and E, due to the fact that these areas are avoided, are more suitable for the construction of the transmission line. However, alternative route B traverses the Knersvlakte Quartz Vygieveld in the vicinity of the Jaagleegte River, as well as Namaqua Sand Fynbos near Kotzesrus, which is a biogeographically important vegetation type with a relatively restricted occurrence. Alternative E, conversely, avoids Namaqua Sand Fynbos, being further inland. It may, however, require to be altered slightly to avoid the Quartz Vygieveld north of Koekenaap.

The impacts of Alternatives B and E are, however, of lesser significance than the expected impacts of alternatives A, C and D.

5.6.1.7 Social and Tourism Impact

The preliminary social and tourism impact discussion does not recommend alternative routes A, B or E, due to the impact on the major tourism centre of the NNP. Alternative route C is recommended, as the larger and more heterogeneous communities along this route are more resilient to possible social impacts resulting from infrastructure development due to the exposure of these communities to existing infrastructure.

5.7 NO-GO ALTERNATIVE

The Department of Environmental Affairs and Tourism stresses that the no-go option should be considered in cases where the proposed development will have a significant negative impact that cannot be effectively or satisfactorily mitigated.

The purpose of the proposed 400 kV line is to supply reliable bulk power to the Western Cape. The line will enable Eskom to meet demands of the existing growth as well as the expected “step load” when the planned aluminium and steel smelters in the Coega IDZ reach operational status in 2009. If the proposed 400 kV line is not constructed, other sources could potentially be investigated, as explored in section 4.2. However, the Transmission power-lines running from Mpumalanga are close to reaching full operational capacity. As such, alternatives sources of power to the Cape grids through these lines will be unreliable for the level of supply security required.

There are other power generation alternatives that are currently being explored, e.g.: the Open Cycle Gas Turbine (OCGT) power stations to be constructed at Mossel Bay and Atlantis. Due to the current power crisis in the Western Cape, demand alternatives (i.e.: reducing electricity demand amongst customers) is also currently being implemented.

However, even with these alternatives, the expected growth in electricity demand in the Western Cape is expected to continue to outstrip supply in the next five to ten years, and the supply of additional power to the Western Cape is therefore a necessity. Given the fact that NamPower has offered Eskom the surplus power to be generated by the Kudu power station, it would be foolish of Eskom to decline this offer in the light of the current power deficit in the Western Cape.

What makes the option of obtaining electricity from the Kudu power station especially attractive as well, is the fact that this power is generated with far fewer environmental impacts than the coal-fired power stations, which account for the vast majority of Eskom's generation capacity. The relatively low environmental impacts of gas-fired power (no NO_x and SO_x emissions, no ash disposal, no land degradation due to coal mining) are important factors to consider when evaluating the alternatives with respect to where the necessary additional power must be obtained.

No other viable bulk power alternatives exist, therefore, should the proposed 400 kV line not be built, it could result in the Western Cape experiencing more frequent power outages, which would worsen as demand grows. This would ultimately nullify the major positive socio-economic spin-offs that would have been associated with the commissioning of the Coega steel and aluminium smelters. Some of these positive spin-offs include:

- The provision of employment;
- A large capital investment and substantial offshore revenue generation;
- A large amount of money invested regionally in the form of the company payroll and secondary industries;
- Significant revenues to the government in the form of taxes; and
- Creation and support of service sector jobs, the procurement of large quantities of consumables annually and the outsourcing of service provision to local service providers.

Based on the analyses of the alternatives, the construction of the proposed 400 kV line must be considered, if the demand in the Western Cape is to be met.

5.8 RECOMMENDATIONS

The various alternative routes for the Eskom Kudu transmission line have been considered by the project team. The suitability of the alternatives for the construction of a transmission line has been considered in terms of various impacts, namely: visual, avian fauna, geotechnical suitability, vegetation, agricultural suitability, social and tourism and heritage impacts. The suitability for the construction of a transmission line is inversely proportional to the impact expected upon a certain aspect of the environment.

No single route has been agreed upon by all the specialists concerned, due to the different potential impacts which have been identified by each. However, certain impacts are considered to be of greater importance when viewed in the context of the study area. For example, the agricultural potential of large parts of Namaqualand is low, largely due to the low rainfall and shallow soil, which is common in large parts of the area. Alternative routes which traverse areas of shallow soil will, as a result, have a low impact on agriculture, and these routes may be deemed to be well-suited for transmission line construction. However, these shallow soils support a unique floral community that is not only endemic, but is a major contributing factor to the tourism potential of the area. In addition, agriculture can continue underneath the pylons as less than 20m^2 per pylon will be permanently affected by the pylon footprints. Considering that there is very limited agriculture but significant tourism dependent upon the existing vegetation and sense of wilderness, the impact upon vegetation in Namaqualand is considered more significant than impacts on agriculture in the area. Similarly, bearing in mind the rather sparse distribution of heritage resources, tourism or vegetation impacts carry greater weight than heritage impacts.

The importance of vegetation in the area is emphasised by tha fact that the majority of the study is situated within the Succulent Karoo, which is recognised as a Region of Endemism. A centre of endemism is a geographical region at a particular scale which is distinguished by particular combinations of endemic plant taxa (Van Wyk and Smith, 2001). Namaqualand possesses a diversity among succulent plants that is unmatched in the world, including no less than four centres of endemism. This includes the Kamiesberg Centre in the Cape Floristic Region and the Centres of the Gariep, Knersvlakte and, depending upon the alignment of Alternative D, the Hantam-Roggeveld in the Succulent Karoo Region. This massive diversity has given rise to a burgeoning tourism industry. Bearing the critical aspects of the natural and socio-economic environment of Namaqualand this in mind, in order to best compare the impacts, the values of the Avifaunal, Geotechnical, Vegetation, Visual and Social/Tourism Impacts have been weighted, through the doubling of the suitability scores for these aspects.

Tables 6 and 7 below score the suitability of the alternative routes in terms of the different environmental variables considered, a score of 5 indicating greatest suitability and 1 indicating lowest suitability. A higher score, therefore, indicates a more suitable alternative for the construction of the line due to a lower expected impact.

Table 6: Alternative scoring table

	Alternative A	***Alternative B***	***Alternative C***	***Alternative D***	***Alternative E***
Heritage	5	3	2	2	5
Vegetation	1	4	1	1	5
Soils and agriculture	2	1	5	5	3
Visual	1	1	5	4	1
Geotechnical	4	3	1	1	5
Avian	2	1	5	4	4
Social and Tourism	1	1	5	0	1
Unweighted score	16	14	24	17	24

Table 7: Weighted alternative scoring table

	Weight	***Alternative A***	***Alternative B***	***Alternative C***	***Alternative D***	***Alternative E***
Heritage	1	5	3	2	2	5
Vegetation	2	2	8	2	2	10
Soils and agriculture	1	2	1	5	5	3
Visual	2	2	2	10	8	2
Geotechnical	2	8	6	2	2	10
Avian	2	4	2	10	8	8
Social and Tourism	2	2	2	10	0	2
Weighted score		25	24	41	27	40

Therefore, according to this preliminary comparison of expected environmental impacts of the construction of the Kudu transmission line, the most suited route is alternative C, followed by E.

However, while considering the environmental impacts, it is of cardinal importance not to lose sight of the goals of the entire project: to supply sufficient power for the increasing demand in Cape Town. As such, the alternatives investigated in the EIA phase must place the power source as close to the load centre as possible as well as technically feasible. As such, alternative route D is rejected due to the fact that the increased line length in effect removes the Kudu power station from the load centre and inflates construction costs significantly. Although it is technically unfeasible for the transmission line to be built adjacent to the N7, it will be necessary to investigate the impact of constructing a line in a corridor which is no further than 5km from the N7 within the corridor of alternative C. Therefore, it is proposed that the alternative routes C and E are investigated during the EIA phase.

SECTION 6: IDENTIFICATION OF ENVIRONMENTAL ISSUES AND CONCERNS

6.1 INTRODUCTION

Various meetings and site visits took place to identify environmental issues and concerns relating to the construction of the 400kV Transmission power-line.

6.2 PRE-APPLICATION MEETING

A pre-application meeting was held with Mr Vincent Matabane of DEAT on 18 April 2005, the agenda of which is included in the appendices.

6.3 SITE VISITS

An initial site visit took place in May 2005, where the following members of the project team attended:

- John Geeringh Eskom
- Hannes Coetzee Eskom
- Andrew Woghiren SEF
- Guillaume Nel SEF
- Stefan du Toit SEF
- Johan Lambrechts University of Stellenbosch
- Mark Richter Moore Spence Jones
- Jon Smallie Endangered Wildlife Trust
- Beate Sachse Private
- Damien Terlien Private
- Tim Hart University of Cape Town

The second site visit was conducted by Reuben Heydenrych, Mader van den Berg and Werner Eiselen (all of SEF) in January 2006.

6.4 KEY ISSUES

6.4.1 Key issue 1: The physical and biological environment

The issues identified here are based on an overview of the entire study area that was obtained from the site visit. This entailed an assessment by a team of specialists that were commissioned to assess the environment and the likely

impacts that the Transmission power-line could have on it. In this regard, the chosen Route will need to bear in mind key impacts such as:

- *Visual intrusion;*
- *Floral impacts in a highly sensitive area, where tourism is dependent upon the annual blooms of desert ephemerals;*
- *Wind erosion;*
- *Water erosion;*
- *Loss of high potential arable land;*
- *Habitat destruction and disturbance;*
- *Faunal impacts, the most significant being Bird impacts such as, electrocutions, collisions, habitat destruction and disturbance; and*
- *Destruction of heritage/historical sites.*

6.4.2 Key issue 2: The social environment

It must be ensured that the environment surrounding the development is safe and secure, and in all respects acceptable to the affected I&AP's. In this regard the social issues flagged during the site visit, (including the tourism issues) as well as the concerns raised in the public consultation process must be taken into account.

SECTION 7: CONCLUSIONS AND RECOMMENDATIONS

The purpose of this report is to identify relevant issues and alternatives in preparation of a full assessment of the environmental impacts. Potential impacts were identified in consultation with I&AP's, as well as through the technical expertise and experience of SEF.

7.1 ISSUES

The probable impacts of sufficiently high significance to warrant mitigation measures and management during the construction of the Transmission power-line are as follows:

- Visual intrusion as a result of the building and eventual operation of the Transmission power-line.
- Floral destruction through vegetation clearing and earthworks during the construction phase, and maintenance activities during the operational phase. Within the context of this region floral destruction could be kept to minimal levels if the preferred route is aligned along the shortest possible distance.
- Loss of tourism potential as a direct result of the visual intrusion and floral destruction listed above.
- Loss of high potential arable land as a result of the demarcating the servitude along current farm lands.
- Faunal destruction and displacement as a result of the construction activities, the most significant being the impacts on bird life.
- Destruction of heritage / historical sites.
- Impacts related to the social environment e.g. farm owners and other I&AP's. The public participation process should provide suggestions and recommendations to address all the major concerns and issues of I&AP's.

7.2 ALTERNATIVES AND GUIDELINES FOR THE IMPACT ASSESSMENT PHASE

The Scoping exercise consisted of preliminary specialist studies that enabled the identification of potential impacts and key issues. *These specialist studies are compared in section 5.6 and recommendations are made in this regard in section 5.8.* A holistic approach based on the principles of IEM was used to integrate and weigh the likely impacts of building the Transmission power-line along each route. This was done by mapping all the infrastructure and possible impact points along the proposed routes (such as pans, vegetation types, tourism locations, game farms etc.). *More attention was given to the most sensitive issues like the ecology of the area, bird impacts, tourism impact etc. through continual interaction with the specialists.*

At this stage, the preliminary specialist evaluation of the biophysical and economic constraints indicates that the Transmission power-line should be aligned along route alternative C, D or E, as discussed in Section 5.6 and 5.8.

The following aspects, however, need to be borne in mind regarding the development:

It is not a feasible solution to construct the Transmission power-line directly through a large section of the existing Namaqua National Park, due to the large visual intrusion that would result. In an area where the tourism is dependent upon the visual beauty of the landscape, such an impact cannot be mitigated. That eliminates route alternative A north of the Spoeg River.

The Hardeveld section of the Knersvlakte cannot be rehabilitated, and as such no Transmission power-line can be constructed through this area. That eliminates all but route alternatives B and E. Most I&AP's expressed the view that no line should be permitted to cross the Knersvlakte

Route alternative C is not feasible for the proponent as it would be too costly, requiring a great number of strain towers to make the necessary number of turns. This inflates the price of the line significantly.

Route alternative D is not feasible for the proponent as it would be too costly, being substantially longer than the other route alternatives.

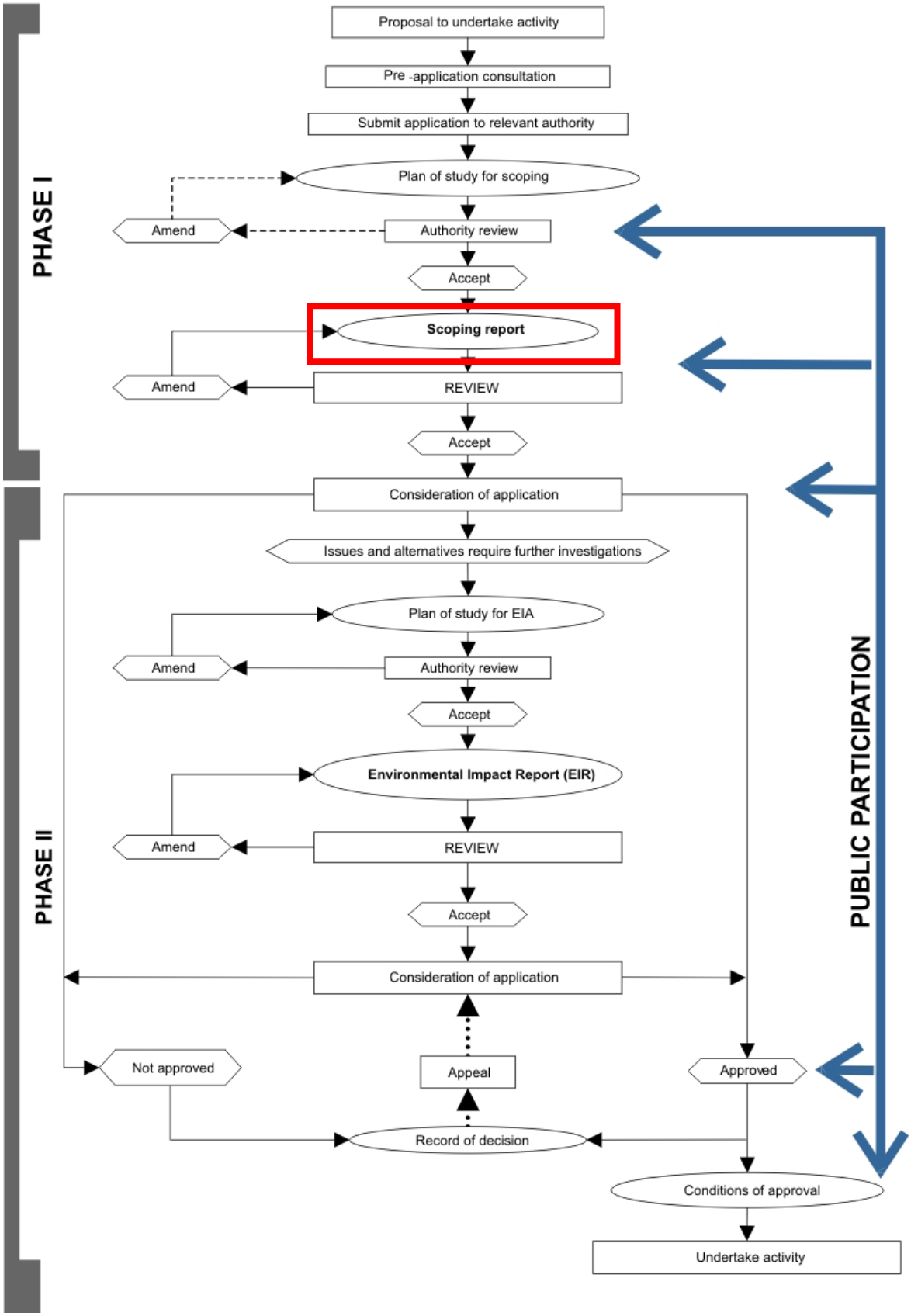
There were a great number of concerns I&APs that expressed their concern about the degree to which the development would create work for the local inhabitants.

7.2.1 Mitigation and Enhancement

Mitigation measures suggested by the I&AP's should be taken into consideration to avoid or reduce potential negative impacts.

This development could have a number of positive impacts for the region, including improved socio-economic conditions in the Greater Cape Region. Ways and means of enhancing any positive impacts should be addressed in the EIR and EMP.

7.3 STAGE OF PROJECT



7.4 CONCLUSION

The construction of a 400 kV Transmission power-line is a major development project that could have many negative impacts on the biophysical and social environments. Several of the likely impacts of the development are flagged here in a cursory way. Nevertheless, a detailed EIR and EMP are required to assess the significance of the impacts and recommend specific mitigation measures for the development along alternative routes C and E. These documents should focus on a 3km wide servitude area within which the preferred alignment is to be located. Such that, should it become necessary, the final alignment for the Transmission power-line can be adjusted to accommodate any issues or concerns identified in this Scoping Report.

REFERENCES:

The Gouritz Initiative. Accessed 2006. Electronic source: www.gouritz.com

COWLING, R & PIERCE, S. 2000. Namaqualand: Plant life in an extraordinary desert. Electronic source: www.plant-talk.org. Plant Talk No 22/23 (July 2000)

LOUBSER GJJ, MOUTON FN & NEL JAJ. 2001. Information supply on lesser-known but abundant animals: The ecotourism potential of herpetofauna in South Africa. Seminar on Planning, Development and Management of Ecotourism in Africa. Regional Preparatory Meeting for the International Year of Ecotourism, 2002. Presented at Maputo, Mozambique, 5-6 March 2001.

LOW, A.B. & REBELO, T.G. 1996. Vegetation of South Africa, Lesotho and Swaziland Dept. of Environmental Affairs and Tourism, Pretoria, Pretoria, South Africa.

VAN WYK, AE & SMITH, GF. 2001. Regions of Endemism of Southern Africa with the emphasis on Succulents. Umdaus Press (Pty) Ltd.