

**PROPOSED INSTALLATION OF ELECTRICAL
INFRASTRUCTURE IN THE COEGA IDZ**

**ENVIRONMENTAL IMPACT ASSESSMENT
EIA/12/12/20/781**

DRAFT SCOPING REPORT

MAY 2006



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ACRONYMS

DEAET	EASTERN CAPE DEPARTMENT OF ECONOMIC AFFAIRS, ENVIRONMENT AND TOURISM
DEAT	NATIONAL DEPARTMENT OF ENVIRONMENTAL AFFAIRS & TOURISM
DSM	DEMAND SIDE MANAGEMENT
DSR	DRAFT SCOPING REPORT
EIA	ENVIRONMENTAL IMPACT ASSESSMENT
EMP	ENVIRONMENTAL MANAGEMENT PLAN
IEM	INTEGRATED ENVIRONMENTAL MANAGEMENT
IAP'S	INTERESTED AND AFFECTED PARTIES
NEMA	NATIONAL ENVIRONMENTAL MANAGEMENT ACT
PPP	PUBLIC PARTICIPATION PROCESS
ROD	RECORD OF DECISION

EXECUTIVE SUMMARY

This draft scoping report covers the environmental scoping for the installation of proposed high voltage electrical infrastructure within the boundaries of the Coega IDZ that is situated near Port Elizabeth, Eastern Cape.

Eskom transmission and the Coega Development Corporation (CDC) propose the installation of electrical infrastructure within the Coega Industrial Development Zone (IDZ) near Port Elizabeth, Eastern Cape. The project includes the installation of 400kV and 132kV powerlines, substations for stepping down the power for end users, radio towers for communications, and the upgrade of the existing Grassridge substation. The proposed Open Cycle Gas Turbine (OCGT) for peaking hours, and Combined Cycle Gas Turbine (CCGT) for base load supply are external to this EIA. However, the powerlines covered by this EIA need to feed into the CCGT, and it thus has been considered in this project.

The installation of electrical infrastructure on this scale is a listed activity in terms of current environmental legislation, requiring that the proponent undertake an Environmental Impact Assessment (EIA) process ahead of any construction activities. Accordingly, Eskom and Coega (joint project proponents) have appointed Eyethu Engineers cc to undertake the required EIA.

The aim of the project is to obtain a Record of Decision (ROD) from the National Department of Environmental Affairs and Tourism (DEAT) regarding the installation and integration of electrical infrastructure within the Coega IDZ.

Project options centre on structural and technical alternatives more so than locality alternatives. This is due to spatial and operational constraints, due to the existence of the IDZ masterplan. The "No Go" option and strategic alternatives have also been considered as part of this Draft Scoping Report.

Based on feedback from the Public Participation Process, input from specialists, and an analysis of project alternatives, impacts and possible mitigation measures, it is recommended that the high voltage electrical infrastructure as described in this report is installed in the Coega Industrial Development Zone.

CHAPTER 1 THE EIA PROCESS FOLLOWED FOR THE PROJECT

1.1 BRIEF BACKGROUND TO THE PROJECT

The Coega Industrial Development Zone (IDZ) is located within the Nelson Mandela Metropolitan Municipality, and comprises an industrial development complex covering 28 000 acres (11 500 hectares). It includes the deepwater Port of Ngqura.

Proposed IDZ Clusters are to include Academic and Training, Automotive, Electronics and Technical, Metals and Metallurgical, and Textiles. A Strategic Environmental Assessment (SEA) was carried out for the Coega concept, followed by separate Environmental Impact Assessments (EIAs) for the rezoning of the land for the IDZ, for the construction of the Port of Ngqura, and for mining of the Western Coega Kop Quarry (to obtain rock for the port breakwaters). Once the IDZ is developed, the demand for electricity is expected to be at 5000 megawatts, which will be more than the whole Eastern Cape currently uses. Port Elizabeth is currently using 800 megawatts of power per day. A significant amount of infrastructure is thus required to ensure that the supply of electricity to the IDZ is sustainable.

In order to achieve this, Eskom Transmission and the Coega Development Corporation (CDC) propose the installation of high voltage electrical infrastructure within the Coega IDZ. The project includes approximately 20 kilometres of 400kV transmission lines and 26 kilometres of 132kV transmission Lines. In addition the project includes the construction of 3 substations, the upgrade of the existing Grassridge substation, and the installation of infrastructure to be used by Eskom Telecommunications, All components of the project except the upgrade to the Grassridge substation are to take place within the Coega IDZ boundary. Lower voltage infrastructure such as 11kV and 132 kV lines and substations are already in the construction phase and were subject to separate environmental authorisation)



Figure 1: Locality Map

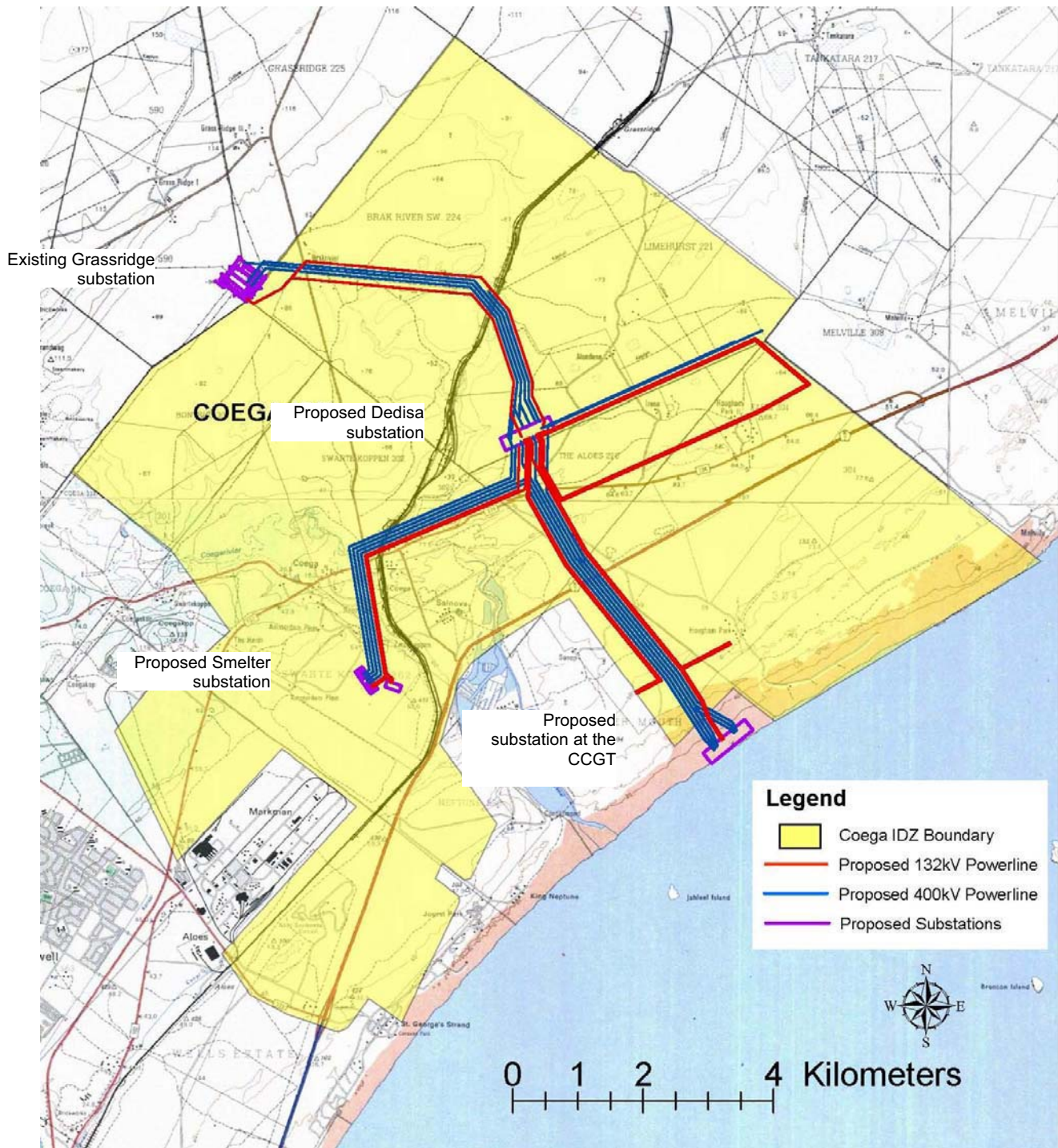


Figure 2: Study Area

1.2 THE EIA PROCESS FOLLOWED

This section provides a background to the EIA process for the project and places this report in the project's current context. Eyethu Engineers cc were appointed by Eskom Transmission and Coega Development Corporation to undertake the necessary environmental investigations in order to obtain a Record of Decision (RoD) from the National Department of Environmental Affairs and Tourism (DEAT) on whether the proposed project may proceed or not. Although National DEAT are the decision making authority for the project, their decision requires input from the Eastern Cape Department of Economic Affairs, Environment & Tourism (DEAET). All correspondence between the consultant and National DEAT throughout the scoping process is thus copied to DEAET. The EIA process is carried out according to an Integrated Environmental Management (IEM) procedure, as advocated by the Department of Environmental Affairs and Tourism (1992) and the Regulations promulgated under the Environment Conservation Act 73 of 1989. This report is the draft scoping report, and constitutes part of the abridged EIA process, as illustrated in Figure 2.

The EIA process as a whole is intended to provide information on the affected area, identify alternatives at an early stage, facilitate consultation with the landowners, key stakeholders and specialists, and to address the concerns of Interested and Affected Parties (IAPs). This report aims to collect and address all issues raised during the scoping process, and to provide sufficient information for National DEAT to assess the project at scoping level. Based on the review of the scoping report, National DEAT will rule whether further environmental investigations are required, or they will issue a record of decision at this stage. The RoD will either state that the project may not proceed, or that it may proceed with conditions.

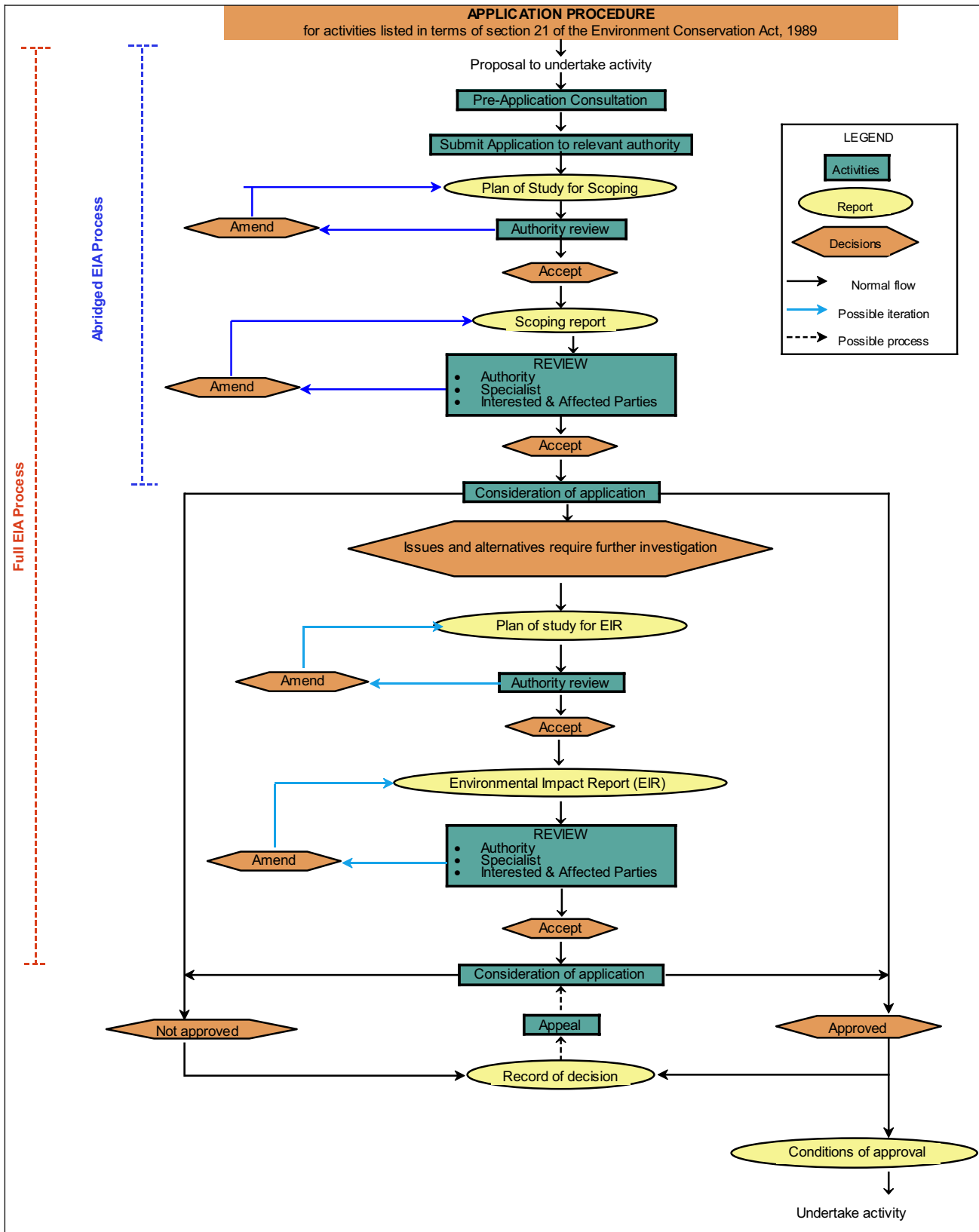


Figure 3: The EIA Process

Table 1: Approach to the Study

Phase	Main Action	Description
Phase 1	Need and justification	Establish the need. Establish alternatives. Identify study area.
Phase 2	Scoping study	Evaluate alternatives. Identify and contact IAPs. Collect background data. Identify problem areas.
Phase 3	Environmental Scoping Report	Draft Environmental Scoping Report (Current)
Phase 4	Review	Independent IAP review. Comments received and analysed, and Draft Scoping Report revised.
Phase 5	Decision	Final Environmental Scoping Report submitted to National DEAT for approval. Decision on the project made by National DEAT with input from DEA&DP. Decision made public.

1.3 SCOPING

The project is currently at the environmental scoping phase of the environmental assessment process. Scoping can be defined as an exercise involving the preliminary identification of the environmental issues surrounding a project that require assessment. It identifies the potential impacts that are to be addressed by the assessment and initiates the public consultation/public participation process.

The first step of the scoping study was to identify the main issues surrounding the project. Issues were identified using professional judgement, experience of similar projects, knowledge of the study area, a review of available literature, public consultation, specialist input and consultation with relevant Government authorities.

The draft scoping report will now be publicly reviewed and finalised, and a decision will then be made by national DEAT with input from DEAET. All Interested and Affected Parties (IAPs) are invited to comment on the draft scoping report.

1.3.1 Authority Consultation

A pre-application meeting was held with the following attendees in Pretoria on the Pretoria 23rd February 2006:

- Mr Danie Smit, Department of Environmental Affairs and Tourism (National);
- Mr John Geeringh, Eskom Transmission
- Mr Fezile Ndema, Coega Development corporation
- Ms Sharon Boast, Eyethu Engineers cc

See attendance register and minutes in Appendix A.

All correspondence including minutes of the pre-application meeting have been copied to Mr Andries Struwig of the Eastern Cape DEAET.

A key stakeholder workshop was held at the Port Elizabeth City Hall on the 29th March 2006. Local and provincial authorities, as well as NGO's were invited to attend the Key Stakeholder Workshop. (see attendance register and minutes in Appendix A)

1.3.2 Specialist Input

The following specialists were consulted concerning the project and produced reports at the scoping stage:

- Archaeology: Len van Schalkwyk, eThembeni Cultural Heritage
- Avifauna: Jon Smallie, Endangered Wildlife Trust.
- Ecology: Pete Illgner
- Geology: GV Price, Terreco

The aims of authority and specialist consultation at this stage was to discuss and define the following:

- the need for the project;
- alternatives;
- any constraints which may be identified by Authorities;
- scope of work for the study;
- study approach and methodology with respect to data collection, data evaluation and public participation;
- identification of additional interested parties;
- the main environmental issues which require detailed study;
- relevant data;
- verification of map data;
- identification of "no go" areas.

1.3.3 Site Visit

The project team and specialists undertook a site visit from to the Coega IDZ on the 17th of February 2006. The site visit included a flight over the study area in a helicopter, where the

substation sites were viewed and the powerline corridors were followed. The team was accompanied by Eskom and Coega personnel in order that technical and strategic questions could be addressed.

1.3.4 Information Gathering

Information gathering was carried out through:

- Correspondence with specialists and Eskom and CDC personnel
- Literature reviews
- Geographic Information System (GIS) analysis including 1:50 000 topographical maps
- Red Data Flora information
- Vegetation maps of South Africa (Mucina and Rutherford 2003)
- Geological maps of southern Africa (Theron 1990)
- Heritage Databases for the Eastern Cape
- Interaction with NGOs and individuals
- Interaction with Authorities

1.4 PUBLIC PARTICIPATION

Public participation forms a central part of the Scoping process. Details of the public participation process followed are provided in Appendix B. An issues report highlighting all issues raised and comments relating to the project is included as Appendix C.

1.5 CONTENTS OF THE FINAL SCOPING REPORT

- Chapter 1 The EIA Process followed for the Project
- Chapter 2 The Legal Position
- Chapter 3 The need for the Coega Electrical Infrastructure Project
- Chapter 4 Description of the Environment
- Chapter 5 Description of the Proposed Project
- Chapter 6 Identification of Potential Issues and Impacts
- Chapter 7 Alternatives
- Chapter 8 Conclusions and Recommendations

CHAPTER 2 THE LEGAL POSITION

2.1 INTRODUCTION

A project involving a new or upgraded powerline requires a review of applicable legislation, policy guidelines and administrative procedures.

This chapter reviews legislation pertaining to environment conservation, pollution prevention, use and conservation of resources, protection of the socio-cultural heritage, etc.

2.2 PERTINENT ENVIRONMENTAL LEGISLATION

Given the nature of the Coega IDZ electrical infrastructure study area and the proposed development, the pertinent environment laws that are applicable to the study area have been identified and are presented in Table 2.

Table 2 Pertinent Environmental Legislation Applicable to the Project

NAME OF ACT OR ORDINANCE	AREA OF APPLICATION	CONTROLLING AUTHORITY
Agricultural Pests Act (Act no 36 of 1983)	Control to prevent agricultural pests, including the importation of exotic plants and animals	Department of Agriculture
Atmospheric Pollution Prevention Act (Act no 45 of 1965)	Control of all forms of air pollution, e.g. smoke, dust and vehicle emissions	Delegated through regulations to Local authorities, Department of Environmental Affairs and Tourism
Conservation of Agricultural Resources Act (Act no 43 of 1983)	Control of the utilisation and protection of wetlands, soil conservation and related matters, control and prevention of veld fires, control of weeds and invader plants, the control of water pollution from farming practices	Department of Agriculture
Environment Conservation Act (Act no 73 of 1989) and Regulations under the act	Matters relating to conservation, littering, combating of noise, etc.	Department of Environmental Affairs and Tourism
Eskom Act of 1987	Matters relating to Eskom	Eskom
Fencing Act (Act no 31 of 1963)	Prohibition of damage to a property owner's gates and fences	Department of Agriculture
Fertilisers, Farm Feeds, Agricultural Remedies and Stock Remedies Act (Act no 36 of 1947)	Control of aspects concerning the importation, manufacture, registration, sale, storage and use of pesticides and herbicides	Department of Agriculture
Forest Act (Act no 122 of 1984)	Control of veld, forest and mountain fires and the protection of biota and	Department of Environmental Affairs and Tourism

NAME OF ACT OR ORDINANCE	AREA OF APPLICATION	CONTROLLING AUTHORITY
	ecosystems	
Hazardous Substances Act (Act no 15 of 1973)	Control of substances capable of causing injury, ill-health or death of human beings by reason of their toxic, corrosive, irritant, strongly sensitising or flammable nature	Department of Health
Health Act (Act no 63 of 1977)	Control of the provision of sewerage and sanitary facilities and the pollution of surface and ground water, which may endanger human health	Most powers delegated to local authorities Department of Health
Land Survey Act (Act no 8 of 1997)	Cadastral surveys and associated activities	Department of Regional and Land Affairs
Minerals Act (Act no 50 of 1991)	Controls land use and infrastructure on mining and prospecting areas. Controls environmental matters in areas to which this Act applies, e.g. the removal of trees and bushes	Department of Minerals and Energy
National Monuments Act (Act no 28 of 1969)	Controls for and protection of natural and historical monuments, relics and antiques	Department of National Education
National Roads Act (Act no 54 of 1971)	Disposal of waste near national roads	Department of Transport
Occupational Health and Safety Act (Act no 85 of 1993)	Controls the exposure of employees and the public to dangerous and toxic substances or activities	Department of Manpower
Physical Planning Act (Act no 125 of 1991)	Regional and urban structural plans (Sections 23-27)	Department of Regional Planning and Land Affairs
Regional Services Council Act (Act no 109 of 1985)	Enabling regional services councils to control environmental matters within their areas of jurisdiction	Regional Services Councils
South African Transport Services Act (Act no 65 of 1981)	Control on all environmental matters of SA Transport Services properties	Department of Transport
Water Act (Act no 36 of 1998)	Control of the conservation and use of water for domestic and industrial purposes; treatment and disposal of waste and waste water and pollution of surface and ground water	Department of Water Affairs and Forestry
National Environmental Management Act no 107 of 1998	Control of Environmental Management	Department of Environment Affairs and Tourism
National Heritage Resources Act no 25 of 1999	Control of heritage resources	South African Heritage Resources Agency
Advertising on Roads and Ribbon Development (Act No 21 of 1940)	Prohibition of leaving refuse, and erection and construction of	Department of Transport

NAME OF ACT OR ORDINANCE	AREA OF APPLICATION	CONTROLLING AUTHORITY
	structures near certain roads	

Of importance are also all provincial and municipal by-laws and regulations that are not listed here. Some of the acts may have changed or are in the process of change. However, once construction starts, current legislation and all amendments will apply.

2.3 SPECIFIC RELEVANT ENVIRONMENTAL LEGISLATION

2.3.1 *Environmental Conservation Act No 73 of 1989 (ECA)*

The ECA created the mechanism for the implementation of compulsory EIA's by way of ministerial regulation. Section 21 empowered the Minister to promulgate regulations identifying activities that may have a detrimental effect on the environment. Section 22 prohibits the undertaking of activities identified under regulations promulgated under Section 21, except by virtue of a written authorisation issued by the Minister or delegated competent authority.

Section 26 is again enabling, allowing the Minister to promulgate regulations regarding information to be submitted to the Minister to enable an informed decision to be taken in terms of Section 21.

The Minister promulgated regulations in terms of Section 21 and Section 26 in Government Gazette No 18261 in September of 1997. Regulation 1182 set out a list of activities which may have a substantial detrimental effect on the environment – including "1(a) The construction or upgrading of facilities for commercial electricity generation and supply".

Regulation 1183 set out the application procedure for approval to carry out a listed activity. The procedure is represented graphically in Chapter 1, Figure 3.

In terms of Section 1.1(a) of Regulation 1182 promulgated under Section 21 of ECA, Eskom and CDC are legally obliged to undertake an EIA for this project in the format prescribed under Regulation 1183 promulgated under Section 26 of ECA.

2.3.2 *National Environmental Management Act No 107 of 1998 (NEMA)*

In essence NEMA repealed ECA in total. Section 50(2) however, provides that Sections 21, 22 and 26 of ECA and regulations promulgated under these Sections shall have force and effect until regulations under Section 24 of NEMA are promulgated. The regulations have been promulgated and will be implemented on 1 July 2006, at this time ECA and NEMA operate side by side. NEMA focuses primarily on co-operative governance, public participation and sustainable development.

Section 2 of the act sets out a series of principles which serve as guidelines “by reference to which any organ of state must exercise any function when taking any decision in terms of this act or any statutory provision concerning the protection of the environment.” These principles include:

- The development must be sustainable.
- Pollution must be avoided or minimised and remedied.
- Negative impacts must be minimised and positives enhanced.
- Waste must be avoided or minimised, reused or recycled.

Section 2(4)(vii) effectively writes into law the “precautionary principle”, whereby a risk-averse and cautious approach is applied to the decision-making process.

Section 28 imposes a duty of care to avoid environmental damage or pollution, and where it is not possible to avoid this by taking reasonable steps, then imposes an obligation to remediate any environmental damage that may occur as a result of the activity.

2.4 THE REGULATORY FRAMEWORK

2.4.1 The Electricity Act No. 41 of 1987 (and Electricity Amendment Acts of 1994 & 1995)

This Act governs the control of generation and supply of electricity in South Africa and the existence and functions of the Electricity Control Regulator (NER).

Section 3 of the Act sets out the objectives of the Regulator, which are to exercise control over the electricity supply industry so as to ensure order in the generation and supply of electricity, and to perform all functions assigned to it under the Act. “Supply” is defined as the provision or distribution of electricity or both.

Section 4 sets out the functions of the regulator that are inter alia, that the regulator may:

- (a) issue licences for the generation, provision and, within the area determined by it, distribution of electricity.
- (b) determine the prices at and conditions on which electricity may be supplied by a licensee.

The Board of the NER consists of a chairperson and eight part-time members, all of whom are knowledgeable and experienced in broader electricity supply issues. Board members are appointed by the Minister of Minerals and Energy Affairs and are funded predominantly from licence fees levied on the licence in respect of electricity generated or supplied.

Section 6 stipulates that no person shall generate or supply electricity except under the authority of a licence.

Section 10 sets out duties of licensees which includes inter alia that the licensee must supply electricity to every applicant within his licence area, who is in a position to make satisfactory arrangements for payment thereof. Should the licence unduly delay or refuse to supply the applicant may appeal to the regulator, who will decide whether the licensee shall supply the applicant and the conditions for such supply.

Section 12 gives the regulator power to give a defaulting licensee 30 days, or such longer period as may be required, to meet his obligations. Failure to comply may result in a criminal conviction, the taking of possession of the undertaking of the licensee or the withdrawal of his licence.

At present Eskom and over 400 distributors - mainly municipal electricity departments-supply electricity to end customers. Eskom is the largest single distributor in the country in terms of sales for final consumption and number of customers. The municipal distributors are under direct control of elected local councils. All electricity distributors are subject to regulation by the NER.

The current electricity distribution industry is fragmented and a restructuring and consolidation process has commenced whereby 6 Regional Electricity Distributors (REDs) and Eskom will be responsible for distribution and transmission of electricity

2.4.2 The Eskom Conversion Act No. 13 of 2001

The objective of the Eskom Conversion Act is to convert Eskom into a public company having a share capital in terms of the companies Act, and to provide for matters connected therewith, such as powers and duties of Eskom.

Section 2A stipulates that the ownership of Eskom's equity shall rest in the State.

Section 3 sets out the objectives of Eskom which is "to provide the system by which the electricity needs of the consumer may be satisfied in the most cost-effective manner, subject to resource constraints and the nations interest".

2.4.3 The Eskom Act 40 of 1987 as amended by the Eskom Amendment Act 51 of 1991

Section 3 of the Act sets out the objectives of Eskom, being *inter alia* the provision of a system by which electricity needs of the consumer may be satisfied in the most cost effective manner, subject to resource constraints and the national interest.

The Electricity Council exercises control over the performance of Eskom's functions and the exercise of its powers and duties. (Sect 4 (1)). The management of the affairs of Eskom are conducted by the Management Board (Sect 4(4)), the members of which are appointed by the Electricity Council.

Section 11 authorises Eskom to generate or supply or to generate and supply electricity within the Republic of South Africa subject to the right of local authorities and holders of licences under the provisions of the Electricity Act, 1987.

Section 12 sets out the functions, powers and duties of Eskom, which include inter alia:

1(a) the power to investigate, establish, acquire, maintain, co-ordinate, amalgamate and carry on undertakings to provide an efficient and cost-effective supply of electricity to any body or person in the republic.

1(aa) to enter into any contract or perform any act As will in the opinion of the Electricity Council contribute towards the attainment of Eskom's objectives.

2.4.4 The White Paper on the Energy Policy of the Republic of South Africa (December 1998)

White Papers are policy documents and hence lack the legal force of legislation. They are however indicative of the government's plans and future policies and often result in the tabling of legislation to achieve the policies and goals set out therein. In 1998 the government published its White Paper on the Energy Sector of South Africa.

Energy sector policy objectives identified include increasing access to affordable energy services, improving energy governance, stimulating economic development (including the encouragement of cost-effective energy prices which include quantifiable externalities), managing energy-related environmental and health impacts and securing supply through diversity. There is a recognition that there needs to be a balance between energy prices and sustainable environmental standards.

The White Paper recognises that electricity industry is effectively a state monopoly, which is tightly regulated by government policies and regulators and commits the Government to encourage competition within energy markets, particularly in the generation sector, with the introduction of Independent Power Producers (IPP).

2.5 SUMMARY

To summarise: Eskom has a number of legal obligations arising out of various statutes that are applicable in this context, the key aspects being:

- (a) An obligation to supply electricity to every person applying for electricity who is in a position to pay for it, in the most effective manner, subject to resource constraints and the national interest.
- (b) An obligation to undertake an EIA for activities which fall within the scope of Regulation 1182 promulgated in terms of ECA and / or the National Resources Heritage Act.
- (c) Various obligations to prevent environmental damage by taking all reasonable steps to prevent it (NEMA, National Water Act and others).

CHAPTER 3 THE NEED FOR THE INSTALLATION OF BULK ELECTRICAL INFRASTRUCTURE IN THE COEGA IDZ

3.1 INTRODUCTION

Electricity cannot be stored. It is therefore necessary to generate and deliver power over long distances the instant that it is needed. In South Africa, thousands of kilometres of high voltage transmission lines transmit power, mainly from the Power Stations located at the Mpumalanga coal fields to major substations where the voltage is reduced for distribution via distribution lines to industry, businesses, homes and farms all over the country.

Eskom transmission is responsible for the supply of bulk electricity via high voltage lines (between 275 and 765 kVs) from the generation source to the distributor. Eskom distribution is responsible for distributing this electricity to municipalities and some end-users via smaller voltage lines (between 11 and 132 kV's). Most towns and cities purchase electricity in bulk from Eskom and sell it to households, industrialists and other end users within their areas of jurisdiction, while Eskom also sells electricity directly to end users in some parts of South Africa. The network is illustrated in Figure 3 below.

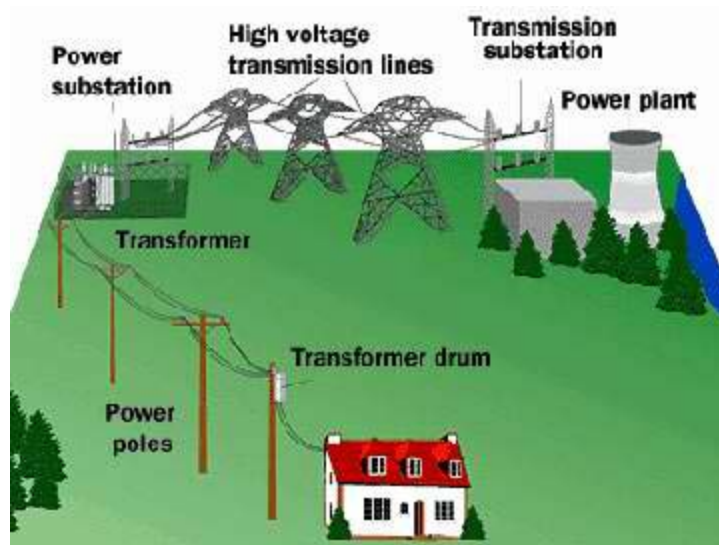


Figure 4 Overview of the electricity network

Eskom has taken measures to get the most out of the existing transmission system, and even with the measures listed below, the new infrastructure for Coega will be required. These measures include:

- Comprehensive checks on the existing lines to ensure that they are within the legal clearance for overhead lines. Lines sag when placed under heavy load conditions, due to heating of the conductors.
- Installation of line monitoring devices that measure the atmospheric conditions prevailing. This allows Eskom to decide whether the lines can cope with more loading (e.g. on a cold day the line can be loaded to more than usual levels since the lines cool down and they do not sag as much.)
- When reinforcement options were looked at, the best option was chosen to ensure that an optimised mix of cost, technical benefit and environmental impact was achieved.

Eskom planners forecast that once the IDZ develops, the demand for electricity is expected to be at 5000 megawatts, which will be more than the whole Eastern Cape currently uses. (Port Elizabeth is currently using 800 megawatts).

In addition to bringing power to the IDZ, the bulk infrastructure also needs to serve the purpose of integrating the proposed power generation plant (CCGT) into the country's electricity network.

CHAPTER 4 DESCRIPTION OF THE ENVIRONMENT

The information contained in this section provides a broad overview of the environmental context within which the proposed project would take place, if approved. It is anticipated that much of the study area will be transformed and developed for the IDZ. The layout of the remaining open areas can be seen below in Figure 5 (the IDZ's planned open space system). For the purposes of this study emphasis has been placed on what will remain once the IDZ has been developed (this has already received environmental authorisation), rather than what is currently present. Should any gaps in the information be identified that make decision-making difficult, components of the affected environment may need to be examined in more detail.

4.1 BIOPHYSICAL CHARACTERISTICS

The IDZ boundary is regarded as the study area for the purposes of this report, although focus has been placed on the development footprints of the components of the power distribution network.

4.1.1 Climate

The climate of this region is complex as it experiences the overlapping of both temperate and subtropical climatic regimes. The Coega area has a warm temperate climate and the temperature ranges are not extreme, except during summer. Average maximum and minimum monthly temperatures for Port Elizabeth (which is 20km away from Coega), are shown in the table below.

Average monthly temperatures (°C) for Port Elizabeth (1957 - 2002)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Min	16.8	17	16	13.6	10.8	8.5	8.1	9.2	10.7	12.5	14	15.6
Max	24.3	24.4	23.5	22	20.7	19.5	19	18.8	19.1	20	21.4	23.2

Rainfall peaks for the Coega area occur in Spring and Autumn. Annual rainfall in the Port Elizabeth region ranges from 440 mm to 820 mm. The Coega area receives approximately 400 mm of rain annually with rain occurring throughout the year. The long-term average rainfall data for Port Elizabeth for the period 1970 to 2004 is given in the table below.

Average monthly rainfall (mm) listed for Port Elizabeth (1970 - 2004)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total Ave
36.8	39.5	51.4	50	51.1	56.8	49.1	71.6	52.8	57.8	57.9	43.4	618

Prevailing winds along the coast tend to follow the coastline and the winds in the Port Elizabeth area are from the West-South-West and East-North-East. The dominant prevailing winds are west to south-south westerly, at times changing to east to east north easterly. The Coega area

experiences strong winds with a prevalence from the west and west-south-west all year round, and east from October to March. Light winds are also experienced in the area and are more variable in direction, especially in winter.

4.1.2 Hydrology

4.1.2.1 Surface water

The Coega catchment area is approximately 45 km long, 15 km wide and has a total area of about 550 km². The Coega River, which is a relatively small sand-bed river, is the most significant surface water feature associated with the Coega IDZ. The Coega River classification, based on preliminary river classification guidelines, ranges from moderately modified (i.e. C classification) in the upper reaches to critically modified (i.e. F classification) in the lower reaches at the salt works facility.

Low permeability clays underlying the study area limit the vertical infiltration of rainwater and produce a horizontal groundwater flow towards the river channel. Consequently, rapid run-off takes place following precipitation. Due to the limited infiltration of rainfall, a significant fluctuation in groundwater level does not occur, although groundwater levels can fluctuate by 3-4 m with rainfall.

4.1.2.2 Groundwater

The southern portion of the Coega IDZ is underlain at depth by an artesian aquifer formed by the sandstones and quartzites of the Table Mountain Group. Confining this aquifer is a succession of eastward-thickening Cretaceous formations (Uitenhage Group) up to 1 200 m thick near the coast. It is one of the few artesian systems in southern Africa and the only one of practical importance in the country. (SRK 2005). This artesian system was protected under Government Proclamation No. 260 of 1957 and No. 958 of 1958, but the rights of access to this water will probably alter in the light of the new National Water Act (Act No. 36 of 1998). Overexploitation of the aquifer has led to several periods where artesian yields have dropped, which led to the regulation of drilling and abstraction. Groundwater quality in the Coega Ridge Aquifer deteriorates relatively little along the flow path from west to east and has been carbon fourteen dated at 28 000 years near Coega Kop. In general, the water is mildly acidic due to oxidation of pyrite in the Table Mountain Group.

Groundwater levels at Coega are generally about 3 to 5 m below surface, i.e. just above the contact between the permeable sands and the underlying impermeable clays. The groundwater flow direction is to the southeast, following the surface water drainage direction.

The shallow groundwater is consistently characterised by a high natural salinity and total dissolved solids content.

4.1.3 Geology and soils

A geotechnical study was carried out by Terreco as part of the scoping process and can be found in Appendix D. The general geological environment of the study area comprises Cretaceous to Recent Age, generally soft rock, weathered, sedimentary rocks. Relatively recent, in terms of geological age, transgressive marine depositions resulted in peneplanation of the surface topography, providing the relic flat-topped plateaus characterising the area. Geomorphological processes have since carved the deeply incised interstitial gullies and valleys which truncate the terrain.

The geological strata are generally near-horizontal, resulting in complete stratigraphic exposure of the geological legend through erosion by steeply incised flow lines. This allows accurate mapping with easy location of exploitable minerals for road building; brick making and construction aggregates. Those available, are currently being exploited, and while the electrical footprint is relatively thin, checks must be in place to see that existing facilities are not compromised and future opportunities protected.

Current opportunities include sand/ gravel borrowing; deep excavation of Sundays River mudstone for brickmaking; and exploitation of salt brine from shallow seawater pans.

A large brick borrow pit is located in the central part of the study area but both it and the actual brickmaking plant area are located well outside the pylon/ cable footprint with extensive material reserves located away from this zone. The footprint transects other areas with potential but reserves are so extensive that the thin zone establishing electricity for the IDZ should not impinge on future opportunities.

Sand and gravel calcrete borrowing has occurred from time to time but in a haphazard manner and at various points along the Coega River floodplain. These raised platform deposits are extensive in the area and where the 'footprint' crosses these presents only a thin slice of extensive other opportunities. Borrowing can in any case continue, with permission from Eskom, beneath the electric cables should this be required.

Salt mining from pans continues in the river floodplain east of the National Route 2. The Eskom footprint is located far off all of these.

4.1.5 Vegetation

An ecological study was undertaken in March 2006 by ecological specialist Pete Illgner. Please refer to Appendix E. According to Illgner (2006), the Nelson Mandela Metropolitan Open Plan System (NM MOSS; Stewart et al. 2004) recognizes a number of distinct vegetation types within the Coega IDZ. These correspond with the STEP (Subtropical Thicket Ecosystem Planning project; Cowling et al., 2003, Pierce, 2003; Vlok & Euston Brown, 2002) vegetation types. The coastal

vegetation types are Algoa Dune Thicket and Colchester Strandveld (Broad Habitat Unit = Algoa Dune Thicket), while the inland vegetation types are Grassy Ridge Bontveld, Sundays Valley Thicket, Motherwell Karroid Thicket and Sundays Doringveld Thicket (Broad Habitat Unit = Sundays Valley Thicket). Colchester Strandveld and Motherwell Karroid Thicket are endangered, whilst the remaining vegetation types are all vulnerable. These vegetation types correspond broadly with the vegetation categories described in detailed studies carried out within the Coega IDZ (CES, 1997; Finch, 1996, Campbell, 1998), which described the vegetation at a finer resolution.

The dune vegetation is comprised of three units, namely (1) Foredues and Hummocks; (2) Dune Woodlands and (3) Dune Grasslands, which are typical of the sandy beaches along the Eastern Cape Coast. The dune vegetation tends to be highly invaded by *Acacia cyclops* (Rooikrans), with a few remnant pockets of intact vegetation remaining. They are very sensitive systems, underlain by mobile sands, which are susceptible to the formation of 'blow-outs' when disturbed. Colchester Strandveld and Algoa Dune Thicket would overlap broadly with the Algoa Dune Thicket, whilst the Foredune and Hummock vegetation would be a non-thicket vegetation type according to the NM MOSS.

The inland vegetation, in an undisturbed state, tends to be dominated by dense thickets within the valleys, whilst the flat topped ridges tend to be characterized by open grassland/fynbos and Karroid species interspersed with bush clumps of typically thicket species. The thicket elements tend to be confined to deeper soils (associated with pseudo-karstic landforms), whilst the Karroid, fynbos and grassland species occur on shallower soils. Two distinct types can thus be identified, the Mesic Succulent Thicket (corresponding to the Sundays Valley Thicket of Stewart et al., 2004) and the Bontveld (corresponding to the Grassy Ridge Bontveld of Stewart et al, 2004). The Motherwell Karroid Thicket has not been identified as a separate vegetation unit in previous studies in relation to the IDZ.

In disturbed areas, where bush clearing has resulted in a loss of tree and shrub components, Grassy Fynbos vegetation is recognized as a secondary plant community, composed of grassland, fynbos and Karroid species with a few tree and shrub elements.

The majority of the proposed transmission line falls within the 'inland' vegetation types, particularly the Grassy Ridge Bontveld and Sundays Valley Thicket, while the substations fall within Grassy Ridge Bontveld.

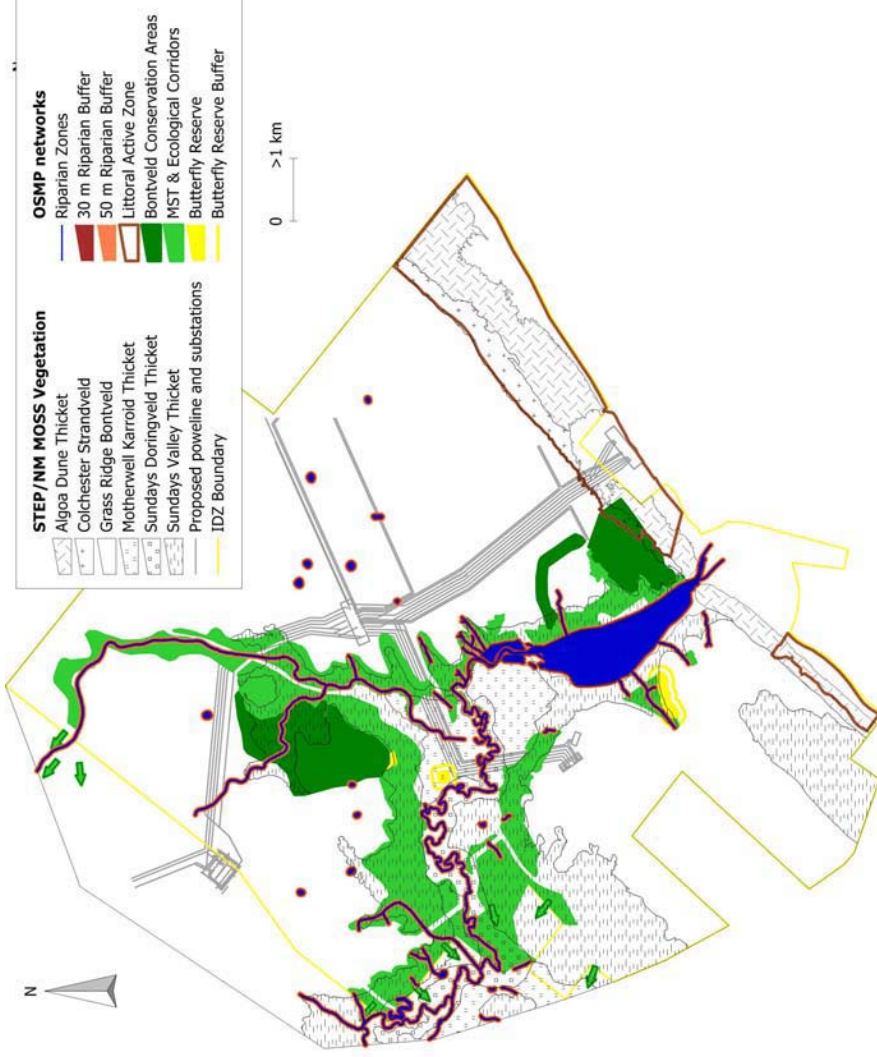


Figure 5. Vegetation types according to NM MOSS/STEP and areas of conservation importance.

4.1.6 Open space areas

An area of approximately 2 167 ha, spanning both the CDA and the remainder of the IDZ, has been set aside as the primary open space network and is to be managed in accordance with the CDC's approved Open Space Management Plan. The Open Space Management Plan has not only been designed to ensure the protection of the environmentally sensitive areas within the IDZ, but also to provide for active and passive recreation areas where the public can have freedom of movement. (SRK 2005).

The primary open space network consists of environmentally sensitive areas such as Bontveld conservation areas, dense Mesic succulent thicket on steep slopes, butterfly habitat, grave sites, the riparian zone, the 1:100 year floodline and the coastal dune area.

4.1.7 Fauna

Two 'Rare' butterflies, namely the Coega Copper (*Aloeides clarki*) and Wineland Blue (*Lepidochrysops bacchus*) occur within the study area. Butterfly reserves have been set aside within the IDZ (see Figure 5). The presence of the Addo Flightless Dung Beetle (*Circellium bacchus*) in the study area is unknown, although it is known to occur at Colchester close by (Illgner 2006).

At least five endemic species of reptile (two of which are endangered) occur within the study area. In addition, endangered sea turtles, and certain CITES-listed species are present, necessitating careful adherence to the project's Environmental Management Plan.

The Albany adder is a protected species and, although not recorded to date within the greater Coega IDZ, the species does appear to be found in association with Bontveld habitats, and the only known population is within close proximity to the Coega IDZ.

At least one endemic and Endangered species, namely the Albany dwarf adder (*Bitis albanica*) and three other endemic species (Tasman's girdled lizard, *Cordylus tasmani*; Dwarf burrowing skink, *Scelotes anguineus* and Eastern legless skink, *Acontias (meleagris) orientalis*) are known to occur inside or in close proximity (< 2km) to the IDZ, (Illgner 2006).

4.1.8 Avi-Fauna

A full list of bird species occurring in the study area can be found in Appendix F – specialist Avi-fauna report. A total of 32 Red Data species were recorded, including two "endangered", eight "vulnerable" and 22 "near threatened". In addition, the White Stork was included as although it is not a Red Data species, it is protected internationally under the Bonn Convention on Migratory Species.

Since much of the natural vegetation currently present in the study area will be transformed as the IDZ develops, the following description of micro habitats that will remain available to

birds after the proposed transformation is all the more relevant. The bird micro habitats described below were identified during the field investigation:

4.1.8.1 Rivers/drainage lines

Most rivers in southern Africa are in the east and extreme south, in the higher rainfall areas. Thirteen species of water bird are mostly restricted to riverine habitat in southern Africa. The map distribution of these species correlates with the river courses in southern Africa. In this study area, several smallish streams were identified. These streams serve as important habitat for some species as well as important flight paths for many bird species even when dry.

4.1.8.2 Estuary

Estuaries are coastal wetland systems typically associated with river mouths. They represent the interface between freshwater and salt water systems. Most estuaries occur on the east coast of South Africa. In this study area the Coega River estuary is of great importance to a number of bird species including the Red Data species shown in Appendix F (Avifaunal Specialist Study).

4.1.8.3 Salt works

Salt works are an important type of artificial wetland. Species that benefit from these areas are Chestnut-banded Plover and the Greater and Lesser Flamingoes. Although the salt works at Coega will apparently be discontinued when the full IDZ development takes place, it seems likely that the physical characteristics (i.e. extensive shallow water areas) of the site will not be altered significantly meaning that it will continue to represent important habitat to these bird species.

4.1.8.4 Shoreline

The coast line of South Africa represents the interface between land and sea and is characterized by an exposed shoreline with strong wave action. The average tidal range is 1 metre so the inter-tidal zone is relatively narrow. There are relatively few bays providing sheltered shorelines along the coast. In this study area the coast line consists mainly of sandy beaches. Although the shore itself will not be traversed by the proposed power lines, its close proximity will influence the presence, abundance and movement of various bird species and so is relevant to this study.

4.1.8.5 Natural vegetation – bontveld, fynbos, remnant valley bushveld

This has been discussed above under vegetation description – areas of natural vegetation that will remain once the IDZ is developed can be seen in Figure 5.

2.2.6 Coastal Dune Area

This is the area immediately above or inland of the high water mark. It is currently earmarked for a "low intensity recreation area" with boardwalks, trails and look out spots. It appears however that this would clash with the construction of the proposed 9 overhead power lines that will connect the grid to the Gas Power Station.

Tinley (1985) had the following to say about this area, often called the Littoral Active Zone in Illgner & Pote (2006) - "Roads, railways, bridges, powerlines, parking lots, houses and any other immovable structure must not be placed within reach of the littoral active zone." This more or less clarifies the sensitivity of this micro habitat in terms of broader ecology, which would obviously include avifauna.

4.1 SOCIAL AND SOCIO-ECONOMIC CHARACTERISTICS

4.1.1 Institutional Context

The Coega Industrial Development Zone falls within the Eastern Cape Province of South Africa. The IDZ is situated within ward 54 of the Nelson Mandela Municipal Metro (NMMM). There is no tribal authority for this area.

4.1.2 Regional context

The nearest city to the Coega IDZ is Port Elizabeth which is South Africa's fifth largest city. Other settlements in close proximity to the Coega IDZ are Colchester, Cannonville, Motherwell, Bluewater Bay and Wells Estate.

The total population of the NMMM area is approximately 1 300 000 people (NMMM 2005). Approximately 52 % are female and 37 % are below the age of 20. There are considerable discrepancies in the standard of living of the different population groups: the white and Asian communities live in conditions that could be described as developed world with adequate access to educational, recreational and health facilities, while black communities live in developing world conditions. The black community experiences the highest levels of poverty and unemployment, with least access to these facilities, particularly in the Motherwell area near Coega.

4.1.3 Demographic information for the remaining area within the Coega IDZ

There are currently no people living in the remaining area within the IDZ (Coega Development Corporation). All people living in the IDZ were relocated in June 2001. The CDC was required to resettle communities, since no residential areas are allowed within an IDZ. Three communities living within the Core Development Area of the IDZ were relocated to Wells Estate Phase 1. They were the King Neptune Community located near Joorst Park, consisting of 45 households, the Council Grounds community located west of the water pipe

and close to the Truckers Inn and the Coega community located east of the water pipe, consisting of 300 households (SRK 2005).

4.1.4 Infrastructure

4.1.4.1 Water and sanitation

The development of the Coega IDZ will substantially increase the consumption of water within the NMMM. Water is currently purchased by the metro from DWAF and is sourced from the Orange River Scheme and the groundwater source of the Uitenhage Artesian System.

4.1.4.2 Waste disposal

The NMMM currently disposes its general, non-hazardous waste at two permitted solid waste disposal sites; the Koedoeskloof landfill site and the Arlington landfill site. The municipality further relies of a network of approximately 50 waste transfer stations to transport waste from under-serviced and peri-urban areas, to these two landfill sites. The NMMM's Integrated Waste Management Plan aims to phase out un-permitted sites that service areas such as Colchester; i.e. by replacing them with waste transfer stations.

Hazardous waste is currently disposed of at the privately owned Aloes II hazardous waste facility (permitted Class H:H facility) or the municipally owned Koedoeskloof hazardous waste facility (permitted H:h). The Koedoeskloof hazardous waste facility is limited in the types and volumes of hazardous waste that may be disposed, and the Aloes II hazardous waste facility is nearing capacity. The CDC and the NMMM have therefore identified the need for the establishment of a new regional general and hazardous waste processing facility in the Eastern Cape to serve the metropolitan and surrounding areas, including the needs of the Coega IDZ. In this regard, a site selection and EIA process has been underway for some years with a view to identifying the most suitable location.

4.1.4.3 Transport

The NMMM has an extensive transport system, including road, sea, air and rail facilities. The lower income community is highly dependent on public transport. Taxis are the most commonly used mode of transport, while other modes of transport include private vehicles, commuter trains and buses. The Algoa Bus Services is the only licensed service provider operating in the NMMM and adjacent rural areas. Most residential and industrial areas fall within a maximum walking distance of 750 m from the nearest bus stop. There is a fleet of over 2 000 taxis licensed to provide transport within the NMMM and surrounding rural areas. These taxis compete directly with the Algoa Bus Service and also command a bigger market share because of the flexibility of stops and journey times. A transport forum has therefore been established in an attempt to co-ordinate transport activities and address problems regarding road transport.

The existing rail network and station placement does not provide accessibility to and from the low-income residential areas. Grassridge, Aloes and Coega stations are located within the boundary of the IDZ. These stations currently only handle freight and are not for commuters. A commuter railway service, including stations, is planned within the Coega IDZ. It will form a circular line through the IDZ and will be integrated with the existing rail network.

4.1.4.4 Power supply

The development of the Coega IDZ has necessitated the augmentation of the existing power supply to the area. The transmission capacity of the Grassridge substation will therefore be expanded, which will serve the requirements of the Coega IDZ. An EIA, including route selection process, is currently underway in order to determine the best route for additional powerlines to service the IDZ

4.1.5 Archaeological and cultural resources

A desktop archaeological assessment of the proposed site was conducted by the Len van Schalkwyk of eThembeni Cultural Heritage (See Appendix G), followed up by a site visit to inspect the route visually for any historical or archaeological material that may be impacted upon by the proposed upgrade.

The general area is one of variable heritage resource significance, with sites recorded from both the Stone and Iron Ages. A range of heritage resources has been recorded within and adjacent to the study area. These include Early, Middle and Later Stone Age sites, Early and Late Iron Age sites and sites from the historical period.

The region is significant in historic times as a frontier between hunter-gatherers, pastoralists, Nguni-speaking farming communities and European settlers. As a consequence of contact between people on the frontier, historical sites occur widely throughout the area and include domestic, trade, war and battle sites and trade routes.

It is suggested that a detailed archaeological assessment take place once actual tower positions and substation boundaries have been finalised. It is further recommended that site staff are aware of the possibility of uncovering items of historical / cultural significance and are able to identify these. The EMP for the project should outline the steps to be followed to minimise the impact to cultural heritage.

4.1.6 Visual Receiving Environment

Due to the industrialised nature of the proposed site, visual impact is not regarded as being of high significance. Although at present the site is fairly open with little undulation for much of the topography, this will change significantly once the IDZ begins to develop as per the IDZ masterplan. The powerlines, substations and associated infrastructure will thus find themselves against a backdrop of a built-up, industrialised nature. The visual receiving environment can thus be described as having a low sensitivity.

CHAPTER 5: DESCRIPTION OF THE PROPOSED PROJECT

5.1 PROJECT BACKGROUND

The project entails the installation of the bulk electrical infrastructure within the Coega IDZ, specifically:

- Structural changes and upgrading of the existing Grassridge Substation
- Construction of a new substation called Dedisa in the IDZ, including a micro wave tower for telecoms and operation.
- Construction of a new substation at the proposed aluminium smelter site, including a micro wave tower for telecoms and operation.
- Construction of a new substation at the proposed Gas Power Station site, including a micro wave tower for telecoms and operation.
- Construction of 3 x 400kV lines connecting the existing Grassridge Substation and the new Dedisa Substation over a distance of approximately 6 kms.
- Construction of 1 x 400kV line connecting the existing 220kV traction line (which will be upgraded) to the new Dedisa Substation - a distance of approximately 2.5 kms.
- Construction of 2 x 132kV lines between Grassridge Substation and the new Dedisa Substation - a distance of approximately 6 kms.
- Construction of 2 x 400kV lines and 2 x 132kV lines between the new Dedisa Substation and the new Smelter Substation - a distance of approximately 4 kms.
- Construction of 2 x 400kV lines between the new Power Station Substation and the new Smelter Substation - a distance of approximately 9 kms.
- Construction of 3 x 400kV, and 4 x 132kV lines between the new Dedisa Substation and the new Power Station Substation - a distance of approximately 7 kms.
- Construction of 1 x 400kV and 2 x 132kV lines between the new Dedisa Substation in a north easterly direction to the eastern boundary of the IDZ a distance of approximately 3 kms.

The 400kV route is approximately 20km long in total, whereas approximately 26km of 132kV powerlines is required. Different tower types are to be used for different sections of the route. One powerline requires:

- Pylons
- 3 Insulators (attached to each pylon)
- 3 bundles of conductors or cables through which the electricity travels
- an earth wire

A 400kV transmission line requires a 8.1 metre clearance between the conductors and the ground. A 66kV or 132kV distribution line requires an 7 metre clearance between the conductors and the ground. These clearances are measured at an air temperature of 50° Centigrade as the conductors sag in hot conditions.

The three conductors need to be 8 metres apart from each other on a 400kV transmission line, and 2 metres apart from each other on a 66 or 132kV distribution line. Maintenance of a multi-circuit line is more difficult than on lines that are on separate structures as all lines on the structure must be switched off during maintenance for safety reasons. (Live line work can be undertaken but is dangerous and extremely expensive). This contributes to the interruption of power supply in the area. It is therefore recommended that separate structures be used for each line. Although using separate structures are regarded by some as having a greater visual impact, the operational and cost benefits of separate structures seem to outweigh a multi-circuit option, especially as this is to take place within an industrial area.

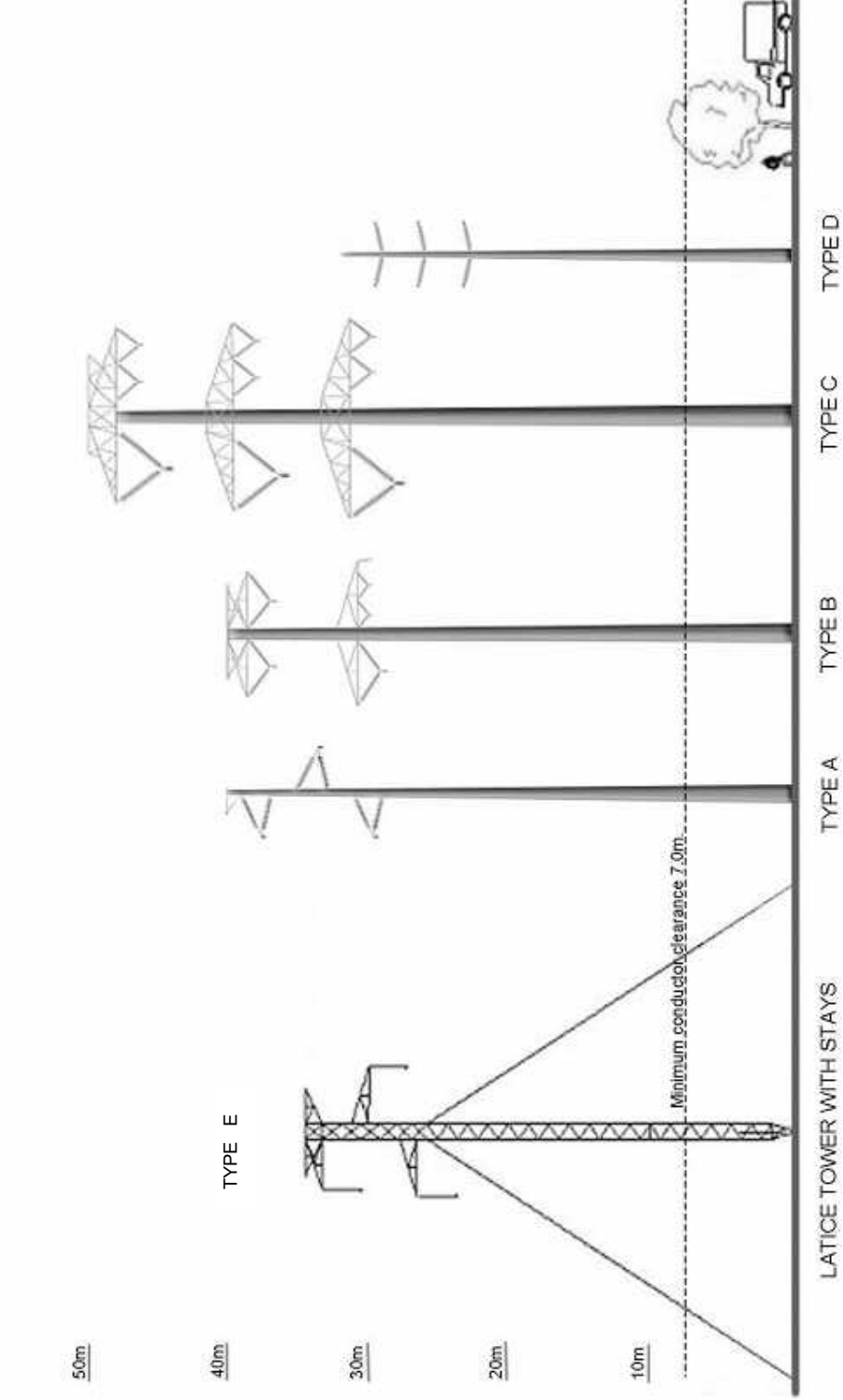


Figure 6: Alternative Tower Types

5.1.1 Tower Type A – 400kV Single-Circuit Tubular Monopole Structure

This tower is intended for carrying the 400kV transmission line only. It is a tubular structure made from sheets of stainless steel and is 40metres tall. The structure is self-supporting and does not require stay cables. It is 1.0 metre in diameter at its base and is set into a concrete foundation that is 6 metres by 6 metres, (the depth of the foundation is dependant on the soil type)..

This tower type is preferred in sections where space is limited. It is however more costly and is considered more visually intrusive than a single pole lattice-type structure (Tower Type E).

5.1.2 Tower Type B – 400/132kV Multi-Circuit Tubular Monopole Structure

This tower is intended for carrying both the 400kV transmission line and one 132kV distribution line. Two of the 400kV insulators are on the one side of the tower, whilst the other 400kV insulator and all three 132kV insulators are on the other side. Tower type B is a tubular structure made from sheets of stainless steel and is 40metres tall. The structure is self-supporting and does not require stay cables. It is 1.1 metres in diameter at its base and is set into a concrete foundation that is 6 metres by 6 metres, (the depth of the foundation is dependant on the soil type).

This tower type is required where the two lines need to follow the same route in built up areas, where there is not enough space for parallel servitudes.

5.1.3 Tower Type C – 400/2X132kV Multi-Circuit Monopole Structure

This tower is intended for carrying both the 400kV transmission line and two 132kV distribution lines. All three of the 400kV insulators are on the one side of the tower, whilst six 132kV insulators are on the other side of the tower. Tower type C is a tubular structure made from sheets of stainless steel and is 50 metres tall. The structure is self-supporting and does not require stay cables. It is 1.2 metres in diameter at its base and is set into a concrete foundation that is 6 metres by 6 metres, (the depth of the foundation is dependant on the soil type).

This tower type is not preferred from a visual impact perspective as it is significantly taller than existing infrastructure in the study area and would constitute a high visual impact. Tower Type C is not preferred by Eskom due to the high cost of sheets of steel on a structure of this size, as well as the difficulty and high costs associated with maintenance on multicircuit structures of this size.

5.1.4 Tower Type D – 2X132kV Multi-Circuit Monopole Structure

This tower is intended for carrying two 132kV distribution lines. The insulators for each 132kV line are situated evenly on either side of the tower. This tower type is a tubular structure made from sheets of stainless steel and is 32metres tall. The structure is self-supporting and does not require stay cables. It is 0.7 metres in diameter at its base and is set into a concrete foundation

that is 6 metres by 4 metres, and is 2 metres deep. It is significantly smaller than the other monopole structures relevant to this project because of the lower voltage it is designed to carry, and consequent smaller clearances and weights of the conductors.

This tower type is required where the two 132kV lines need to follow the same route. Because the distribution lines weigh less, carry lower voltages and require shorter towers than transmission lines, the tubular monopole structures do not need to be as strong as those required for supporting a 400kV transmission line. The sheets of steel that make up the tubular monopole pylons for a distribution line are made locally, whereas those needed for a transmission line need to be thicker and bigger in size, and must be imported. Thus the tubular monopole structures are preferred for the distribution section of the project, but not for the transmission section of the project.

5.1.5 Tower Type E – Single Pole Lattice Type Tower with Stays

This tower is intended for carrying the 400kV transmission line only. It is a single pole lattice type structure made from stainless steel and is 35.5 metres tall. The structure requires two stay cables that extend to 16metres away from the base of the tower on each side (i.e. the distance between the anchor points of the two stay cables is 32metres).

This tower type is preferred (for the 400kV line) to all other tower types on the project as it is considered more cost effective and is not as tall as the other types available for carrying the 400kV line.

5.1.6 Tower Type F – Strain / Bend Lattice Type Tower

This tower is used where the line needs to deviate at an angle of greater than 3 degrees, as none of the other tower types can withstand this strain. The strain or bend towers have a 10m X 10m footprint and are ± 35 m high. An attempt will be made to minimise the use of these towers however, as they are more costly and visually-intrusive than other tower types.

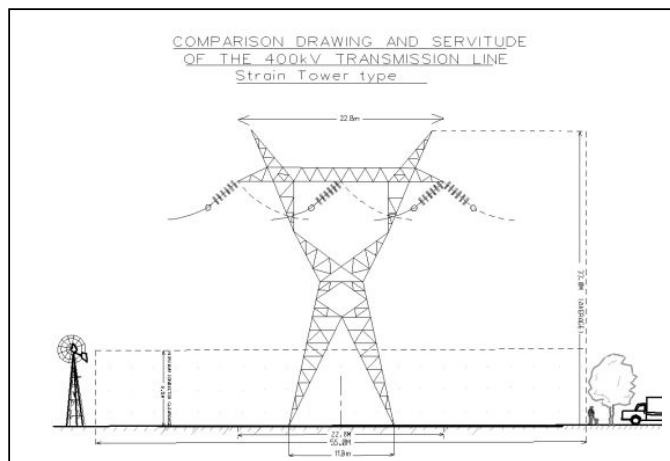


Figure 7 Strain / Bend tower type

5.2 PRE-CONSTRUCTION ACTIVITIES

Before construction can start on a powerline or substation, Eskom needs to secure a servitude by negotiating with affected landowners. The width of a servitude is dependent on the size of a powerline as well as the land use around it. For the most part, a 400kV transmission line requires a 55 m wide servitude. A 132kV distribution line requires a 31m wide servitude. It is possible that these servitudes can overlap if they are parallel to each other. Thus approximate servitude widths for the various sections are:

- Grassridge substation to Dedisa substation: 306m wide
- Dedisa substation to smelter substation: 295m wide
- Dedisa substation to CCGT: 426m wide

A powerline servitude gives Eskom and CDC certain defined rights for the use of the specific area of land. These are:

- Access to erect a powerline along a specific agreed route.
- Reasonable access to operate and maintain the line inside the servitude area.
- The removal of trees and vegetation that will interfere with the construction or operation of the line.
- The removal of other infrastructure that would interfere with the construction or operation of the line, subject to negotiation with the relevant landowner.

The landowner is prevented from erecting any structures or carrying out activities under the line that would interfere with the safe operation of the line.

5.3 CONSTRUCTION, OPERATION AND DECOMMISSIONING ACTIVITIES

The installation of the bulk electrical infrastructure will take place in phases to coincide with the gradual development of the IDZ (i.e. infrastructure will be put in place as and when it is needed). The construction of the Dedisa substation and 400kV transmission lines between Grassridge substation, Dedisa substation and the smelter site, will however commence as soon as possible. This portion of the project will take approximately 2 years to complete.

Construction of this type involves different teams working in a number of phases. There are five main teams responsible for activities such as the excavation of foundations, concrete works, erection of steel structures, stringing of cables and rehabilitation. Construction cannot take place as a single action, as there are a number of limitations with regard to certain activities (e.g. 28 days of curing for foundation concrete). The process is followed along the powerline route continuously, although some phases may occur concurrently (e.g. pegging and gate installations). However, others may occur weeks apart. All activities are required to take place within the servitude. The servitude is also utilised as an access road where possible (Coetzee, H, Eskom Transmission, Personal Communication).

Approximately 200-250 people, including drivers, will be employed for the immediately planned

construction process. However, there are seldom more than 50 people employed in any one phase. Construction activity at any one point will not be continuous for the whole 2 year period. Therefore, there are minimal people employed throughout the process, over a wide area, for an extended period of time. Any impacts associated with construction workers are likely to be minimised as a result of the limited numbers of people employed over the area.

It is anticipated that one construction camp will be required for the project. It is recommended that the camp be situated within the Eskom boundary on the Grassridge substation property. It is expected that there will be approximately 80 people residing in the construction camp at any given time.

The location, number, size and type of construction camp are determined by the contractor and negotiated with landowners, in keeping with certain basic guidelines set out in Eskom Transmission's 'Generic EMP – Line Construction' (Geeringh, J. Undated). This EMP is included as Appendix H

According to Eskom the proposed construction camp would require an area of approximately 2 ha. Of this, approximately 1 ha would comprise the construction camp while the remainder would be used as construction yard.

A summary of the different construction phases is outlined below:

5.4.1 Work on Substations

This project includes the upgrade of the existing Grassridge substation and the construction of three new transmission substations within the Coega IDZ. Eskom's generic EMP for substation construction is included as Appendix I. With regard to substations, work entails:

5.4.1.1 Grassridge Substation

The extension to the substation will be approximately 518 metres by 116 metres in total (approximately 6 hectares), and will take place on Eskom land. The upgrade includes the construction of a new control building, steel and cable works, and the installation of two major transformers. The height of the new infrastructure will be approximately 35-40 metres, which is the same height as the existing structures in the substation. The construction of the 400kV yard will take approximately one year and will include the construction of access roads within the substation, which will remain as part of the substation's permanent infrastructure. The construction phase will entail the following:

- Construction of new entrance and roads within the substation
- Removal of all exotic plant material
- Minor terracing (the site is relatively flat)
- Levelling of the site
- Installation of foundations for infrastructure such as transformers and control building
- Construction of bunds and oil holding dams (for emergency holding of transformer oil in the event of a spill)

- Compaction and filling with gravel of the areas between the foundations
- Creation of formal drainage and stormwater control measures
- Delivery and installation of transformers, towers, busbars and associated infrastructure
- Connection of the new infrastructure to the existing 400kV network



Photograph 1: Existing Grassridge Substation



Photos 2 and 3: Example of transformer foundations



Photos 4 and 5: Example of transformer installation

5.4.1.2 Dedisa Substation

This new substation is to be approximately 600 x 600 metres in size, with the average height of structures being 23 metres. It is to be an outdoor station with a tubular bus bar arrangement, and is to be situated roughly at the centre of the IDZ. Its function is to step down high voltage power for use by tenants / industries within the IDZ.



Photograph 6: Example of Tubular Aluminium Conductor Arrangement

5.4.1.3 "Smelter" Substation

This new substation is to be approximately 400 X 400 metres in size and is to be situated adjacent to the proposed aluminium smelter. Its function is specifically to provide a secure and appropriate voltage of electricity to the supply to the smelter. It is proposed that this substation is an outdoor substation with a tubular bus bar arrangement. Average structures are to be 23metres in height.

5.4.1.4 Substation Adjacent to the Proposed Closed Cycle Gas Turbine Generation Station

This new substation is to be approximately 400 x 200 metres in size and is to be situated adjacent to the proposed CCGT power station. Average heights of structures are approximately 23metres. It is proposed that this substation is a Gas Insulated In-House substation. It entails longer-term planning than the other substations and will serve to step down the power generated at the CCGT for integration into Eskom's transmission network.

The construction phase for each of the three substations will entail the following:

- Construction of access road to site off existing IDZ roads
- Clearing of existing vegetation
- Minor terracing (the sites are relatively flat)
- Levelling of the site
- Installation of foundations for transformers
- Compaction and filling with gravel of the areas between the foundations
- Creation of formal drainage and stormwater control measures
- Delivery and installation of 400kV/132kV transformers, towers, busbars and associated infrastructure
- Connection of the new infrastructure to new transmission infrastructure and to the existing distribution network

5.4.2 Access negotiations

Negotiations between the landowner, contractor and Eskom are undertaken in order to determine access routes. Rehabilitation measures are agreed to and photographs are taken of relevant areas for reference purposes. Access roads are established through recurring use of the route(s) and only constructed or upgraded under special circumstances.

5.4.2 Tower pegging

The contractor appoints a surveyor to undertake this work. Once central line pegging has taken place, the surveyor sets out the footprint of the substation and/or powerline and its pylons. This is done in two phases; first the centre points of the proposed route and pylons are marked and then the position of the tower pegs are marked. The surveying team makes the first basic track (access route) to the proposed site and pegs the position of the tower. However, if there is a problem with the site (e.g. gully erosion) the problem is recorded and the tower site is moved.

Once the tower site has been pegged, the team moves to the position of the next tower. This allows for the creation of access roads along/within the servitude, through repeated vehicular movement on the same tracks. Grading of access roads is not permitted unless, for example, there are large rocks in the path.

5.4.3 Gate installation

Once the positions of the towers have been pegged, gates are installed at positions, where it is necessary to breach existing fence lines. This installation follows guidelines set out in Eskom's Environmental Management Plan (EMP). Geo-technical variables, such as soil types, are taken into account in determining foundation requirements. Following this, the area is marked off and concreted, and approximately one week later the gate is installed. Approximately five people carry out this task.

5.4.4 Excavation of foundation

A team of 10 to 15 people with equipment, move onto site to excavate holes for the pylons. These foundation sizes are determined by the tower type, soil conditions etc. The foundations are ultimately filled with concrete. According to Eskom's EMP, the topsoil from these holes should be stockpiled to cover the holes at a later stage. Contractors are also required to erect a three-strand temporary wire fence around the holes as a safety precaution to prevent people and animals from falling into them and the anchor holes are covered with a safety plate.

5.4.5 Foundation reinforcing steelwork

A separate team goes onto site to position pre-made re-inforcing steelwork for foundation structures, into the excavated holes. After these have been tied together for support, the team moves on to the next site.

5.4.6 Concrete filling/foundation pouring

A team moves onto site with a 'Ready-mix' truck, containing concrete. Where possible, the trucks use the servitude road as a means of access. If there are difficulties in gaining access by truck, concrete is mixed on site. After the concrete is poured into the foundation holes, approximately 28 days are required for the concrete to set, before the next phase can be undertaken.

5.4.7 Delivery of steel to tower site

The steelwork is usually delivered to the site approximately one month after the foundation has been poured. Where possible, the steel is transported to the site by trucks. Access roads are clearly marked to facilitate this process. The steel required to build one tower can usually be accommodated in one truckload. However, taller towers such as Tower Type C require more than one truck.

5.4.8 Assembly team/punch and paint

A team of approximately 50 people with equipment are required on the site to assemble the tower. The tower is assembled whilst it is lying on the ground with every nut screwed into the framework painted with a non-corrosive paint ("punch and paint"). The whole tower consists of galvanised steel that takes on a silver-like coloration, which later fades to a dull grey.



Photos 7 & 8 Pylon foundation (strain / bend type tower) and pylon foundation structures

5.4.9 Erection of towers

A new team moves onto the site and a maximum of two 70-ton cranes are used to lift the towers into place (Photo 9). If different tower structures are erected along the route, the number of cranes required per site may vary. If this is the case, certain sites may be skipped in the process and may be revisited at a later stage.



Photo 9 Lifting of structures for lattice – type transmission line towers

5.4.10 Stringing, sag and tension

Large equipment, including cable drums, are utilised in this phase. The cable drums carry approximately 2,5 km of cable. Two of these, with a winch in the middle, are placed approximately 5 km apart along the route. A tractor drives along the route, laying a pilot cable. This pilot cable is pulled up on to the pylons with the use of pulleys. Once the tension has been exacted, the conductor cables are strung, never touching the ground.

A small team of people with survey equipment conducts the sag and tension process. Tension is created, the conductors clamped at the tower and the excess cable cut off.

5.4.11 Rehabilitation

Rehabilitation is a continuous process conducted throughout the construction phase. Temporary access roads are ploughed over, contoured and re-planted with endemic grasses.

5.5 INACCESSIBLE OR SENSITIVE AREAS

A few sections of the proposed powerline corridors pass through or immediately adjacent to areas that have been set aside as part of the IDZ's Open Space System (see Appendix E – Ecological Assessment).

It is recommended that the existing access routes are used wherever possible and that specialist ecologists play a part in the development of the project-specific Environmental Management Plan to ensure that sensitive fauna and flora are protected. It is further recommended that the number of pylons placed in these sensitive areas is minimised wherever possible.

5.6 OPERATION AND MAINTENANCE

During operations, Eskom requires access to the servitude to enable maintenance of the powerline. This could require traversing private property. Maintenance is carried out at regular intervals and is sometimes done by helicopter so that electricity supplies are not disrupted. Maintenance activities are highly specialised and are, therefore, carried out by Eskom employees.

The servitude will need to be cleared occasionally to ensure that vegetation does not interfere with the operation of the line. This entails the cutting back of vegetation and not the clearing of the roots. It is understood from the specialist ecological study that the corridor will provide an important refuge for several species of fauna and flora and thus activities within the powerline will be minimised wherever possible.

5.7 DECOMMISSIONING

It is very rare that powerlines are decommissioned as their need and justification has been carefully established by Eskom's planning unit. However, should the need to decommission one of the powerlines during its operational life, the following is to be assumed:

- The physical removal of the line and the pylons would entail the reversal of the construction process.
- A rehabilitation programme would need to be agreed to with the landowner before being implemented.
- The disposal of materials from the decommissioned powerline (steel / cabling / concrete etc) would either need to be recycled or disposed of at an approved waste disposal facility.
- Specific considerations regarding the servitude and landowner rights would need to be negotiated with the landowner at the time of decommissioning and fall outside the scope of this EIA.

5.8 DESIGN LIMITATIONS AND PHYSICAL PARAMETERS REQUIRED FOR THE POWERLINES

Although some aspects of the powerline alignment can be negotiated or changed due to the presence of environmental limitations, there are certain parameters that are unavoidable and must be taken into account. These include:

- A 400kV transmission line may be no closer than 95 metres from the centre line of a national road, unless a relaxation on this is given by the roads department. This does not apply when the proposed lines cross a national road (in this case the N2)
- The monopole tubular and single pole lattice type structures cannot bear the strain of a bend of more than 3°. Where the line needs to turn a bend or strain tower is thus required. (see Figure 7 in Section 5.1.6).
- The minimum spacing between pylons is ± 300 metres and the maximum spacing is ± 800 metres, depending on the topography of the area. The minimum clearance between the midspan point of the line and the ground is 8.1 metres. These heights are calculated at a temperature of 50° Centigrade, as the height of the line above the ground is partly dependant on air temperature.
- It is not economically viable to place powerlines of these voltages underground (the estimated cost per kilometre is up to 10 times that of an overhead line). There are currently no underground powerlines of this capacity in South Africa and Eskom does not consider this option viable. In addition to financial considerations, the environmental impact of placing such a line underground is high.
- The minimum safe distance required from the centre of the powerline to any building according to the Occupational Health and Safety Act is 5.6 metres. This must be taken into account as part of the IDZ Masterplan.

CHAPTER 7: PROJECT ALTERNATIVES

7.1 INTRODUCTION

One of the functions of the environmental scoping process is to describe and evaluate the alternatives to the project. A limited choice of powerline corridors and substation sites exist within the Coega IDZ in line with the Coega IDZ masterplan that outlines specific zones, open spaces, and utility corridors. The required power infrastructure needs to fit into this framework that limits alternative corridors that can be assessed within the Coega IDZ. Other types of alternatives i.e. the "no go" option, pylon design alternatives etc. still exist and are examined below.

- Strategic Alternatives (Including the "No Go" Alternative)
- Alternative designs for the proposed powerlines (as discussed in Chapter 5)
- Alternative designs for the proposed substations

7.2 STRATEGIC ALTERNATIVES TO THE INSTALLATION OF BULK ELECTRICAL INFRASTRUCTURE WITHIN THE COEGA IDZ

Strategic alternatives to the bulk electrical infrastructure project are limited to the "do nothing" option, as there is only one way of integrating the electricity needs of the IDZ, i.e. through the construction of powerlines and substations. Demand side management is also discussed although it is shown not to be a viable alternative.

7.2.1 The "Do Nothing" Option

The Department of Environmental Affairs and Tourism states that the "do nothing" or "no-go" option should be considered in cases where the proposed development could have significant negative impacts. For this project, the no-development option would mean not undertaking the proposed installation of bulk electrical infrastructure within the IDZ. This does not appear to be a viable option as this would essentially prevent the IDZ from developing. Environmental and economic studies have shown the benefits of the IDZ to the immediate area and the Eastern Cape region. For the IDZ to be viable and play a role in South Africa's economy, the proposed electrical infrastructure is required in the form as stated by this project. The "No Go" option is not regarded as a viable alternative.

7.2.2 Demand-side Management

Demand Side Management (DSM) is a function carried out by the electricity supply utility aimed at encouraging a reduction in the amount of electricity used at peak times. This is achieved by influencing customer usage to improve efficiency and reduce overall demand. 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 managing the level of growth forecast for the Eastern Cape region. The existing power network will not be able to supply the IDZ and cannot be modified to integrate IDZ components into the network. Instead, new bulk infrastructure is required, as proposed in this project.

7.3 DESIGN ALTERNATIVES

Design alternatives take the form of various tower and line configurations for the power line component of the project and different layout designs for the substation component of the project. Both aspects have been carefully considered by Eskom Transmission and the Coega Development Corporation to ensure that the most functional and cost effective options are chosen.

7.3.1 Placing the Transmission Line Underground

The environmental impacts associated with placing a high voltage powerline underground are significantly higher than the conventional aboveground structures. In addition the space required is that equivalent to a 4 lane highway as the conductors cannot be cooled by the air and need to be spaced apart. It is not economically viable to place a transmission line of this voltage underground - the estimated cost per kilometre is up to 10 times that of an overhead line.

7.3.2 Alternative Pylon Options

The various pylon options were discussed in Chapter 5. The self-supporting tower types are considered the most cost effective and suitable in this scenario. Other towers are often designed to be used where space constraints or visual impacts are sensitive. However, in an industrialised setting of this nature, with pre-planned space available in the form of a utility corridor, the self supporting tower is regarded as both the most practical and cost-effective.

7.3.3 Substation Design Alternatives

Careful cost benefit and planning analyses have been undertaken by Eskom Transmission to ensure that the most cost effective and efficient substations are designed for the IDZ. Both the Dedisa and Smelter substations are to be outdoor substation with a tubular bus bar arrangement. This is significantly cheaper than constructing a Gas Insulated Substation. The substation at the CCGT site needs to be a GIS due to its proximity to the coast and associated damage from salt corrosion. The current proposed designs are regarded as the best alternatives available in terms of substation design.

CHAPTER 8 IDENTIFICATION OF POTENTIAL ISSUES AND IMPACTS

This purpose of this chapter is to indicate that the issues raised during the scoping process have been adequately captured and understood. In addition it serves to explain how these issues affect the process of evaluating the project alternatives.

Very limited feedback was received from the public with regard to the project, with most of the issues being raised by Eskom or Coega personnel, or the specialists appointed to the project.

Issues raised relate to:

- The impact of the powerlines on avi-fauna and subsequent gene dispersal
- Preferred infrastructure for ease of maintenance
- The public participation process
- Implications of new infrastructure for civil and commercial aviation

(See Appendix B – Comments and Response Report)

Table 3 gives a summary of the criteria used for the assessment of the issues of concern identified during the scoping study.

TABLE 3: SUMMARY OF CRITERIA USED FOR THE ASSESSMENT OF THE IMPACTS

	CRITERIA	DESCRIPTION OF ELEMENTS THAT ARE CENTRAL TO EACH ISSUE.
	Status	Positive, negative or neutral.
ASSESSMENT	Extent and Spatial Scale	High. Widespread. Far beyond site boundary. Regional / National / International scale.
		Medium. Beyond site boundary. Local area.
		Low. Within site boundary.
	Intensity or Severity	High. Disturbance of pristine areas that have important conservation value. Destruction of rare or endangered species.
		Medium. Disturbance of areas that have potential conservation value or are of use as a resource. Complete change in species occurrence or variety.
		Low. Disturbance in degraded areas that have little conservation value. Minor change in species occurrence or variety.
	Duration	High (long term). Permanent. Beyond decommissioning. Long term (more than 15 years).
		Medium (medium term). Reversible over time. Lifespan of project. Medium term (5-15 years).

	CRITERIA	DESCRIPTION OF ELEMENTS THAT ARE CENTRAL TO EACH ISSUE.
	Status	Positive, negative or neutral.
		Low (short term). Quickly reversible. Less than the project lifespan. Short term (0-5 years).
	Mitigatory Potential	High. High potential to mitigate negative impacts to the level of insignificant effects.
		Medium. Potential to mitigate negative impacts. However, the implementation of mitigation measures may still not prevent some negative impacts. Low. Little or no mechanism to mitigate negative impacts.
	Acceptability	High (Unacceptable). Abandon project in part or in its entirety. Medium. With regulatory controls. With project proponent's commitments. Low (Acceptable). No risk to public health.
	Degree of Certainty	Definite. More than 90% sure of a particular fact or of the likelihood of an impact occurring. Probable. Over 70% sure of a particular fact or the likelihood of an impact occurring. Possible. Only over 40% sure of a particular fact or of the likelihood of an impact occurring. Unsure. Less than 40% sure of a particular fact or the likelihood of an impact occurring.
	Magnitude and Significance	High. Of the highest order possible within the bounds of impacts that could occur. In the case of adverse impacts, there is no possible mitigation that could offset the impact, or mitigation is difficult, expensive, time consuming or a combination of these. Social, cultural and economic activities of communities are disrupted to such an extent that these come to a halt. In the case of beneficial impacts, the impact is of a substantial order within the bounds of impacts that could occur.
		Medium. Impact is real, but not substantial in relation to other impacts that might take effect within the bounds of those that could occur. In the case of adverse impacts, mitigation is both feasible and fairly easily possible. Social, cultural and economic activities of communities are changed, but can be continued (albeit in a different form). Modification of the project design or alternative action may be required. In the case of beneficial impacts, other means of achieving this benefit are about equal in time, cost and effort. Low. Impact is of a low order and therefore likely to have little real effect. In the case of adverse impacts, mitigation is either easily achieved or little will be required, or both. Social, cultural and economic activities of communities can continue unchanged. In the case of beneficial impacts, alternative means of achieving this benefit are likely to be easier, cheaper, more effective and less time-consuming. No impact. Zero impact.

The following pages contain a tabulated assessment of impacts during the construction and operational phases for the proposed infrastructure :

Table 4 Potential Issues and Impacts and Suggested Mitigation		Construction and Operational Phase Impacts: Coega Electrical Infrastructure EIA	
<u>POTENTIAL IMPACT</u>		POSITIVE / NEGATIVE, SIGNIFICANCE, EXTENT & DURATION	RATIONALE FOR SIGNIFICANCE
1. SOCIO-ECONOMIC IMPACTS			MITIGATION
Creation of job opportunities during construction		(+)Medium, local, temporary	Construction activities will give rise to the opportunity to create employment for local residents.
Promotion of industrial node in the Eastern Cape & creation of business opportunities and job opportunities		(+)High, regional, national, long term	The aim of the Coega IDZ is to stimulate economic growth in the Eastern Cape region. The provision of a secure electricity supply to the IDZ will facilitate this aim.
Health and safety – EMF radiation		(-)Low, local, long term	Servitudes exist for powerlines and associated infrastructure to minimise the risk of exposure of people, animals and equipment to EMFs and radiation. EMF and radiation levels measured at the edge of these servitudes is zero. No houses or businesses may exist within the servitude. No evidence exists to show that limited exposure to powerline EMF and radiation is harmful to health (e.g. walking / driving under powerlines).
Loss of resources - route in conflict with brick-making quarry		(-) Low, local, long term	Good quality brick making materials, though not extensive, must be accounted for in route selection
Increase in labour in the area – affect on micro-economy, spread of sexually transmitted diseases etc		(-)Low, local, short to medium term	The impacts associated with construction camps are localised and can be well mitigated against if outlined in detail in the project specific EMP. Although an extended construction period is expected, work takes place in stages, minimising the number of workers present at any given time.
Possible impact on archaeological resources.		(-) Medium, local, long term	Evidence of both Stone and Iron Age archaeological resources were identified within the study area, which could be destroyed and disturbed by construction activities.
			Brick mining areas avoided. Ensure legal compliance at unavoidable intersections. Adherence to EMP, adequate education of site staff on environmental best practice and social behaviour. Accountability of contractor is to be reinforced contractually in this regard.
			Identify exact locations of tower footings and create 'no-go' areas to conserve archaeological resources if found in zones where construction is to take place.

Construction and Operational Phase Impacts: Coega Electrical Infrastructure EIA			
Table 4 Potential Issues and Impacts and Suggested Mitigation	POSITIVE / NEGATIVE, SIGNIFICANCE, EXTENT & DURATION	RATIONALE FOR SIGNIFICANCE	MITIGATION
POTENTIAL IMPACT Interference with aviation in area	(-) Medium, local, long term	Towers may become obstacles to aircraft operating in the vicinity of the IDZ.	Agree on positioning and design of communication tower and transmission line towers with Civil Aviation and Airports Company of South Africa
2. BIO-PHYSICAL IMPACTS			
2.1 Geotechnical Impacts Access roads: erosion	(-) Low to medium, local, long term	Access to pylon positions and for construction of the powerline will require roads. Poor drainage design and construction will result in rutting and gully formation along the roads and on downslope batters.	Design and install adequate drainage measures Include regular pipe culverts and control downstream erosion by incorporating velocity reduction measures and fanning outflow. Construct regular drainage berms across roads and regulate flow into the surrounding area. Construct sidedrains upslope of roads.
Access roads: river and stream crossings	(-) Low to medium, local, long term	River and stream crossings will result in erosion and severe sedimentation if incorrect design and construction procedures are instigated	Design adequate culvert openings to allow peak flow conditions. Stabilise embankment sideslopes by providing vegetation. Ensure stable foundations. Investigation and correct design is an important and necessary requirement.
Pylon foundations: heaving clay; collapsing sands; and other deleterious geotechnical foundations	(-) Low to medium, local, long term	Pylon foundations on deleterious soils will lead to settlement; differential settlement; collapse settlement; heave and shrinkage; and possible collapse if unaccounted for during construction.	Heaving clays could be expected along low-lying clay-rich areas. Mitigatory measures would be to found elsewhere or ensure deep seating thereby intersecting moisture equilibrium depth. Alternatively special structural pylon foundation designs such as rafts.
Pylon foundations: rock	(-) Low, local, short term	Difficult excavation may require heavy excavation with concomitant degradation of local geology and surrounds.	Collect and remove all excavated rock from site and spoil in an environmentally suitable location Limit noise and dust using boulder breaking methods or excavation with a 'rockpecker'. Although this is a minor environmental hazard it should be accounted for with no mitigation.
2.2 Noise, Dust & Pollution Noise dust and pollution impact associated with construction	(-) Low to medium, local, short term	Although an extended construction period is expected, work will place in stages, minimising the number of activities taking place at any given time.	Noise, dust & pollution can be well mitigated against by adherence to the project specific EMP. Mitigatory measures include: Sticking to working hours

Construction and Operational Phase Impacts: Coega Electrical Infrastructure EIA			
Table 4 Potential Issues and Impacts and Suggested Mitigation	POSITIVE / NEGATIVE, SIGNIFICANCE, EXTENT & DURATION	RATIONALE FOR SIGNIFICANCE	MITIGATION
POTENTIAL IMPACT			
Pollution resulting from transformer failure at substation	(-) Low, local, short term		The use of silencers on vehicles and equipment Watering haul and access roads etc.
2.3 Impacts on Ecology (excl Avi Fauna)			
Habitat fragmentation as a result of the loss of vegetation cover	(-) Low, local, medium term to permanent	Land clearing leads to loss of habitat and exposure of land to the elements, which may result in associated local or downstream degradation.	All transformers are banded with oil traps/sumps in the event of catastrophic failure. Bunds are sized to contain all oils that may
Loss of indigenous habitat for indigenous fauna	(-) Low, local, medium to long term	Existing access paths are to be used wherever possible, and the amount of vegetation to be cleared is only that of the actual pylon base. Construction camps are to be situated on already-transformed areas.	Keep removal of vegetation to a minimum. Loss of vegetation cover implies a loss of habitat. Keep the removal of vegetation to a minimum.
Reduction in the quantity of carbon stored in vegetation.	(-) Low, local, short term	AS per the EMP, any topsoil that is moved is to be stockpiled for return to the site after construction, thus retaining seeds for later germination.	The removal of vegetation and plant biomass will lead to a decrease in the amount of fixed carbon in the tower footprints and the corridor underneath the conductors. Keep the removal of vegetation to a minimum.
Increase in soil erosion as a result of the loss of vegetation cover	(-) Low, local, medium term	Existing access tracks are to be used wherever possible, erosion control measures are to be covered in the EMP.	Ensure that the loss in vegetation cover is kept to a minimum. Disturbed areas should be rehabilitated as soon as possible.
Harvesting of fuelwood	(-) Low, local, short term	This is dependant on the time that poles etc are stored, as the vegetation should be able to recover if the storage is short term.	Discourage the harvesting of fuelwood by workers through a briefing session with the site foreman or the workers themselves.
Hunting of indigenous local fauna	(-) Low, local, short term	There are a number of endemic and endangered species in the area in question, which may be encountered during construction activities.	Construction workers should be informed that hunting of wild animals will not be allowed under the future Eastern Cape Environmental Conservation Act (now Bill). Any acts of this nature should be discouraged.
Barrier to gene dispersal	(-) Medium to low, local, long term	Alien vegetation is an ecological threat to on existing indigenous vegetation and needs to be eradicated to prevent further encroachment.	Fragmentation of habitat through the removal of vegetation cover may make it difficult for some plants to disperse effectively. The developers should ensure that the removal of vegetation is kept to a minimum

Construction and Operational Phase Impacts: Coega Electrical Infrastructure EIA			
Table 4 Potential Issues and Impacts and Suggested Mitigation	POSITIVE / NEGATIVE, SIGNIFICANCE, EXTENT & DURATION	RATIONALE FOR SIGNIFICANCE	MITIGATION
<u>POTENTIAL IMPACT</u> Impact of night lights on fauna in study area associated with substations	(-) Low, local, long term	Insects attracted to lighting are expected to attract foraging bats and other fauna.	Lights are to be designed to reduce "light pollution" by utilising downlighters etc. Substations will be in heavily developed areas, which will offer little habitat for indigenous fauna.
2.4 Impacts on Avi-Fauna (Birds) Destruction and disturbance of bird habitats and riparian areas	(-) Low, local, short term	Damara Tern and African Black Oystercatcher in dune areas. Half-collared Kingfisher in riparian or riverine areas.	Construction and maintenance of the overhead lines and the Power Station Substation will result in disturbance of avifauna. It is recommended that the dune fields area be avoided, although it will not be possible. It is recommended that all construction and maintenance activities be undertaken in conformance with generally accepted environmental best practice guidelines, in order to minimize the impact on avifauna. Activities such as driving and earth moving in the dune area should be kept to a minimum. This applies to the riparian areas.
Impact on quality of electricity supply due to faulting caused by birds	(-) Medium, regional, long term	Birds roost and use tower structures for hunting, which may sometimes have adverse effects on operations.	When the tower structures for the lines are finalized, EWT will need to examine the technical drawings and determine whether faulting due to birds is likely. If it is to be a problem, EWT will provide recommendations on how to mitigate.
Habitat destruction	(-) Low, local, long term	Damara Tern and African Black Oystercatcher in dune areas	Construction and maintenance of the overhead lines and the Power Station Substation will result in disturbance of avifauna in the dune fields, and to an extent in riparian areas. It is recommended that if possible the dune fields area be avoided, although if the Gas Power Station is situated right on the coast, it will not be possible. Failing, it is recommended that construction and maintenance be undertaken in conformance with accepted environmental best practice guidelines, in order to minimize the impact on avifauna. Activities such as driving and earth moving in the dune area should be kept to an absolute minimum. These last two points would apply to the riparian areas as well.

CHAPTER 9 CONCLUSIONS AND RECOMMENDATIONS

It is the finding of this report that a definite need has been established for the installation of bulk electrical infrastructure within the Coega IDZ.

The specialist scoping studies commissioned as part of this study have provided useful input into the environmental, impact process. Findings and recommendations of these reports, together with feedback from the public obtained during the public participation process, have allowed the following conclusions and recommendations:

- The construction of the proposed infrastructure within the CDC will have a significant environmental impact on the receiving environment, however this must be seen in the context that it is all contained within the proposed industrial development zone (IDZ), which will be ultimately be heavily industrialised and modified.
- The positive benefits that the proposed electricity infrastructure offer are of great regional and national significance and far outweigh the negative, predominantly local and mitigatable impacts.
- The proposed infrastructure is inherently necessary to enable the IDZ to function as envisaged and to attract the level of development necessary to make it viable.
- The proposed transmission line route should be followed as shown in the project description as this route appears to be the best option in terms of utilisation of existing servitudes, grouping infrastructure into “utility corridors”, and avoiding riparian buffer zones and sensitive areas of vegetation.
- The tower type options and detailed routes as described in detail in Chapter 6 are recommended and should be incorporated into the design and planning phases of the project by Eskom.
- The self-supporting tower type “A” is the preferred tower for the project – it is thus recommended that this be used.
- Further investigation into the location of the proposed CCGT Power station is required. Although not part of the scope of this project, the 2 aspects are closely linked and the findings of the specialists on this project are that the proposed power station should not be locate within the L.A.Z. These details should be addressed timeously, although will not affect the RoD on this project as the length of the last section of the powerline corridor can be shortened accordingly.
- Once the exact locations of the tower footings and substations are determined the archaeologist and botanist should be called in to verify these positions.
- A project-specific Environmental Management Plan (EMP) should be drawn up for the project with input from all specialists that have undertaken work on the project.
- Environmental auditing and monitoring of the project should take place by an independent Environmental Control Officer, with monthly audits being submitted to the compliance division of the relevant environmental authority.

REFERENCES

- Final Scoping Report Proposed change in land use of the remaining area within the Coega Industrial Development Zone SRK, 2005
- Geological / Geotechnical Assessment by Dr V G Price of Terreco
- Bird Impact Assessment Study by Jon Smallie of Endangered Wildlife Trust
- Heritage Resource Scoping Assessment by Len Van Skylkwyk of eThembeni Cultural Heritage
- Ecological Assessment by Dr Peter M Illgner



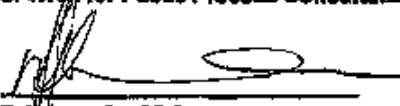
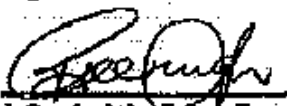
**MINUTES OF KEY STAKEHOLDER WORKSHOP (KSW)
PORT ELIZABETH**

29 MARCH 2006

<p>1</p>	<p>ATTENDANCE</p> <p><u>Present</u></p> <p>Ms. S. Boast - Eyethu Engineers CC Mrs. C.Esbend - Eyethu Engineers cc Mr. J. Geeringh – Eskom Transmission Mr. E. Grunewald – Eskom Transmission Mr. F. Ndema – Coega Development Corporation Ms. A. Kamineth – NMMM Mrs. G. Ntuli – Eskom Generation Ms. B. Njoloza – Coega Development Corporation Ms. N. Lufuta – Coega Development Corporation Ms. K. Ngesi - NMMM Ms. Z. Kwaza – Eskom Transmission Ms. T.Mzamo – Coega Development Corporation Mr. S.Simayi – Coega Development Corporation Ms. S.Wren – Public Process Consultants Ms. Z. Ndikinda – NPA Mr. B. Vockerodt – Eskom Transmission Ms. P. Madikizela - NPA</p>	<p>SB CE JG EG FN AK GN BN NL KN ZK TM SS SW ZN BV PM</p>	
<p>2</p>	<p>INTRODUCTION OF THE PROJECT</p>	<p>ACTION</p>	<p>DATE</p>
	<p>SW explained meeting procedure and purpose, project context and background.</p>		
<p>3.</p>	<p>SCOPE OF THE EIA</p> <p>It was explained that the EIA incorporates the 400 and 132 kV powerlines, the construction of substations and radio towers, and the upgrade of the Grassridge substation. It was explained that the Open Cycle Gas Turbine (OCGT) for peaking hours, and Combined Cycle Gas Turbine (CCGT) for base load supply are external to this EIA. However, the powerlines covered by this EIA need to feed into the CCGT, and so it's positioning will affect this project.</p> <p>SW explained the purpose of the KSW as an information sharing exercise, and outlined the rest of the public participation process.</p>		

4.	<p>SPECIALISTS</p> <p>SS wanted to know if the specialists were local.</p> <p>SB advised that both the ecology and geology specialists are local, whereas the archaeologist is based in Pietermaritzburg, and the bird specialist is based in Pretoria. She further explained that all the specialists had work experience in the Coega area.</p>		
5.	<p>ALTERNATIVES</p> <p>The question of alternatives was raised and the project team was asked to clarify.</p> <p>JG explained that in terms of current environmental legislation, feasible alternatives must be considered.</p> <p>EG explained that the Coega Development Corporation has set aside corridors and that the proposed electrical infrastructure needs to fit in with the existing IDZ masterplan, and that this has been explained to DEAT.</p> <p>FN explained that in addition to locality alternatives, structural and technical alternatives also exist and will be investigated.</p> <p>SW explained the “no-go” and “go” alternative as minimal requirement, and that process, design and locality comprise further alternatives.</p>		
6.	<p>POWER DEMAND</p> <p>JG advised that once the IDZ develops, the demand for electricity is expected to be at 5000 megawatts per day, which will be more than the whole Eastern Cape currently uses. Port Elizabeth is currently using 800 megawatts of power per day.</p> <p>Therefore a significant amount of infrastructure is required to ensure that the supply of electricity to the IDZ is sustainable.</p>		

7.	<p>IMPACTS AND ENVIRONMENTAL MANAGEMENT</p> <p>JG advised that it is the parallel placement of the powerlines as per the map shown is an opportunity for a green corridor within the IDZ.</p> <p>SB explained that the vegetation does not need to be completely cleared underneath the powerlines, but only at the pylon footprint.</p> <p>The possibility of fire risk was raised, and JG stated that this would be minimal, as the vegetation typical of the area is not hazardous in this regard.</p> <p>EG stated that one access road would be used to service the whole corridor, and this road would overlap with existing or planned IDZ roads where possible.</p> <p>AK – Wanted to know about the birds, their seed dispersal, and would appreciate it if EWT looks into this.</p> <p>SB – Explained that the necessary precautions would be taken in order to protect birds, same was explained by EG in his presentation with the aid of slides and photographs.</p>		
8.	<p>PRESENTATION BY ERNEST GRUNEWALD</p> <p>A presentation on the background to the project and the wider context was given by Ernest Grunewald. This presentation is available on request.</p> <p>BV explained that the higher the voltage lines, the less the losses over distance.</p> <p>EG explained that the tower type options for the Coega project include: Cross rope, compact cross rope and self-supporting.</p> <p>The positioning of the proposed closed cycle gas turbine (CCGT) generation station was discussed. This is still to be finalised by Eskom Generation and the CDC, but the servitude for providing powerlines to and from the CCGT will remain in the same vicinity as shown on the map at this meeting.</p> <p>Ms G Ntuli of Eskom generation explained that the EIA for the CCGT is planned for April this year, with construction expected to take place in 2008.</p>		

9.	APPROVAL OF CONTENTS OF MINUTES Signed as acknowledgement of correctness of contents of the minutes:  _____ S. Boast for Eyathu Engineers  _____ S. Wren for Public Process Consultants  _____ F. Mearns for CDC  _____ J. Gearing for Eskom Transmission		
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Key Stakeholder Workshop Minutes KSW20 06/03/06

APPENDIX B

PUBLIC PARTICIPATION PROCESS RECORD

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A record of issues raised by I&APs as part of Scoping, together with corresponding responses by the project team, is presented in Appendix B as the Comments and Response Report.

1. INTRODUCTION

The objective of Appendix B is to provide an account of the Public Participation Process (PPP) conducted as part of Scoping for the Environmental Impact Assessment (EIA) for the installation of the electrical infrastructure within the Coega Industrial Development Zone (IDZ) near Port Elizabeth. This allows the Interested and Affected Parties (I&APs) the opportunity to assess the process in terms of its effectiveness, appropriateness, transparency, and environmental legislation.

The PPP was aimed at establishing efficient communication channels that would allow all I&APs the opportunity to participate meaningfully and timeously in the environmental investigations. Scoping, as part of the EIA process, commenced in March 2006.

The findings of the Scoping process are presented in the Draft Scoping Report (DSR) prepared by Eyethu Engineers, the lead Environmental Consultant. For the process to be completed, I&APs need to be given the opportunity to verify these findings prior to the report's submission to the environmental authorities. For this purpose, the opportunities provided for the review of the DSR will comprise:

- Distribution of the DSR to key stakeholders and the general public for review.
- Participative discussion of the DSR with I&APs at a public meeting in June / July 2006, to facilitate its review, should this be called for.

2. SCOPE OF WORK

2.1 Terms of reference

The following terms of reference formed the scope of work for the Public Participation Process for the proposed Coega Electrical Infrastructure EIA:

- To meet public participation requirements in the EIA Regulations and other relevant legislation, as well as those activities required by the environmental authorities.
- The initial and ongoing identification and categorisation of I&APs and their incorporation into the PPP and the EIA process, making use of existing databases where possible.
- The establishment and maintenance of liaison channels with stakeholders and stakeholder groups.
- Facilitation and mediation on behalf of Eyethu Engineers, Eskom Transmission and the Coega Development Corporation.
- The arrangement, co-ordination, facilitation and documentation of all PPP activities, processes and results, including public meetings, key stakeholder workshops and individual interaction.
- To maintain public awareness of the proposed Coega Electrical Infrastructure EIA through a range of information dissemination activities, including Background

Information Documents, general correspondence and media announcements, in close co-operation with Eskom Transmission and the Coega Development Corporation.

- To record issues raised by I&APs in a Comments and Response Report and which will be addressed during the environmental investigative process.

2.2 Assumptions and limitations

The PPP has been founded on limited assumptions and limitations that have influenced the methodologies selected.

2.2.1 Assumptions

- All information provided by Eskom Transmission, the Coega Development Corporation and I&APs to the Eyethu Engineers was correct and valid at the time that it was provided.

2.2.2 Limitations

- Lack of interest by I&APs in the EIA because of the numerous studies relating to the Coega development in the past, and the widespread knowledge that the IDZ concept has already been approved.

Despite these assumptions and limitations, Eyethu Engineers cc is confident that the PPP was adequate, afforded I&APs adequate opportunities to contribute to Scoping and accurately reflects issues raised in the public domain.

2.3 Methodology

Scoping is defined as the identification of issues in the public domain through technical scoping, specialist scoping, proponent scoping and public scoping. Thus, in order to determine key issues and potential impacts of the proposed development, two interlinked processes were followed during Scoping. These were:

- A public participation process.
- A technical process (described in the Draft Scoping Report).

PUBLIC PARTICIPATION PROCESS

A PPP was undertaken in terms of the Plan of Study for Scoping as approved by the Department of Environmental Affairs and Tourism (DEAT), with input from the Eastern Cape and the Department of Economic Affairs, Environment and Tourism (DEAET).

The main objective of public participation is to provide an opportunity whereby I&APs, Technical Specialists, the Authorities and the development proponent work together to create an environment conducive to improved decision-making.

A further objective is to raise a diversity of perspectives, while at the same time not forcing consensus amongst I&APs. A measure of due process is whether the public participation process is able to obtain an indication of trade-offs that all role players (I&APs, Technical Specialists, the Authorities and the development proponent) are willing to accept with regard to economic growth, social equity and ecological sustainability, the three elements comprising sustainability within a framework of sound governance.

The following best practice public participation principles derived from the Core Values of the International Association for Public Participation were applied in the PPP designed for the project:

- The public should have a say in decisions about actions that affect their lives.
- Public participation includes the promise that the public's contribution will influence the decision.
- The public participation process communicates the interests and meets the process needs of participants.
- The public participation process seeks out and facilitates the involvement of those potentially affected.
- The public participation process involves participants in defining how they participate.
- The public participation process provides participants with the information they need to participate in a meaningful way.

Following from the Core Values, the following best-practice principles apply to public participation as well as conflict and dispute resolution processes, and were applied during the PPP. These principles ensure that the views of all participants are fairly heard and considered, that the process needs of participants are met and that the process itself cannot be unfairly attacked or delayed.

- Consultation is inclusive (consultation takes place with all sectors of society, and affords a broad range of I&APs the opportunity to become involved, bearing in mind that it is not practically possible to personally consult with every individual in the project area).
- The opportunity to comment is announced in various ways.
- Information is sufficient to allow meaningful contributions and is accessible in a language that I&APs can understand and written in a non-technical way.
- Information is presented in various ways (for example, by way of information documents, public meetings, visual displays and print).
- Enough time is allowed for comment, but time is not wasted on options that are not viable.
- There are various opportunities for comment, at various stages in the process.
- There are various ways for I&APs to comment (written submissions, comment sheets, email, faxing, public meetings, personal contact with members of the EIA team).

- I&APs have the opportunity to exchange information and viewpoints (for example, at public meetings).
- I&APs receive ongoing feedback.
- Transparency, honesty and integrity on the part of all involved in the process.

3.1 I&AP identification and registration

The identification and registration of I&APs was ongoing for the duration of the study, although concentrated during the initial phase. I&APs were identified from reconnaissance visits to the area, use of existing databases, internet searches, stakeholder referrals, advertisements, completed comment sheets and attendance registers at meetings. These I&APs were entered onto a database. At the time of completing this Appendix, the database contained 92 I&APs across a range of sectors, including:

- National Government.
- Provincial Government (Eastern Cape).
- Local Government (local & district municipalities).
- Tourism
- Conservation
- Local residents (urban, peri-urban and rural; resident associations).
- Industry.

The database was also used to code what are termed key stakeholders. These include the authorities (relevant national, provincial and local government) and I&APs who act as sectoral representatives. An easy way used to identify key stakeholders was to ask other stakeholders during the course of networking and referral in the compilation of the database. Key stakeholders received all project documentation and special efforts were made to encourage their attendance at the Key Stakeholder Workshop and the Public Meetings as well as to submit comment.

An electronic database was used to capture I&AP details and interactions, which was updated as and when information was distributed to or received from I&APs. A list of registered I&APs is provided in Annexure 1.

3.2 Project Announcement

The project and environmental assessment process was widely announced, with an invitation to the general public to register as I&APs and to actively participate in the PPP. This was achieved via the following activities:

- Print media **advertisements** in English and Afrikaans were placed in national, regional and local newspapers for initial project announcement. Copies of the advertisements are available from Eyethu Engineers on request.

- **Key stakeholders** were contacted telephonically and/or electronically, and informed of the project and EIA process.
- A **letter of invitation** (dated 06 March 2006) was faxed or e-mailed to key stakeholders inviting them to a **Key Stakeholder Workshop** as well as informing them of the project and inviting their participation in the EIA process.
- A **Background Information Document** (BID) and **comment sheet** was produced in English, detailing the proposed project and anticipated impacts associated with it EIA process (Annexure 2). The BID was e-mailed and/or faxed to I&APs on the database (8 March 2006).
- Copies of the BID were also handed out at the public meeting.
- A **letter** was e-mailed to regional Eskom staff to announce the project and invite participation in the EIA process.
- The Eskom and Coega **websites** were used to house the various public documents loaded, which have been available on line from March 2006 and will be throughout the project. The website address is www.eskom.co.za/eia and www.coega.co.za.

3.3 Identification of issues

Various opportunities were provided for I&APs to participate in the process and submit comment. These included the Key Stakeholder Workshop and Public Meeting. In many cases, stakeholders were involved in more than one category of meeting. The issues raised by I&APs at the various meetings have been incorporated into the Comments and Response Report (Appendix B).

3.3.1 Key Stakeholder Workshop

One Key Stakeholder Workshop to discuss key issues around the proposed Coega Electrical Infrastructure EIA. This was held at Port Elizabeth on the 29th March 2006. Stakeholders that were invited to the workshop were representatives of relevant sectors. The objectives of this workshop was to:

- Identify issues (positive and negative) relating to the proposed project.
- Provide an opportunity for constructive debate and discussion.
- Ensure common understanding of what is proposed and why.
- Provide an opportunity for stakeholders to comment, ask questions and raise issues to be addressed by Eskom Transmission, Coega Development Corporation and the EIA Project Team.

3.3.2 Public Meetings

Invitations to the Public Meetings were extended in advertisements, BIDs, letters, and telephone calls.

The purpose of Public Meetings was to provide an appropriate platform to enable I&APs to raise issues and have the opportunity to interact one-on-one with Eskom Transmission, Coega Development Corporation and the EIA Project Team, either in English or Afrikaans. A short data projector presentations were given where there was sufficient interest. The public meeting was very poorly attended, although IAPs were notified well in advance of the date and venue.

3.3.3.1 Local Government

Local Government officials were contacted telephonically where they were informed of the proposed project.

3.3.3.2 National and Provincial Government

National and Provincial Government Departments and Agencies were contacted telephonically and were sent copies of the Background Information Document.

3.3.5 Website and e-mail address

A project website (www.eskom.co.za/eia and www.coega.co.za) was established which allowed I&APs opportunity to find out about the project and the EIA process as well as be able to submit comment via e-mail (carrine@eyethupmb.co.za).

3.3.6 Local Public Participation Office

A Public Participation Office was hosted in Port Elizabeth that provided assistance in the dissemination of project information and as well as providing a local contact for stakeholders within the study area.

3.4 Ongoing communication

In addition to initial interaction with I&APs through the various communication tools described above in Sections 3.2 and 3.3, there was ongoing communication between the Public Participation Team, Eskom, the EIA team and I&APs. These interactions included:

- Forwarding of information requests, including maps, and issues raised by stakeholders to the Project Team, Eskom Transmission and Coega Development Corporation.
- Timeous feedback to stakeholders, individually and collectively.
- Distribution of minutes of meetings for verification.
- Verbal and written translations in Afrikaans were available on request.

3.5 Record keeping

An important part of the PPP is record keeping. The following information has been kept on record as hard copy and on the electronic database:

- Minutes and notes of meetings.
- Attendance registers.
- Comments sheets.
- Letters, e-mails and faxes.
- Telephone conversations.
- Public Participation Process Report (this Appendix), which summarises the public participation process from March 2006 up to the distribution of Draft Scoping Report (May 2006).
- Comments and Response Report (APPENDIX C of the main report).

ISSUES RAISED BY I&APS

4.1 Issues raised

Issues were raised by I&APs as part of Scoping at the various meetings, on comment sheets, and by fax or e-mail. These issues were forwarded to the relevant specialists and project team members and collated in the Comments and Response Report (APPENDIX C).

4.2 Public review of Draft Scoping Report (DSR)

The following are proposed actions associated with the public review process of the DSR.

- The DSR will be made available in the public domain for review and comment before it is finalised and submitted to DEAT and DEAET for consideration.
- A letter will be sent to all registered I&APs informing them of the report's availability.
- Key stakeholders will be contacted electronically.
- Print media advertisements will be placed in national, regional and local newspapers in English.
- The DSR with comment sheets will be made available at public venues and on the project website.
- Assistance, where required, will be provided to I&APs in order to facilitate understanding of the DSR so that I&APs have the opportunity to provide meaningful comment.
- Meetings will be held with key stakeholder groups on their request.

Annexure 1:
IAP Database

Last Name	Initial	First Name	Capacity	Organisation
Adshade	A	Aubrey		Swartkops Trust
Anthony	A	Albers		Kyle Business Projects / Nightsky Ideas Trus
Bakker	N			Bisho Steel (Ballast Nedham)
Binneman	J	Dr Johan		Albany Museum
Bok	A	Anton		Anton Bok & Associates CC
Boshoff	A	Dr André	Ecologist	Terrestrial Ecology Research Unit
Boyce	T	Tokota	Nelson Mandela Metropolitan Municipality	
Bush	B	Barbara	Sundays River Valley Tourism	
Connor	T	Teresa	The Manager	Mandela Metropole Sustainability Coalition
Dano	M	Mabhuti		ANC Port Elizabeth Region
Desi		Fikile	Motherwell Councillor	Nelson Mandela Metro
Du Plessis	J	JHH	Sundays River Irrigation Board	
DuPreez	E	Prof Eugene		Bureau of Industrial Liaison
Emeran	H	Hishaam		SA Rail Commuter Corporation
Finn	J	Joan	47 Riverside Drive	Swartkops Trust
Fisher		G J	Scientist	Blue Horizon Consulting
Geeringh	J	John	Snr Env Advisor	Eskom
Golding	M	Marianne		Endangered Wildlife Trust
Goldman	N	Neville	Station Manager	Radio Kingfisher
Goosen	E	Ester	Port Services Manager	Portnet
Griffiths	M	Morgan	Environmental Officer	Wildlife and Environment Society of SA - PE
Grunewald	E	Ernest	Land & Rights	Eskom
Hansen	P	Paul	SVR Community Forum	
Hendrikse	K	Kevin		Birdlife SA - PE
Hindes	B	Brendan	Nelson Mandela Metropolitan Municipality	
Holness	S	Stephen	South African National Parks	
Jones	G	Gregory	Sundays River Citrus Co-operative	
Justice	J	Jeff	Eastern Cape Parks Board	
Kamineth	A	Abigail	Environmental Officer	Nelson Mandela Metropolitan Municipality

Last Name	Initial	First Name	Capacity	Organisation
Keke	Z	Zolile	Chairman	DWAF
Khunou	S	Solomon	PE Tourism	
King	P	Philippa	Alcom Matomo (Pty)Ltd	
Klages	N	Norbet	The Director	UPE SAB Institute for Environ & Coastal Management
Knight	MH		The Manager	Scientific Services Port Elizabeth SANP
Koza	T	Themba	Environmental Manager	Coega Development Corporation
Koza	T	Themba		CDC
Kwaza	Z	Ziyanda	Environmental Advisor	Eskom-Transmission
Lake	G	Gordon		LW Lake and Sons Tankatara
Langman	D	Deryk	Nelson Mandela Metropolitan Municipality	
Lochner	P	Paul	CSIR	
Lufuta	N	Nqabakazi	SHE - Intern	CDC
Mabogoane	D	Daphne	Eskom - Transmission	
Madikizela	P	Primrose	SHEQ Manager	NPA
Mahosonke Boyce	MB	Plaatjies	Dept of Minerals and Energy	
Martin	P	Paul	Nelson Mandela Metropole Municipality	
Mhlabeni	M	Mfundo		ILDPSBU University of Port Elizabeth
MI	Mr	Mangcothywa	Nelson Mandela Metropolitan Municipality	
Minnaar	J	Johan	Centre Manager	ATNS Company
Mona	A	Arnold		
Moolman	L	Lucius	Manager	Addo Elephant National Park
Moon	G	Graham	The Managing Director	Bohlwueki Environmental
Mr	MG	Mvoko	Cacadu District Municipality	
Mr/Mrs	M	Bradfield	SANParks Addo National Park	
Mrs	Dawn	Mc Carthy	Forward Planning Division	Authorities
Msingizane	T	Theo		CAWU
Mzamo	T	Thembisile	SHE	CDC
Mzamo	T	Thembisile		Coega Development Corporation
Ndema	F	Fezile	SHE - Project Manager	CDC
Nel	R	Renaldo	WPCO	DWAF

Last Name	Initial	First Name	Capacity	Organisation
Ngesi	K	Kithi	Ass Man. Env. Man. Systems	Nelson Mandela Metropolitan Municipality
Njoloza	B	Belinda	SHE - Intern	CDC
Nomvuyo	N	Ketse	Dept of Mineral and Energy Affairs	
Ntuli	G	Goodness	Land & Rights	Eskom - Generation
Oldham	L	Lloyd	Environmental Journalist	Algoa Sun
Offerman	E	Eric		Coega Brick
Pearson	R	Roald		Swartkops Trust
Peter	P	Neilson	Dept - City Electrical Engineers	
Phumla	P	Madlingozi	Cacadu District Municipality	
Pillay	D	DM	Cacadu District Municipality	
Retief	P	Pieter		Department Of Water Affairs - PE
Rogers	G	Guy	Environmental Journalist	Eastern Province Herald
Roote	M	Mike	Munilec	
Rump	A	Authur	Secretary	Swartkops Trust
Simayi	S	Siyabonga	Manager	CDC
Snyman	P	Piet		Cacadu District Municipality
Stone	R	Rob	Eskom	
Struwig	A	Andries	Acting Deputy Director	DEAE&T
Stuckenberg	B	Belinda	Coega Aluminium Smelter	
Summers	G	George		Swartkops Trust
Tselane	H	Helen	Chief Air Pollution Control Officer	Department of Environmental Affairs & Tourism
Tshiwula	F	Fezekile	CEO	Nelson Mandela Bay Tourism
Tyf	C	Chinese		V3 Consulting Engineers - PE
Van Der Riet	C	Clive		Van Der Riet Architects
Vockerodt	B	Brian	Lines & Servitude Manager	Eskom
Wayile	Z	Zanoxolo	Regional Chairperson	COSATU
Welgemoed	D	Dawie	Nelson Mandela Metropolitan Municipality	
Wren	S	Sandy	Manager	Public Process Consultants
Zitumane	V	Vuyo	Acting Mun.Manager	Nelson Mandela Metro
Pretorius	J	J.P.(Koos)	Inspector CNS - Aerodrome Safety Oversight	Civil Aviation Authority
Letsholonyane	L	Lucas Mothei Vincent		ACSA- Port Elizabeth

ANNEXURE 2:
BACKGROUND INFORMATION DOCUMENT

BACKGROUND

Eskom transmission and the Coega Development Corporation (CDC) propose the installation of electrical infrastructure within the Coega Industrial Development Zone (IDZ) near Port Elizabeth, Eastern Cape. The project includes the installation of 400kV and 132kV powerlines, substations for stepping down the power for end users, radio towers for communications, and the upgrade of the existing Grassridge substation. Some of the proposed powerlines within the IDZ will link up to a proposed Combined Cycle Gas Turbine Power Station, which is proposed at a future date, and will require a separate EIA.

The installation of electrical infrastructure on this scale is a listed activity in terms of current environmental legislation, requiring that the proponent undertake an Environmental Impact Assessment (EIA) process ahead of any construction activities.

Accordingly, Eskom and Coega (joint project proponents) have appointed Eyethu Engineers cc to undertake the required EIA.

The aim of the project is to obtain a Record of Decision (ROD) from the National Department of Environmental Affairs and Tourism (DEAT) regarding the installation and integration of electrical infrastructure within the Coega IDZ.

WHAT IS AN EIA?

An EIA is an environmental study that assesses the potential impacts (both positive and negative) that a project may have on the biophysical, social and economic environments, as well as the impacts that the different environments may have on the project. The EIA also looks at alternatives and provides recommendations on how to minimise or avoid the negative impacts and maximise the positive impacts.

THE EIA PROCESS FOR THIS PROJECT

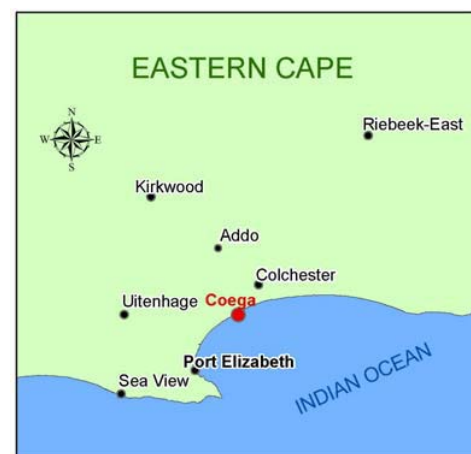
The environmental scoping phase is the first phase in the Environmental Impact Assessment process, and can be followed by a full EIA when more detailed investigation is deemed necessary. Specialist studies have been commissioned at the scoping phase. By this, avi-fauna (bird), archaeology, geology and ecology specialists will be feeding into the scoping process. The scoping phase includes a full public participation process to ensure that all potential issues or concerns raised by interested or affected parties are identified and addressed through the Scoping Process.

The Final Scoping Report will be considered by the National Department of Environmental Affairs and Tourism (DEAT), with input from the Eastern Cape Department of Economic Affairs, Environment & Tourism (DEAET).

Should gaps in the data, which make decision-making difficult, be identified, the project may proceed to the full EIA phase.

ALTERNATIVES

A limited choice of powerline corridors and substation sites exist within the Coega IDZ in line with the Coega IDZ masterplan that outlines specific zones, open spaces, and utility corridors. The required power infrastructure needs to fit into this framework that limits alternative corridors that can be assessed within the Coega IDZ. Other types of alternatives i.e. the "no go" option, pylon design alternatives etc. still exist and will be examined in the Scoping Report.



ANTICIPATED PROGRAMME

Study begins: *Mid February 2006*

Project announcement: (advertisements, distribution of this Background Information Document)
28 February 2006

Identification of Issues: (from key stakeholders, IAPs, specialists) (*Ongoing*)

Public Meeting and Key Stakeholder Workshop:
29 March 2006

Closing date for public comments: *07 April 2006*

Drafting of Scoping Report: *April 2006*

Distribution of Draft Scoping Report for comment:
+28 April 2006

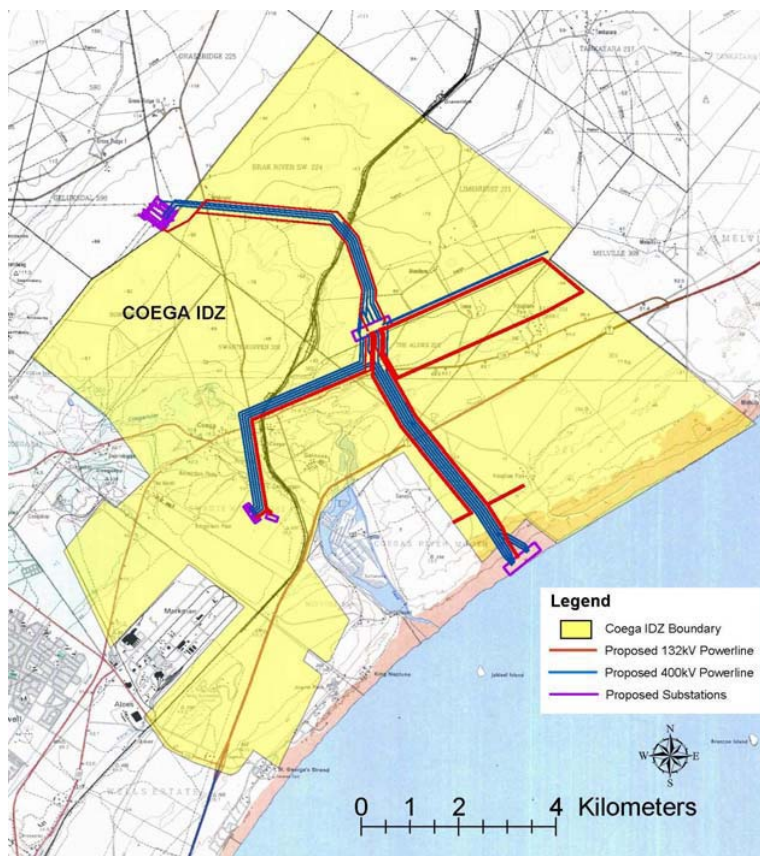
Closing date for public comments on DSR:
+29 May 2006

Submission of Final Scoping Report to DEAT:
+22 June 2006

Decision from DEAT: (*dependant on DEAT*)

Feedback to stakeholders:
(*dependant on Record of Decision date*)

Possible EIR Phase:
(*dependant on Record of Decision*)



Map showing Coega Industrial Development Zone , and proposed electrical infrastructure

INVITATION TO PARTICIPATE

Public participation is an integral part of an EIA. Anyone who is interested or affected by the proposed project has a right to participate.

Please make use of the following opportunities:

- Study the information made available in this Background Information Document, at meetings, on the website, and in the draft Scoping Report.
- Attend a public meeting to obtain further project information, interact on a one-to-one basis with the Project Team, and / or raise issues and concerns (see details on map)
- Contact the Public Participation Office to obtain further project information, and / or raise issues or concerns.
- Register as an interested and affected party and be included on the database in order to receive future project information and / or formally record issues and concerns.
- Complete the comment sheet and return either in person, or by mail, fax or e-mail.
- Visit Eskom or Coega's website to register, view information and / or submit comment.



WHO SHOULD YOU CONTACT?

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DETAILS OF PUBLIC MEETING

DATE: 29 March 2006
TIME: 17h30
VENUE: Port Elizabeth City Hall

Please note that a second public meeting will be held to discuss the Draft Scoping report once all IAPs have had a chance to view this documents. All IAPs on the database will be notified of the availability of the DSR, and of the details of the meeting to discuss the DSR.

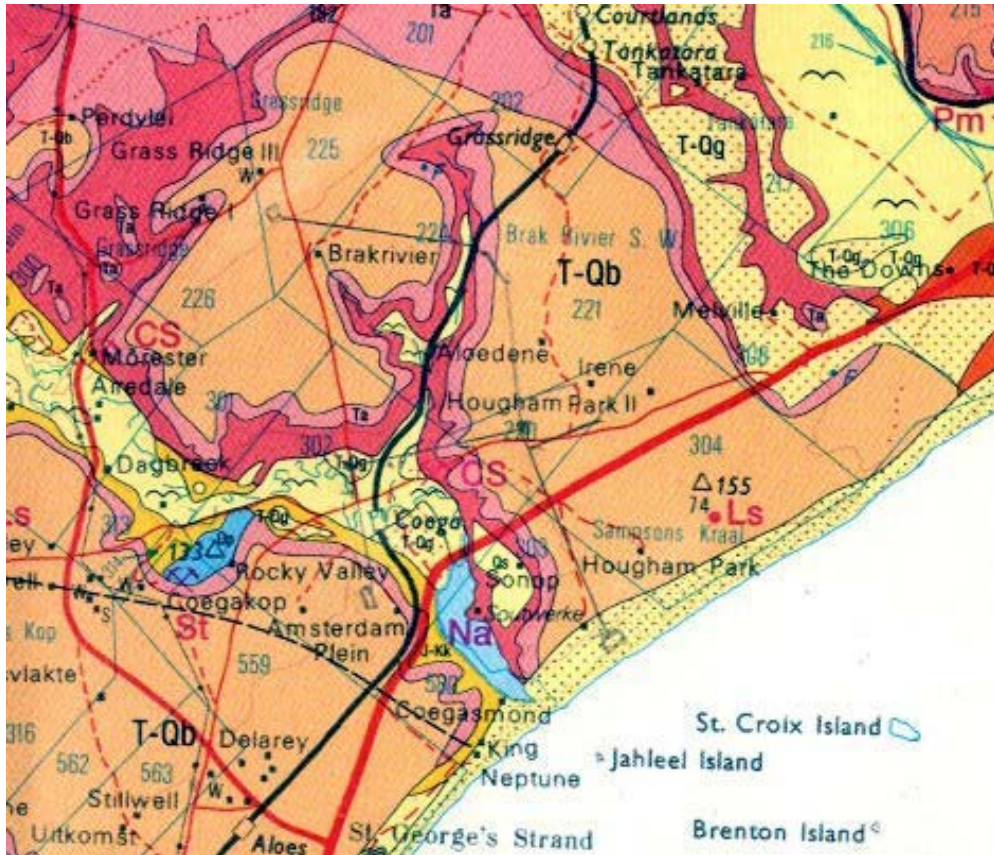


Appendix C
Issues Report

NAME	ORGANISATION	COMMENTS RECEIVED	RESPONSE
1. Mr Letsholonyane	Airports Company South Africa – ACSA	The proposed communication tower may become an obstacle to aircraft operating in the vicinity of an airport. It may have to be verified what the heights are and whether it does not penetrate the minimum obstacle clearance limits designed for this airport approach path. The SA Civil Aviation Authority have to be approached to approve the design of the communication tower.	Comment noted.
2. Mr Pretorius	SACAA (Civil Aviation Authority)	<p>It should be noted that in terms of the aviation act (Act 74 of 1962) part 139.01.33. The erecting of structures referred to, such as communication towers etc, require prior permission from the Commissioner for civil aviation.</p> <p>To give any real feedback I need some more details, such as the total height of the pylons the starting, turning points and the end of the proposed lines in degree, minute, second format. As I am not aware of known flying activities in the IDZ area, the only comment I can make at this time is that there is a requirement to fir aviation warning spheres on the line where it crosses the N route. Once the power line is finalised, Aeronautical warnings are issued with the above information and also indicated on aeronautical maps where applicable.</p> <p>Wanted to know if the specialists were local.</p>	<p>Comment noted.</p> <p>Comment noted. These details will be forwarded to Mr Pretorius at the tower placement stage, should the project receive environmental authorisation.</p>
3. Mr Simayi	Coega Development Corporation	<p>Wanted to know if the specialists were local.</p> <p>Wanted to know about the birds, their seed dispersal, and would appreciate it if EWT looks into this.</p>	<p>He was advised that both the ecology and geology specialists are local, whereas the archaeologist is based in Pietermaritzburg, and the bird specialist is based in Pretoria. She further explained that all the specialists had work experience in the Coega area.</p>
4. Ms A Kamineth	Nelson Mandela Metropolitan Municipality	<p>Wanted to know about the birds, their seed dispersal, and would appreciate it if EWT looks into this.</p> <p>Ensure that I&AP's database is updated and no one is left out. Requested copy of the IAP database and the presentation that was given at the KSW workshop.</p>	<p>An avi fauna specialist has been appointed to the project and has provided input into mitigatory measures. Neither the avi fauna specialist nor ecologist found that the presence of the powerlines would hinder gene dispersal.</p> <p>Comment noted, the database and presentation were forwarded to Ms Kwaza.</p>
5. Ms Kwaza	Eskom Transmission	<p>Requested that composite insulators be used on the new lines. Requested that dual circuit structures be avoided if possible.</p>	<p>Comments noted.</p>
6. Mr Vockerodt	Eskom Transmission (Operations)	<p>Requested that composite insulators be used on the new lines. Requested that dual circuit structures be avoided if possible.</p>	<p>Comments noted.</p>

APPENDIX D
GEOTECHNICAL SPECIALIST STUDY

**COEGA ESKOM ELECTRICAL INFRASTRUCTURE
INTEGRATION EIA
GEOLOGICAL/ GEOTECHNICAL ASSESSMENT**



MARCH 2006

Prepared
For:

EYETHU ENGINEERS
PO Box 100418
SCOTTSVILLE
3209



Prepared
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Gonubie
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EXECUTIVE SUMMARY

This report presents the findings of environmental geological considerations for the proposed Coega IDZ/ Eskom electrical integration. Investigations reveal that geological items that can be impacted on include sand/ gravel borrow pits; material sources for brickmaking, and salt mining from the Coega Estuary. The powerline footprint nowhere intersects any of these.

Identified impacts of a geological nature relate mainly to access during construction of the powerline and revolve around the need to ensure adequate drainage and slope stability measures. Additional impacts include possible unstable pylon founding; rock intersected close to surface, and servitude conflicts with respect to clay brick deposits.

Mitigatory measures comprise care in construction; stable road embankment and cutslope design; free flow beneath structures; legislative requirements for material borrow pits; foundation investigations for pylons, and perhaps most important, ensuring there are no material prospect claims beneath the powerline footprint.

No major geological obstacles are envisaged therefore with respect to the proposed powerline layout but additional geotechnical investigation of individual pylon points will be necessary during investigations immediately prior to the final design.

TERRECO QUALITY VERIFICATION			
	<i>PREPARED BY</i>	<i>REVIEWED BY</i>	<i>APPROVED BY</i>
<i>ORIGINAL</i>	Dr GV Price	Mr F Volbrecht	Dr GV Price
<i>DATE</i>	March 2006	March 2006	March 2006
<i>SIGNATURE</i>			

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COEGA ESKOM ELECTRICAL INFRASTRUCTURE INTEGRATION EIA

GEOLOGICAL/ GEOTECHNICAL ASSESSMENT

1. INTRODUCTION AND METHODOLOGY

This report provides the findings of a geological/ geotechnical assessment for the Coega Industrial Development Zone (IDZ) Eskom electrical infrastructure integration Environmental Impact Assessment (EIA). See Figure 1: Locality Plan.

Eyethu Engineers appointed Dr GV Price of Terreco cc to undertake the study on the 20th of February 2006 as per Reference No. D205, with brief, as per the letter of appointment, as follows:

- (a) Prepare a background statement, including particulars of the study area from previous experience or desk top studies.
- (b) Undertake a site visit to verify the above information and determine if there are gaps in the baseline data and to identify any areas of potential sensitivity that may require a more detailed study.
- (c) Prepare a brief report on the study methodology, findings, conclusions and recommendations which will include, *inter alia*, types of geological formations along the route, their locations, expected impacts and mitigation and monitoring requirements.
- (d) Mapping of sensitive areas.
- (e) Assess and evaluate potential impacts according to the magnitude, spatial scale, timing, duration, reversibility, probability, significance and acceptability.

The remuneration for this study would amount to R10 000.00 excluding VAT.

Baseline studies of the route geology for the comprised accumulation of all the geological data as obtained from the following map and geological description:

1:250 000 geological series: PORT ELIZABETH: 3324

A field trip was undertaken from the Coega IDZ via helicopter surveillance as arranged through Ms S Boast of Eyethu Engineers. This comprised of a detailed fly over along the full length of the route (see Figure 1) with airborne observation negating the need for difficult road access.

Additional field inspections were also carried out at selected positions to gain contact knowledge of the local geology. These were undertaken to gain familiarity with the geology and surrounding topography. Terreco has previously undertaken extensive geotechnical and materials investigations in the Port Elizabeth area and surrounding environs and is therefore familiar with the geology; soils and geotechnical constraints the route may have to overcome in terms of environmental requirements.

2. ASSUMPTIONS AND LIMITATIONS

2.1 General

A major assumption of the study is that adequate geotechnical investigation and design will be undertaken for all pylon positions and access roads – particularly in terms of erosion control where good drainage measures will be required, and in areas where cutslopes and fill embankments cannot be avoided, such as at all river and valley crossings.

Additional investigation may be required to establish mining rights and possible royalties emitting therefrom in brick/ sand/ and gravel winning areas. Where potential mineral deposits are crossed it will be necessary to interact with the Department of Minerals and Energy to establish any legal obligations in such areas.

2.2 Specialist applicable laws

The man law applicable to the geological aspect of the investigation is the:

Minerals and Petroleum Resources Development Act 28 of 2002,

especially since supplanting the previous Minerals Act 50 of 1991.

The Minerals and Petroleum Resources Development Act requires that each and every mine, quarry, borrow pit and sand winning operation must have an Environmental Management Programme report (EMP). This will affect the Coega Eskom project should it be necessary to obtain materials locally for access roads and foundations for pylon constructions. The Act furthermore provides that all mineral rights will in future be subjected to new control such payment of royalties.

Section 53 has particular relevance to this project in which potential mining areas are protected. It is incumbent for Eskom to make representation to the Department of Minerals and Energy Affairs in stating the nature of the powerline activity and obtaining relevant permissions with respect to location and specifically pylon locations.

3. GENERAL DESCRIPTION OF THE ENVIRONMENT

The general geological environment comprises Cretaceous to Recent Age, generally soft rock, weathered, sedimentary rocks. Relatively recent, in terms of geological age, transgressive marine depositions resulted in peneplanation of the surface topography, providing the relic flat-topped plateaus characterising the area. Geomorphological processes have since carved the deeply incised interstitial gullies and valleys which truncate the terrain.

The geological strata are generally near-horizontal, resulting in complete stratigraphic exposure of the geological legend through erosion by steeply incised flow lines. This allows accurate mapping with easy location of exploitable minerals for road building; brick making and construction aggregates. Those available, are currently being exploited, and while the electrical footprint is relatively thin, checks must be in place to see that existing facilities are not compromised and future opportunities protected.

Current opportunities include sand/ gravel borrowing; deep excavation of Sundays River mudstone for brickmaking; and exploitation of salt brine from shallow seawater pans.

A large brick borrow pit is located in the central part of the study area but both it and the actual brickmaking plant area are located well outside the pylon/ cable footprint with extensive material reserves located away from this zone. The footprint transects other areas with potential but reserves are so extensive that the thin zone establishing electricity for the IDZ should not impinge on future opportunities.

Sand and gravel calcrete borrowing has occurred from time to time but in a haphazard manner and at various points along the Coega River floodplain. These raised platform deposits are extensive in the area and where the 'footprint' crosses these presents only a thin slice of extensive other opportunities. Borrowing can in any case continue, with permission from Eskom, beneath the electric cables should this be required.

Salt mining from pans continues in the river floodplain east of the National Route 2. The Eskom footprint is located far off all of these.

4. PROJECT OVERVIEW

4.1 Geomorphology and Soils

The proposed area comprises the near-coastal zone typical of areas north of Port Elizabeth with a wide dune covered seaboard and flat-topped inland plateau dissected by local gullies; streams and rivers in this case the Coega River and Brak River tributary.

Soils in the area comprise mostly calcareous silts; sands and gravels in the higher lying plateau and other flat areas; river gravels along river valley floodplains; aeolian sands along the seaboard; and alluvial silts and clays along river and stream lines.

4.2 Geology

The stratigraphic geological succession is indicated below with oldest rock types at the base:

Formation	Group
<i>Recent</i> <i>Bluewater Bay</i> <i>Alexandria</i>	<i>Tertiary / Recent</i>
<i>Sundays River</i> <i>Kirkwood</i>	<i>Uitenhage</i>

Figure 2: Geological Plan indicates that legs A – B and B – E of the proposed Eskom route crosses almost the entire geological legend apart from the basal Kirkwood Formation. Legs B – C and C – D cross the entire succession with older geological units on the south side of the Coega River and a younger succession on the north

bank. Most of the geology traversed consists of unconsolidated sediments of the Bluewater Bay Formation.

The Uitenhage Group comprises Late Jurassic – Early Cretaceous rocks deposited in fault-controlled geological structural basins. Deposition comprises early coarse conglomerates followed by distal sandstones of mudstones of the Kirkwood Formation terminating in marine sediments of the Sundays River Formation.

The Kirkwood formation outcrops along parts of the Coega River where through its mainly fluvial deposition consists mainly of silty mudstone and sandstone. The pelites are variegated reddish-brown, pinkish or greenish grey, and the sandstones are yellowish, white or pale grey. Coarser sandstones are either massive or cross-bedded. The transition to the overlying formation may be gradational.

As a result of marine transgressions during the Tertiary Period, Uitenhage Group and Cape Supergroup rocks were bevelled for several tens of kilometres inland. The marine Alexandria Formation was deposited on this wave-cut platform in at least 3 steps during Neogene times with the landward margin as far in as Paterson 30 kilometres from, and 300m above, current sea level. It reaches a thickness of 13m near Colchester and consists of calcareous sandstone, sandy limestone (coquinite) and conglomerate. Most beds carry marine gastropod and pelecypod shells. The formation is regarded as mainly a littoral deposit. The Alexandria Formation is exposed along the higher-lying areas of exposed gully cut valleys (see Figure 2).

The Bluewater Bay Formation comprises alluvial gravel and sand of 2 types: older gravels which cannot be linked to existing drainage systems and fluvial deposits which represent former flood plains of major rivers in the area. The former in Late Tertiary and latter in Early Cretaceous. This is a thin layer comprising a few metres or less of reddish-stained gravel overlying the Alexandria Formation. This formation outcrops over most of the study area as previously described.

Well developed fluvial terraces reflecting changing sea levels in the Quaternary characterise major drainage lines including the Coega River. The terraces are generally covered by gravel and soil cemented by lime and occasionally silica or iron oxides producing thereby respectively pedogenic calcrete; ferricrete and silcrete.

Alluvium occurs in the Coega River floodplain soils and in local tributaries. These “estuarine” alluvial deposits are generally finer-grained than more “terrestrial” inland deposits. Aeolian sands occur as shifting dune sands (E on Figure 2) along the coastline and can be up to 30m high. Primary source is sandstone of the Cape Supergroup.

Inland bodies of light reddish-brown sand appear to be of aeolian and alluvial origin.

5. “NO GO” AREAS

“No go” areas are indicated in Figure 1 and consist of the following:

- Gravel and sand borrow areas towards the south-west part of the site
- Brick borrow pit in the Sundays River mudstones in the central part and
- Salt extraction in the south-central part in the Coega River estuary.

None of these occur within the proposed Eskom IDZ reserve and there are therefore no “no go” active geological areas beneath the proposed powerline footprint.

6. POTENTIAL IMPACTS AND ISSUES

The description and evaluation of impacts that might arise concerning geological and geotechnical impacts is based on a “summary of criteria used for the assessment of the issues of concern”. Impacts would generally be identified and evaluated for three phases:

- Construction of the Powerline
- Operational life
- Future decommissioning

Any major impacts of a geological and geotechnical nature which might arise will, however, be during the construction stage of the powerline, and while some of these might remain during the operational and decommissioning phases they will nonetheless remain the same and will to all intent and purpose diminish over time. The description and evaluation of impacts is therefore conducted as part of one grouping only.

Table 1 over page comprises the detailed description and evaluation of impacts as conforming to DEAT requirements.

Impact No	Activity	Description	Criteria						Magnitude and Significance	Management Plan Reference
			Intensity or Severity	Duration	Spatial extent	Mitigatory Potential	Acceptability	Degree of Certainty		
1	Access roads: erosion	Access to pylon positions and for construction of the powerline will require roads. Poor drainage design and construction will result in rutting and gully formation along the roads and on downslope batters.	H	M	M	M	M	Pr	M	7.1
2	Access roads: cut-slopes	Access roads in steep gully areas may require cuttings for access. Poor design will lead to slope cutface instability and possible blockage of roads.	M	M	L	H	M	Ps	M	7.2
3	Access roads: embankments	Road sideslope embankments will be required along steeper sideslopes and though few may be expected poor design and construction will lead to embankment failure and downslope landslip	M	M	L	H	M	Ps	M	7.3
4	Access roads: river and stream crossings	River and stream crossings will result in erosion and severe sedimentation if incorrect design and construction procedures are instigated	H	H	H	M	M	Pr	M	7.4
5	Access roads: borrow pits	Access roads will at certain times require gravel wearing course materials for their construction	H	L	L	H	M	Pr	L	7.5
6	Pylon foundations: heaving clay; collapsing sands; and other deleterious geotechnical foundations	Pylon foundations on deleterious soils will lead to settlement; differential settlement; collapse settlement; heave and shrinkage; and possible collapse if unaccounted for during construction.	L	M	L	H	L	Ps	M	7.6
7	Pylon foundations: rock	Difficult excavation may require heavy excavation with concomitant degradation of local geology and surrounds	L	L	L	H	L	Ps	L	7.7
8	Powerline servitude: Conflict with brick material quarrying	Good quality brick making materials, though extensive, must be accounted for in route selection	M	H	M	L	M	D	M	7.8

For Extent or Severity; Duration; Spatial Extent; Mitigatory Potential; Acceptability; Magnitude and Significance: L = Low; M = Medium; H = High; N = No significance. Refer to description in Appendix 1

Degree of Certainty; D = Definite; Pr = Probable; Ps = Possible; U = Unsure

7. SUGGESTED MITIGATION MEASURES

7.1 Access roads: erosion

Erosion in and along access and construction roads could be a problem during and after construction. Mitigatory measures include:

- Design and install adequate drainage measures
- Include regular pipe culverts and control downstream erosion by incorporating velocity reduction measures and fanning outflow
- Construct regular drainage berms across roads and regulate flow into the surrounding area
- Construct sidedrains upslope of roads and install velocity reduction measures such as inclusion of Vetiver Grass to reduce flow
- Ensure culvert inlets remain active; do not silt, and are not constructed proud of channel invert with concomitant diversion across the road surface

Drainage measures must ensure that the long-term integrity of the access roads remain intact. This will require regularly and closely spaced inspections and maintenance periods to ensure this objective.

With adequate design and construction erosion should not prevent a serious problem. Mitigation is therefore possible and necessary.

7.2 Access roads: cutslopes

Cutslope excavation may be required in gully areas. Mitigation should ensure that:

- Cutslope heights are kept low
- Creation of cut toe drop zones of at least 2m width
- Slope stability analyses to ensure stability with design of retention if not. This could include gabion support, etc.

Cutface instability should be investigated for and recognized early on. Mitigatory measures will vary according to the severity of the problem.

7.3 Access roads: embankments

Sideslope fill embankments may also be required in gully areas because of too steep fill embankments. Mitigatory measures could consist of:

- Design of embankments to a minimum of 34° (1:1,5).
- Vegetating all embankments sideslopes.
- Decrease the downslope batter when constructing with materials of low shear strength.
- Provide subsoil drainage.
- Remove deleterious topsoil and subsoil materials prior to embankment construction

Mitigatory measures are easy to implement and can be relatively inexpensive.

7.4 Access roads: rivers and stream crossings

River and stream crossings will be required along the route. Those of a temporary nature must be removed in their entirety to prevent downstream sedimentation after construction. Permanent crossings would require careful design to prevent erosion and consequent sedimentation. Mitigatory measures include:

- Design adequate culvert openings to allow peak flow conditions.
- Ensure proper founding conditions to prevent differential settlement
- Provide adequate compaction and shaping to prevent ponding on crossing embankments
- Stabilise embankment sideslopes by providing vegetation
- Ensure stable foundations.

Investigation and correct design is an important and necessary requirement.

7.5 Access roads: borrow pits

Opening of borrow pits for road material may be a requirement and subject to strict legal and environmental requirements.

Mitigatory elements will include:

- An environmental management programme report (EMP) as required by the Department of Minerals and Energy
- The EMP will include an environmental scoping as required by the Department of Environment and Tourism (provincial DEAET) and national Department of Environment Affairs (DEAT)
- The EMP also requires detail with respect to environmental degradation identification and mitigation, plus a detailed plan for decommissioning and rehabilitation. Section 6 of the EMP – the mine plan – is a legally binding document

It will not be possible therefore during powerline construction to simply dig out road materials when and where necessary. Proper borrow areas will have to be located and demarcated and an EMP conducted for each and every site.

7.6 Pylon foundations on deleterious materials

Certain deleterious unconsolidated materials could pose problems for pylon foundations if undetected in the field and not designed for as a consequence. These include:

- Collapsible sands are common along coastal areas underlain by windblown aeolian sands. They can undergo severe collapse and differential settlement if inundated with surface water. Mitigatory measures would be to 'pre-collapse' material by excavation and recompaction, and ensure that water is not allowed to pond anywhere near the structures.
- Heaving clays could be expected along low-lying clay-rich areas. Mitigatory measures would be to found elsewhere or ensure deep seating thereby intersecting moisture equilibrium depth. Alternatively special structural pylon foundation designs

such as rafts. Dynamic cone penetration tests (DCPs) should be undertaken to determine safe allowable bearing for the structures.

7.7 Pylon foundations on rock

In some instances it will be necessary to construct on rock with concomitant problems in excavation and levelling. No rock was noticed during site investigations but this does not rule out outcrop close to surface masked by colluvial or aeolian soils.

Mitigation could include:

- Collect and remove all excavated rock from site and spoil in an environmentally suitable location
- Limit noise and dust using boulder breaking methods or excavation with a 'rockpecker' (excavator boom-mounted pneumatic hammer) rather than blasting

Although this is a minor environmental hazard it should nonetheless be accounted for as with no mitigation such areas could give rise to aesthetically unacceptable visual intrusion.

7.8 Powerline servitude: conflict with brick material mining

The Sundays River Formation is currently being mined as a source for brickmaking material. The geological unit is extensive and possibilities are many. This is therefore probably not a major problem but efforts must be made to ensure the powerline does not intersect commercial borrows or quarries.

Mitigatory measures would therefore be to avoid such areas. Investigations should be undertaken to ensure there are no other areas zoned or 'claimed' for mining which may intersect the powerline, and perhaps more importantly, the pylon footprint.

7.9 Summary of impacts after mitigation

Table 2 below describes in broad outline the impacts that can be expected if proper mitigatory measures have been carried out.

Table 2: Summary of impacts after mitigation

Impact No.	Impact	Impact after mitigation
1	Roads: erosion	Protected sidedrains; grassed verges; unsilted inlets and pipes; non-eroded cross-berms; erosion protected pipe outlets (grassing; cobbled concrete outlet drains; Vetiver Grass, etc.).
2	Roads: cutslopes	Cutslopes constructed at stable batters; drop zone construction minimum 2m; soil slopes grassed on 1:1,5 maximum slope.
3	Roads: embankments	Embankments shaped to stable batters; slopes grassed and vegetated with local sodding; no slopes steeper than 1:1,5; toe stabilization in problem soils; drainage with no erosion.

4	Roads: rivers & stream crossings	All structures founded on adequate bearing; stable embankments grassed; no erosion of embankment toes or slopes; no downstream sedimentation
5	Roads: borrow pits	Borrow pit rehabilitation in strict accordance with EMP requirements. DEAT and DEAET scoping requirements adhered to.
6	Pylons: deleterious materials	Recognised and avoid collapsible sands and heaving clays; alternatively designed to obviate geotechnical problems; stability to be confirmed over time.
7	Pylons: rock	Spoil excavated rock to environmentally acceptable spoil site; limit noise and dust using boulder-breakers and rock-pecking using excavator plant.
8	Servitude: mining for brickmaking materials	Brick mining areas avoided. Ensure legal compliance at unavoidable intersections.

Generally the impact on the geology will be relatively small and because it provides the foundation for the full length of the IDZ powerline, largely unavoidable. The biggest concerns though are erosion and intersection of mining areas. The latter two items must be closely scrutinized; designed for, and appropriately handled.

7.10 Monitoring requirements to satisfy NEMA

Monitoring of the environmental effects is indicated below with an outline for short-term monitoring during construction and long-term monitoring after construction.

7.11 Short term during construction

Most of the monitoring requirements revolve around short term measures insofar as possible geological and geotechnical environmental degradation is concerned. The list of impact items show those concerning drainage, erosion and consequent sedimentation of the access roads and their cutslopes; sideslope embankments and river crossings, that will require long term monitoring.

Monitoring in the short term comprises undertaking all the impact elements and their mitigatory requirements as listed. If these are all fulfilled according to recommendations there will be no additional requirements once construction has been completed.

Monitoring should be undertaken on a monthly basis by the appointed Environmental Control Officer (ECO).

7.12 Long term monitoring

Long term monitoring will require regular inspections of all potential impacts on an annual basis by the ECO with a checklist and written report of findings.

8. CONCLUSION

Geotechnical inspection along the length of the powerline has been completed and a geological map included in the report as Figure 2. Investigations reveal that geological items that can be impacted on include sand/ gravel borrow pits; material sources for brickmaking, and salt mining from the Coega Estuary. The powerline footprint nowhere intersects any of these.

Identified impacts of a geological nature relate mainly to access during construction of the powerline and revolve around the need to ensure adequate drainage and slope stability measures. Additional impacts include possible unstable pylon founding; rock intersected close to surface, and servitude conflicts with respect to clay brick deposits.

Mitigatory measures comprise care in construction; stable road embankment and cutslope design; free flow beneath structures; legislative requirements for material borrow pits; foundation investigations for pylons, and perhaps most important, ensuring there are no material prospect claims beneath the powerline footprint.

No major geological obstacles are envisaged therefore with respect to the proposed powerline layout.

9. REFERENCES

1. 1:250 000 Geological Series as supplied by the Council for Geoscience; Department of Minerals and Energy; Pretoria.

- 1:250 000 geological series: PORT ELIZABETH : 3324

2. Minerals and Petroleum Resources Development Act 28 of 2002

3. A.B.A. Brink, 1979 – 1985, Engineering Geology of South Africa, Volumes 1 – 4, Building Publications, Silverton.

Dr GV Price

TERRECO cc

RAPID ECOLOGICAL ASSESSMENT FOR THE INSTALLATION OF BULK ELECTRICAL INFRASTRUCTURE IN THE COEGA IDZ

Short report for Eyethu Engineers

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Front cover: A close-up view of *Barleria* sp..

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ACRONYMS, ABBREVIATIONS AND DEFINITIONS	
Aeolian	Sediments transported and subsequently deposited by wind.
Article 3.1 (<i>sensu</i> Ramsar Convention on Wetlands)	"Contracting Parties <i>shall formulate and implement their planning so as to promote the conservation of the wetlands included in the List, and as far as possible the wise use of wetlands in their territory</i> ". (Ramsar Convention Secretariat. 2004. Ramsar handbooks for the wise use of wetlands. 2nd Edition. Handbook 1. Ramsar Convention Secretariat, Gland, Switzerland.) (see http://www.ramsar.org/).
Calcrete	A hard calcareous deposit formed by the precipitation of CaCO ₃ in sediments.
CARA	Conservation of Agricultural Resources Act (Act 43 of 1983)
Cambrian	542 to 488.3 million years ago (International Commission on Stratigraphy, www.stratigraphy.org as accessed on the 12 October 2005)
Carboniferous	359.2 to 299.0 million years ago (International Commission on Stratigraphy, www.stratigraphy.org as accessed on the 12 October 2005)
Cainozoic (<i>viz.</i> Paleogene > Neogene)	65.5 million years ago to present (International Commission on Stratigraphy, www.stratigraphy.org as accessed on the 12 October 2005)
Cretaceous	145.5 to 65.5 million years ago (International Commission on Stratigraphy, www.stratigraphy.org as accessed on the 12 October 2005)
Devonian	416.0 to 359.2 million years ago (International Commission on Stratigraphy, www.stratigraphy.org as accessed on the 12 October 2005)
DWAF	Department of Water Affairs and Forestry
Emergent Class (<i>sensu</i> DWAF, 1999)	"This Class is characterised by erect, rooted, herbaceous hydrophytes, excluding mosses and lichens. This vegetation is present for most of the growing season in most years, usually maintaining the same appearance from one year to another. Perennial species tend to dominate Emergent habitats. Areas that are dominated by pioneer species which become established during periods of low water are not Emergent Wetlands and should be classified as Non-vegetated."
Endorheic	Endorheic systems can be classified as lacustrine or palustrine systems, but also have the following features: "...roughly circular to oval in shape, sometimes kidney-shaped or lobed;..." "...flat basin floor;..." "...less than 3 m deep when fully inundated; and..." "...closed drainage (lacking any outlet)"
Eocene	55.8 to 33.9 million years ago (International Commission on Stratigraphy, www.stratigraphy.org as accessed on the 12 October 2005)
Flat Subsystem (<i>sensu</i> DWAF, 1999)	"...wetland habitats occurring on areas of comparatively level land (slope less than 1 %) with little or no relief, but not directly associated with either a valley bottom or floodplain feature"
Habitat	"Place or environment in which specified organisms live, e.g. the sea shore" (Abercrombie et al., 1980).

Jurassic
199.6 to 145.5 million years ago (International Commission on Stratigraphy, www.stratigraphy.org as accessed on the 12 October 2005)
Karst
“A type of topography that is formed over limestone, dolomite, or gypsum by dissolution, and that is characterized by sinkholes, caves, and underground drainage.” (Bates & Jackson, 1984, p.280)
Lacustrine System (sensu DWAF, 1999)
“...wetlands possessing all of the following characteristics:
1. situated in a topographic depression or a dammed river channel;
2. total area greater than 8 ha; and
3. surface area coverage by mosses, lichens, trees, shrubs or persistent emergents of less than 30 %.
Similar wetlands of less than 8 ha are also included in the Lacustrine System if they possess at least one of the following characteristics:
4. water depth in the deepest part of the basin exceeds 2 m at low water; or
5. a wave-formed or bedrock feature makes up all or part of the shoreline boundary...”
Limnetic Subsystem (sensu DWAF, 1999)
“...all habitats lying at a depth of greater than 2 m below low water within the Lacustrine System. Many small Lacustrine ecosystems have no Limnetic Subsystem.”
Littoral Active Zone (LAZ)
The area between the high water mark and the continuous vegetation cover inland. It includes isolated bush pockets within the aforementioned area.
Littoral Subsystem (sensu DWAF, 1999)
“...all wetland habitats in the Lacustrine System extending from the shoreward boundary of the system to a depth of 2 m below low water, or to the maximum extent of non-persistent emergents, if these grow below depths of 2 m.”
Mesozoic (viz. Triassic > Jurassic > Cretaceous)
251.0 to 65.5 million years ago (International Commission on Stratigraphy, www.stratigraphy.org as accessed on the 12 October 2005)
Miocene
23.03 to 5.332 million years ago (International Commission on Stratigraphy, www.stratigraphy.org as accessed on the 12 October 2005)
Natural properties of an ecosystem (sensu Convention on Wetlands)
Defined in Handbook 1 as the "...physical, biological or chemical components, such as soil, water, plants, animals and nutrients, and the interactions between them". (Ramsar Convention Secretariat. 2004. Ramsar handbooks for the wise use of wetlands. 2nd Edition. Handbook 1. Ramsar Convention Secretariat, Gland, Switzerland.) (see http://www.ramsar.org/)
Neogene (viz. Miocene > Pliocene > Pleistocene > Holocene)
23.03 million years ago to present (International Commission on Stratigraphy, www.stratigraphy.org as accessed on the 12 October 2005)
NFA
National Forests Act (Act 84 of 1998)
Non-vegetated Class (sensu DWAF, 1999)
“...surfaces with less than 30 % surface area cover of vegetation other than pioneer species”
NWA
National Water Act (Act 36 of 1998)
Oligocene
33.9 to 23.03 million years ago (International Commission on Stratigraphy, www.stratigraphy.org as accessed on the 12 October 2005)
Ordovician
488.3 to 443.7 million years ago (International Commission on Stratigraphy, www.stratigraphy.org as accessed on

the 12 October 2005)
Palaeozoic (viz. Cambrian > Ordovician > Silurian > Devonian > Carboniferous > Permian)
542.0 to 251.0 million years ago (International Commission on Stratigraphy, www.stratigraphy.org as accessed on the 12 October 2005)
Palaeocene
65.5 to 55.8 million years ago (International Commission on Stratigraphy, www.stratigraphy.org as accessed on the 12 October 2005)
Palaeogene (viz. Palaeocene > Eocene > Oligocene)
65.5 to 23.03 million years ago (International Commission on Stratigraphy, www.stratigraphy.org as accessed on the 12 October 2005)
Palustrine System (sensu DWAF, 1999)
May be defined as follows:
"...1. all non-tidal wetlands dominated by trees, shrubs, persistent emergents, mosses or lichens (greater than 30 % surface area coverage);
2. tidal wetlands where salinity due to ocean-derived salts is less than 0,5 g/l; and
3. wetland habitats lacking the vegetation listed in (1), but with all of the following characteristics:
i. area less than 8 ha;
ii. water depth in the deepest part of the basin less than 2 m at low water;
iii. lacking active wave-formed or bedrock shoreline features; and
iv. salinity due to ocean-derived salts less than 0,5 g/l..."
Permian
299.0 to 251.0 million years ago (International Commission on Stratigraphy, www.stratigraphy.org as accessed on the 12 October 2005)
Planation surface
An erosion surface is characterized by low relief and associated with a particular period in the earth's history. Erosion surfaces can be indicative of periods of quiescence between pulses of tectonic uplift.
Pleistocene
1.806 to 0.0115 million years ago (International Commission on Stratigraphy, www.stratigraphy.org as accessed on the 12 October 2005)
Pliocene
5.332 to 1.806 million years ago (International Commission on Stratigraphy, www.stratigraphy.org as accessed on the 12 October 2005)
Precambrian
+ 542 million years ago (International Commission on Stratigraphy, www.stratigraphy.org as accessed on the 12 October 2005)
Primary dune
A primary dune for the purposes of this study is regarded as being synonymous with fore dune. These dunes are the first row of dunes landward of the high-water mark and usually accompanied by a sparse vegetation cover of dune pioneers. Taller vegetated dunes covered in dune thicket often occur landward of the fore dunes in the Eastern Cape.
Residual
Specifically in reference to soils. Soils that have developed in situ by the weathering of the underlying bedrock.
Ramsar Convention on Wetlands
"The Convention on Wetlands (Ramsar, Iran, 1971) is an intergovernmental treaty whose mission is "the conservation and wise use of all wetlands through local, regional and national actions and international cooperation, as a contribution towards achieving sustainable development throughout the world". As of March 2004, 138 nations have joined the Convention as Contracting Parties, and more than 1300 wetlands around the world, covering almost 120 million hectares, have been designated for inclusion in the Ramsar List of Wetlands of International Importance." (Ramsar Convention Secretariat. 2004. Ramsar handbooks for the wise use of wetlands. 2nd Edition. Handbook 1. Ramsar Convention Secretariat, Gland, Switzerland.) (see http://www.ramsar.org/). South Africa is a Contracting Party to the Convention.

Scrub-Shrub Class (<i>sensu</i> DWAF, 1999)
“...areas dominated by woody vegetation less than 6 m tall. It is characterized by true shrubs, young trees, and trees or shrubs that are small or stunted as a result of environmental conditions. Such communities may represent a successional stage leading to Forested Wetland, or they may be relatively stable.”
Silurian
443.7 to 416.0 million years ago (International Commission on Stratigraphy, www.stratigraphy.org as accessed on the 12 October 2005)
Sustainable Utilization (<i>sensu</i> Convention on Wetlands)
Defined in Handbook 1 as the " <i>human use of a wetland so that it may yield the greatest continuous benefit to present generations while maintaining its potential to meet the needs and aspirations of future generations</i> ". (Ramsar Convention Secretariat. 2004. Ramsar handbooks for the wise use of wetlands. 2nd Edition. Handbook 1. Ramsar Convention Secretariat, Gland, Switzerland.) (see http://www.ramsar.org/).
Triassic
251.0 to 199.6 million years ago (International Commission on Stratigraphy, www.stratigraphy.org as accessed on the 12 October 2005)
Water Surface Class (<i>sensu</i> DWAF, 1999)
“...all water surfaces with a vegetative cover of less than 30 %”
Wise Use (<i>sensu</i> Convention on Wetlands)
Defined in Handbook 1 (citing the third meeting of the Conference of Contracting Parties (Regina, Canada, 27 May to 5 June 1987) as " <i>the wise use of wetlands is their sustainable utilization for the benefit of humankind in a way compatible with the maintenance of the natural properties of the ecosystem</i> ". (Ramsar Convention Secretariat. 2004. Ramsar handbooks for the wise use of wetlands. 2nd Edition. Handbook 1. Ramsar Convention Secretariat, Gland, Switzerland.) (see http://www.ramsar.org/)

EXECUTIVE SUMMARY

This report provides an ecological assessment for the proposed bulk electrical infrastructure in the Coega Industrial Development Zone (IDZ). The proposed transmission lines (132kV and 400kV) follow prescribed corridors through the IDZ, linking key elements within the development zone. These elements should include an upgraded Grassridge Substation, 2 new substations and a proposed gas-fired power plant (Open Cycle Gas Turbine) adjacent to the coast. Associated infrastructure will include still to be installed microwave towers. The Open Cycle Gas Turbine (OCGT) power station does not form part of this study, although it has been discussed briefly, where appropriate, as some of the proposed transmission lines will terminate at the plant. The transmission lines carrying different voltages will be routed through this corridor, resulting in a corridor approximately ± 300 m wide. The potential development footprints of the components of the power distribution network are the focus of this report, although the IDZ was regarded as the study area. Only two alternatives were to be assessed in relation to the above, the infrastructure as described above and the no-go option.

This document provides descriptions of the key biogeographical aspects of the environment, brief descriptions of the flora and fauna of the study area, and assessment of the Present Ecological State of the IDZ, expected impacts associated with the proposed bulk electrical infrastructure installation, and recommended mitigatory measures. The Present Ecological State of the study area was assessed in relation to a Perceived Reference State. The specific aspects of the environment discussed in relation to the above were patterns of biodiversity, ecological processes and ecosystem services. This report has relied heavily, in some instances, such as the identification of Red Listed species, on prior impact assessments for the IDZ.

The Nelson Mandela Metropolitan Open Plan System (NM MOSS; Stewart *et al.* 2004) recognizes a number of distinct vegetation types within the Coega IDZ. These correspond with the STEP (Subtropical Thicket Ecosystem Planning project; Cowling *et al.*, 2003, Pierce, 2003; Vlok & Euston Brown, 2002) vegetation types. The coastal vegetation

types are Algoa Dune Thicket and Colchester Strandveld (Broad Habitat Unit = Algoa Dune Thicket), while the inland vegetation types are Grassy Ridge Bontveld, Sundays Valley Thicket, Motherwell Karroid Thicket and Sundays Doringveld Thicket (Broad Habitat Unit = Sundays Valley Thicket). Colchester Strandveld and Motherwell Karroid Thicket are endangered, whilst the remaining vegetation types are all vulnerable. These vegetation types correspond broadly with the vegetation categories described in detailed studies carried out within the Coega IDZ (CES, 1997; Finch, 1996, Campbell, 1998), which described the vegetation at a finer resolution.

The dune vegetation is comprised of three units, namely (1) Foredunes and Hummocks; (2) Dune Woodlands and (3) Dune Grasslands, which are typical of the sandy beaches along the Eastern Cape Coast. The dune vegetation tends to be highly invaded by *Acacia cyclops* (Rooikrans), with a few remnant pockets of intact vegetation remaining. They are very sensitive systems, underlain by mobile sands, which are susceptible to the formation of ‘blow-outs’ when disturbed. Colchester Strandveld and Algoa Dune Thicket would overlap broadly with the Algoa Dune Thicket, whilst the Foredune and Hummock vegetation would be a non-thicket vegetation type according to the NM MOSS.

The inland vegetation, in an undisturbed state, tends to be dominated by dense thickets within the valleys, whilst the flat topped ridges tend to be characterized by open grassland/fynbos and Karroid species interspersed with bush clumps of typically thicket species. The thicket elements tend to be confined to deeper soils (associated with pseudo-karstic landforms), whilst the Karroid, fynbos and grassland species occur on shallower soils. Two distinct types can thus be identified, the Mesic Succulent Thicket (corresponding to the Sundays Valley Thicket of Stewart *et al.*, 2004) and the Bontveld (corresponding to the Grassy Ridge Bontveld of Stewart *et al.*, 2004). The Motherwell Karroid Thicket has not been identified as a separate vegetation unit in previous studies in relation to the IDZ.

In disturbed areas, where bush clearing has resulted in a loss of tree and shrub components, Grassy Fynbos vegetation is recognized as a secondary plant community, composed of grassland, fynbos and Karroid species with a few tree and shrub elements.

The majority of the proposed transmission line falls within the ‘inland’ vegetation types, particularly the Grassy Ridge Bontveld and Sundays Valley Thicket, while the substations fall within Grassy Ridge Bontveld (Figure 1). The endemic and Critically Endangered, *Euphorbia meloformis*, is found within Grassy Ridge Bontveld and Albany Valley Thicket in the IDZ. A total of 68 plant species that are either rare, vulnerable, endangered, endemic, protected by one or another of the various pieces of legislation have been found to occur within the study area.

All the large herbivores and predators have been lost from the study area. For example Skead (1987) reported that Black Rhino (*Diceros bicornis*) used to be common at Grassridge, with Buffalo (*Syncerus caffer*), Lions (*Panthera leo*) and rhino between the Coega and Swartkops rivers. Most of the small to medium-sized animals are still expected to be present.

Only two mammal species regarded as Vulnerable, Endangered or Critically Endangered by Friedmann and Daly (2004) have distributions which appear to include the IDZ, namely the Black Rhino (*Diceros bicornis bicornis*) (Critically Endangered – Regional Assessment) and the Tree Hyrax (*Dendrohyrax arboreus arboreus*) (Vulnerable – Regional Assessment). Black Rhino are no longer found within the study area, while the IDZ could possibly fall within the far western extremity of the range for the Tree Hyrax. The area is therefore currently of low conservation status within the above context.

At least one endemic and Endangered species, namely the Albany dwarf adder (*Bitis albanica*) and three other endemic species (Tasman’s girdled lizard, *Cordylus tasmani*; Dwarf burrowing skink, *Scelotes anguineus* and Eastern legless skink, *Acontias*

(*meleagris orientalis*) are known to occur inside or in close proximity (< 2km) to the IDZ. No endemic amphibians, or species of concern are known to occur within the IDZ.

Two ‘Rare’ butterflies, namely the Coega Copper (*Aloeides clarki*) and Wineland Blue (*Lepidochrysops bacchus*) occur within the study area (Henning & Henning, 1989; CES, 2001). Butterfly reserves have been set aside for the conservation of the former butterfly within the IDZ (Figure 2). The Wineland Blue is listed on Schedule 2 (as amended in 1976) of Ordinance 19 (1974) of the old Cape Province. The presence of the ‘Vulnerable’ (Picker et al., 2002) Addo Flightless Dung Beetle (*Circellium bacchus*) in the study area is unknown, although it is known to occur at Colchester (pers.obs.) close by.

The Present Ecological State in relation to the patterns of biodiversity for flora and fauna, ecological processes and ecosystem services can in each instance be considered moderately transformed. After completion and subsequent occupation of the IDZ, the environment will in all likelihood be significantly transformed. Open spaces that may survive will include the butterfly reserves, road reserves and servitudes. If the IDZ develops as envisaged and the corridor beneath the transmission lines is kept free from other developments, it could become a highly significant corridor for the conservation and dispersal of organisms. It would also consequently become an important component in the open space system within the IDZ.

No infrastructure should be placed within the Littoral Active Zone (LAZ). This would require the relocation of the power plant to a site further inland, or to another location. This should be taken into consideration now, although the OCGT power station does not form part of this EIA. The current location of the power plant in the LAZ appears to fall outside the IDZ and hence in all likelihood, the areas previously evaluated in earlier environmental assessments.

No towers or other infrastructure should be located within wetland areas, although conductors may pass overhead. Mitigation measures should be implemented in order to

prevent birds colliding with the lines. A suitable qualified botanical specialist must assist in final placement of the infrastructure in order to ensure that the impact on the vegetation, particularly in sensitive areas is minimised.

No roads must be constructed or vegetation cleared in areas demarcated as primary networks in the Open Space Management Plan. No persons must enter demarcated sensitive areas such as the butterfly reserves and other primary network areas during construction and maintenance of the transmission lines and substations, wherever practically possible. The placement of towers must occur outside of areas demarcated as primary networks (including vegetation and Riparian Corridors) in the Open Space Management plan. Removal and follow-up treatment of alien invasive plants must take place as per the requirements of CARA.

The establishment of the bulk electrical infrastructure in the IDZ could be deemed acceptable if suitable environmental precautions are taken and international best practice followed for projects of this nature. General recommendations applicable to the Coega IDZ EIA and Coega IDZ Open Space Management Plan must be honoured.

1. INTRODUCTION

This report provides an ecological assessment for the proposed bulk electrical infrastructure in the Coega Industrial Development Zone (IDZ). The proposed transmission lines (132kV and 400kV) follow prescribed corridors through the IDZ, linking key elements within the development zone. These elements should include an upgraded Grassridge Substation, 2 new substations and a proposed gas-fired power plant (Open Cycle Gas Turbine) adjacent to the coast. Associated infrastructure will include still to be installed microwave towers. The Open Cycle Gas Turbine (OCGT) power station does not form part of this study, although it has been discussed briefly, where appropriate, as some of the proposed transmission lines will terminate at the plant. The transmission lines carrying different voltages will be routed through this corridor, resulting in a corridor approximately ± 300 m wide. The potential development footprints of the components of the power distribution network are the focus of this report, however the IDZ was regarded as the study area. Only two alternatives were to be assessed in relation to the above, the infrastructure as described above and the no-go option.

This document provides descriptions of the key biogeographical aspects of the environment, brief descriptions of the flora and fauna of the study area assessment of the Present Ecological State of the IDZ, expected impacts associated with the proposed bulk electrical infrastructure installation, and recommended mitigatory measures. The Present Ecological State of the study area was assessed in relation to a Perceived Reference State. The specific aspects of the environment discussed in relation to the above were patterns of biodiversity, ecological processes and ecosystem services. This report has relied heavily, in some instances, such as the identification of Red Listed species, on prior impact assessments for the IDZ.

2. KEY BIOGEOGRAPHICAL ASPECTS

Depending on the type of organism being considered, barriers to gene dispersal may be physical elements of the landscape, morphometric changes or behavioural changes in an organism. In simplistic terms, the physical environment influences the survival and breeding success of phenotypes (i.e. the physical appearance of an organism as determined by its genes), an exogenous process, whereas genetic diversity is determined by endogenous processes such as mutation and sexual reproduction (i.e. gene exchange). Endogenous processes therefore tend to increase genetic diversity, whereas exogenous processes act against it, a phenomenon sometimes referred to as natural selection. As this report is concerned with the physical landscape, its associated biogeographical characteristics and the extant ecological processes, only the physical elements of the landscape are considered for further discussion below.

2.1. Barriers to gene dispersal

For terrestrial organisms, physical barriers to gene dispersal typically include the water bodies surrounding islands, rivers and mountain ranges. Similarly, in freshwater environments, lakes and pans may be seen as the inverse of islands. Different types of barriers will vary in their efficacy as agents of isolation. For example, large perennial rivers may be barriers for some small ground dwelling organisms, but be completely ineffectual barriers for flying birds. Physical barriers that separate populations of a species may be associated with speciation to the extent that were the barrier to be removed, the descendants of the original populations would no longer be able to produce viable offspring, as they once did in the past. Speciation of this nature is known as allopatric speciation, in contrast to sympatric speciation where separate species originate in the absence of a physical barrier. Parapatric speciation is a combination of the two aforementioned types, with a partial overlap of two populations.

In the Coega IDZ, there are very few potential barriers to gene dispersal for terrestrial organisms. The most obvious elements of the physical landscape are the small rivers and

drainage lines, but these are likely to be insignificant barriers for most organisms. For example, most if not all the rivers, are non-perennial. Even if some were perennial, most birds and many insects could easily fly across the rivers, while most other organisms could wade, swim or float across them. Similarly, plants reliant on the wind or wildlife for pollination and/or seed dispersal would be similarly uninhibited. To further exacerbate matters, many of the plant species present would be self-compatible, obviating the need for some of them to be pollinated.

2.2. Corridors for gene dispersal

Corridors for gene dispersal can be equated with linear elements in the landscape. These elements could be inter alia geological features (e.g. faults, dykes etc.), watersheds, rivers or a coastline. In the Coega IDZ the most likely corridors for gene dispersal are the river valleys and the coastline. The stronger the link between the coast and the hinterland, the greater the relative importance of the river system as a corridor. For example, the Coega River is a far more important corridor in this context than some of its small tributary valleys discharging into the estuary/salt works. The Coega River penetrates a far greater distance inland than any other river traversing the IDZ, hence the associated riparian zone may provide a link between the coast and the Cape Fold Mountains for mesic plant species.

2.3. Geological Contacts

The contacts between different geological formations have been used as a surrogate for edaphic transition zones in the landscape. This approach assumes that the land within a study area has very low-relief, that the soils are residual and that the climate is homogenous. This is rarely the case, as downslope variation in hillslope sedimentary processes and soil moisture regime are likely to be associated with a change in soil types downslope, sometimes referred to as a catena. The transported sediments on the hillslopes in particular are likely to mask edaphic gradients across the contact between different geological formations. These geological formations would also need to have marked differences in composition if they are to have a marked affect on the vegetation and

substrate dependent fauna (e.g. burrowing animals). Differences in bedrock composition may result in significant changes in the soil nutrient status and/or soil moisture regime across the contact between the two geological formations. However, in selected areas, where at least some of these criteria are met, the approach can be useful.

The Coega IDZ has very low-relief and is assumed to have a homogenous climatic regime. This implies that the underlying geology should be a useful surrogate for edaphic variation in the landscape. However, the horizontal nature of the strata in the IDZ indicate that the contacts between different formations are only likely to be exposed on slopes. Down slope sediment transport, particularly on steep slopes is likely to mask these contacts. If any changes in vegetation are related to changes in the underlying lithologies they could be expected to be diffuse on the steeper slopes. To simplify matters it would be most useful to group similar rock types together, instead of placing the emphasis on the formations as indicated on the 1:250 000 geological map for the area. The clay-rich lower strata of the Kirkwood and Sundays River formations (Uitenhage Group), would then be separated from the higher-lying and younger Alexandria, Nanaga and Bluewater Bay formations (Toerien & Hill, 1989). The fluvial gravels associated with the river terraces within the Coega River valley would also be placed in the latter group. In contrast to the lower group of sediments, the younger upper group would be sandy and in many instances calcareous. As the contact between these two different groups of lithologies is likely to often occur on relatively short, steep slopes, the transition zone between them is expected to be diffuse.

Five different formations and fluvial gravels would be traversed by the transmission lines (in order of increasing age), the Kirkwood (sandstones and mudstones) and Sundays River (mud- and siltstone, sandstone) formations of the Uitenhage Group, the Alexandria Formation (conglomerate, calcareous sandstone and coquinite), the Nanaga Formation (calcareous aeolian deposit), the Bluewater Bay Formation (fluvial gravels and sands) and lastly aforementioned fluvial (terrace) gravels. The validity and origins of the

Bluewater Bay Formation are currently disputed by geologists, with some suggesting the formation represents highly weathered Alexandria Formation sediments.

2.4. Coastal Dunes

Coastal dunes represent a dynamic environment, with frequent wind related erosion and deposition. The vegetation associated with these dunes can be very different to the neighbouring hinterland, although there are likely to be plant species common to both. The susceptibility of the vegetated component of this habitat to blowouts is a good indication of its sensitivity to disturbance, while the migration of bush pockets ahead of associated dunes is an indication of its dynamism.

2.4.1. Littoral Active Zone

Tinley (1985), in his classic work on the “Coastal Dunes of South Africa” had the following to say with regard to what he termed the “Littoral Active Zone”:

"Sandy coasts are composed of four features closely related by the inter-change of sand supply between each. These are (1) beaches, (2) frontal dunes, (3) inshore or surf zone sand bars and banks, and (4) river mouths and estuaries. Together these form a single geomorphic system referred to as the littoral active zone. The sand is shifted between these four, and any change in one of them entrains changes in the others. Hence sand should never be removed from the active zone unless continued erosion of the coast is acceptable. Permissible removal of sand should thus only be allowed from deeper water below 12 m or from the most landward margin of dunefields containing more than one cordon."

For planning purposes it is therefore very important that the inner (terrestrial) boundary of the LAZ is clearly defined. Tinley (1985) defined this boundary as follows:

"The landward boundary of the littoral active zone can be recognized where the completely vegetated ground begins (ie a closed plant cover). Scattered patches of plants

with bare sand between indicates part of the active zone even if it is four kilometres inland as in the case of the Algoa Dune Sea."

Tinley (1985) recommended the following with regard to the LAZ:

1. "The constant state of flux which characterizes the littoral active zone highlights and emphasizes one simple rule in the use of soft coasts. If you want to retain the diversity and viability of their unique resources and attractions and simultaneously protect developments from damage or destruction, do not allow any development within reach of the littoral active zone."
2. "Hence the first obligatory question that any developer must ask is for a specialist in the field of coast dynamics to identify the outer limits of the littoral active zone prevailing at each site, and in which direction if any, the tendency is for change."
3. "The survey must also include a hazards or catastrophe identification which will indicate the least vulnerable sites (ie nodes of least change) for development, the landward boundary of the littoral active zone, and risks from slumping, landslips, and cave-ins in dune limestone areas...".
4. "The golden rule for development on soft coasts is to avoid the littoral active zone, especially the frontal dunes and backbeach which is the country's coastal buffer."
5. "Roads, railways, bridges, powerlines, parking lots, houses and any other immovable structure must not be placed within reach of the littoral active zone."
6. "Before planning a resort township a comparative analysis must be made between the oldest and most recent aerial photographs to determine the setback line for development. This will ensure the long-term protection of buildings and keep the littoral active zone free of interference by wrongly sited structures. The landward boundary of the littoral

active zone is generally indicated by dunes completely covered with bush (thicket/forest)."

7. "The single simple rule for the long term sustained use of soft coasts...is: to put all developments out of reach of the littoral active zone. This alone will obviate most, if not all, problems by protecting the diversity and viability of coast resources and attractions, and at the same time secure developments and property from wasteful damage or destruction."

8. "The prerequisite for responsible use of the coast is therefore to identify a national coast buffer zone, which includes the littoral active zone to the backbeach plus 100 m horizontal distance landwards, all the whole first vegetated dune cordon back to the first trough whichever is the greater, and existing dune forest reserves where they occur. Such a zone should be proclaimed, or at least made a directive that must be recognized in practice by everyone. The 100 m buffer represents a generalized minimum width, as particular objectives or situations will naturally require a broadening of the buffer zone."

9. "Any development envisaged within 100 m on the landward side of this closed cover boundary should be submitted to the Department of Environment Affairs for scrutiny and on site assessment by a professional ecologist (with geomorphological and plant ecological field experience). Where permission is granted any material development should not encroach closer than 40-50 m from the seaward end of the completed vegetated growth."

2.4.2. Primary dune

Tinley (1985), citing Davies (1980), defined primary dunes as follows:

“A. Primary dunes (derived from the beach)

- (i) Free dunes with vegetation unimportant (transverse ridges, barchans, oblique ridges, precipitation ridges and so on). Wind oriented and generally lying perpendicular to the direction of constructing winds.
- (ii) Impeded dunes with vegetation important (frontal dunes, sand beach ridges, dune platforms, etc). Nucleus oriented and generally parallel to the rear of the source beach.”

In contrast, secondary dunes were:

“B. Secondary dunes (derived from erosion of A (ii))

- (i) Transgressive dunes (blowout dunes, parabolic dunes, longitudinal dunes, transgressive sheets, etc). Wind oriented and generally lying parallel to the direction of constructing winds.
- (ii) Remnant dunes (remanie dunes), eroded remnants of vegetated primary dunes.”

According to Hellström (1996, p.227):

“The term ‘primary’ and ‘secondary’, when referring to the frontal dune system, has been used to describe the developmental process of the frontal dunes. The primary frontal dune is that dune which developed initially and then was superseded by the seaward development of a secondary dune...” .

For the purposes of this report “Primary Dunes” are synonymous with foredunes. As such they represent the first line of dunes encountered landward of the high water mark. They are usually thinly vegetated with plant species. During storm events the dunes are sometimes undercut by wave action. Where multiple dune ridges are present, the primary dunes are often the lowest dune ridge parallel to the shoreline. Foredunes lie within the LAZ.

2.4.3. Development in coastal dunes (sensu Tinley, 1985)

Tinley (1985) recommended the following with regard to development in vegetated dune cordons:

1. "Where bush covered coast dunes form a distinct series of ridges and troughs parallel to the beach, only camping and caravanning can be permitted in the first trough behind the first definite dune ridge. Permanent structures such as log cabins should be confined to the landward-most third and fourth dune trough and ridge zone."

2. "Where relatively small vegetated dunes occur as a single or double ridge only, all development should be confined to the landward base of the dunes. Dunes stabilized by indigenous forest or bush should not be removed merely to obtain a view. Ideally houses should be built upwards to obtain a seaview where the height of the dune allows it. Dunes covered by rooikrans or bare dune can, however, be reformed to any shape required, and stabilized using the brushwood mat method...What must be expected in the last case is that phases of sand accumulation will recur, building upwards or landwards again, necessitating repeated removal of sand and restabilization to maintain the desired condition."

3. "In high, steep and broad vegetated dune cordons as in the Wilderness Area and the Tongaland Coast, all permanent development should again be confined to the landward base of the dunes. However, as there is a wide range of possibilities the pros and cons must be analysed on site in each case. For example camping and caravans can be permitted in the first wooded trough behind the first bush covered dune line above the backbeach. Log cabins can be erected in the second dune trough and on the dune slopes and ridges where they are heavily forested. Again on-site placement using natural gaps in the canopy, and ensuring no possibility of donga erosion in access footpaths is fundamental for success. Otherwise mass slumping can occur at times of torrential rains. In the troughs all that need be done is to clear beneath the canopy trees. The canopy trees must always be left in place and replaced if damaged or dying."

4. "Generally in most situations all permanent developments should be confined to the landward base of dunefields (structures such as lighthouses and fire towers are exceptions)."

5. "In the southern and south-western Cape large areas of dunes are vegetated by low dense growths of highly inflammable fynbos, and the alien rooikrans. Housing must therefore be adequately protected against run-away fires which occur with gales and the hot, dry, Berg Winds which blow seawards from the interior. There are two main peaks of fire occurrence, in the summer dry season and in winter when Berg Winds have their highest frequency. On the eastern seaboard where grassland and savanna abuts bush-covered dunes, a similar fire hazard occurs with offshore winds during dry spells."

2.4.4. Sensitivity of coastal dunes to development (sensu Rust & Illenberger, 1996)

Rust and Illenberger (1996) have discussed the sensitivity of active dune systems. They did not consider vegetated dunes or biodiversity and archaeological aspects of active dunefields in their assessment, but rather focused on the physical processes present in these dunefields. They identified two dune systems, namely retentive and transgressive dune systems, which they defined as follows:

Retentive systems => "...coastal dune types where sand accumulation within vegetation is dominant over other processes. In this category we include such morphological types as hummock dunes, foredunes, and retention ridges, including sub-environments such as precipitation ridges that form the landward boundary of transgressive dunefields.

Retentive dune forms grow mostly by accretion, and are comparatively static. In terms of migration rates the dune forms in retentive systems generally migrate less than 0.25 m year⁻¹. Retentive dune systems act as local sand sinks, and tend to store sand in the littoral active zone that may be released to the beach during storms. The residence time of sand stored in retentive systems could range from decades to millennia." (p.166)

Transgressive systems => “...coastal dune types where sand transport is dominant over other processes, and the dunes are unvegetated and mobile. In this category we include such morphological types as parabolic dunes, reversing transverse dunes, barchans, seif dunes, transgressive sheet dunefields and headland-bypass dunefields.

Transgressive dune systems also grow by accumulation of sand, but a conspicuous and diagnostic feature is the dynamic down-wind movement of the individual dune forms as well as the dunefield as a whole, so the dunefield transgresses over the hinterland.” (p.166)

“Transgressive dune systems tend to be non-vegetated; this is a diagnostic feature.” (p.166)

“Because of the critical requirement for the development of coastal dune systems, namely an onshore component in the wind regime, most transgressive dune systems tend to systematically move sand inland, away from the beach and the littoral active zone.” (p.166)

Rust and Illenberger (1996) concluded that “retentive dune systems, being vegetated, are sensitive and fragile. Mobile dunes that form the major component of transgressive dune systems are robust and resilient.” (p.168). They qualified their assessment by suggesting that “...transgressive systems are not universally robust, but include sub-environments, especially precipitation ridges, slacks and vegetated interdune valleys that are highly sensitive to a number of impact types and are identical to retentive dune systems in this respect.” (p.168)

In the study area, the most resilient dunes would therefore fall within the LAZ and hence lie outside the potential development footprint, if the recommendations made by Tinley (1985) are adopted by the project developers. All other areas should therefore, within the context of their (Rust & Illenberger, 1996) conclusions, be regarded as sensitive to

development. It also indicates that beach access should be planned in such a way as to avoid any impacts on the dune slacks. It is very clear from these guidelines that no power plant or any transmission lines should be located within the LAZ (as shown in Figure 1). Ideally, exotic vegetation, such as the Rooikrans (*Acacia cyclops*), should also be removed from the dunes.

2.5. Notable climatic gradients (e.g. rainfall, temperature)

Climate can play a major role in the survival and reproductive success of an organism, primarily as a function of temperature and rainfall. For plants, air temperature may inter alia influence the growth rate, level of moisture stress (in addition to rainfall), onset of flowering and availability of nectar. Too much or too little rainfall can both have a negative impact on plant species depending on the soil moisture regime to which they are best adapted. Temperature and rainfall also have a major influence on many faunal taxa. A detailed review of the thermal ecology of fauna is beyond the scope of this study, although it is important to bear in mind that thermoregulation is important to all organisms and that their tolerances for both low and high temperatures will differ. For example, low temperatures may constrain the ability of some invertebrates to forage and hence pollinate plants, whereas very high temperatures may have a negative impact on mammals. The availability of surface water may also be of importance to many taxa, such as the Elephant (*Loxodonta africana*), which reputedly needs 160 litres of water per day (Smithers, 1983) and the Blue Duiker (*Philantomba monticola*) (Smithers, 1983). However, there are many species that meet their water requirements from their food, by behavioural or physiological means.

As there is unlikely to be a notable climatic variation within the Coega IDZ it is not regarded as a significant factor within the study area. However, the microclimatic influence of slope aspect (temperature and soil moisture) and soil types (e.g. greater water holding capacity of clay-rich as opposed to sandy soils) may influence the species present at a site.

2.6. Notable altitudinal gradients

An increase in altitude may be associated with a decrease in temperature, depending on the magnitude of the change in elevation. Altitudinal gradients are typically associated with an increase in relief and hence the microclimatic variations that accompany differences in slope aspect (see section 2.5). Changes in the amount of rainfall and soil moisture regime are also likely to be associated with altitudinal gradients. For example, orographic rainfall, mistbelts and springs (discharge of rainfed groundwater) may all be associated with mountainous areas.

Altitudinal gradients are unlikely to be factor in the Coega IDZ. For example, most of the routes for the transmission lines lie below 100 m above mean sea level. A lapse rate of 6°C per 1000 m (Global average, sensu Henson, 2002), would therefore imply that the temperatures inland (all else equal) would be approximately half a degree warmer than that on the coast. The low relief and small differences in elevation throughout the study area, would appear to indicate that topographically induced variation in rainfall is also unlikely, although precipitation within the main valley of the Coega River may be slightly higher than elsewhere. Rainfall may be slightly higher along the main axis of the river as updrafts may be associated with the small valley-side scarps, in addition to more moisture being available in the valley floor.

2.7. Rivers and Wetlands (e.g. estuaries, floodplains)

2.7.1. Introduction

As South Africa is a Contracting Party to the Convention on Wetlands (Ramsar, 1971), recommendations within this report are intended to be consistent with the principle of "wise use", as defined by the convention and be guided by current national legislation with regard to wetlands (for a definition of "wise use", please refer to the section entitled "Acronyms, Abbreviations and Definitions" above).

2.7.2. What is a wetland?

In terms of the Ramsar Convention on Wetlands (Iran, 1971) "...wetlands include a wide variety of habitats such as marshes, peatlands, floodplains, rivers and lakes, and coastal areas such as salt marshes, mangroves, and seagrass beds, but also coral reefs and other marine areas no deeper than six metres at low tide, as well as human-made wetlands such as waste-water treatment ponds and reservoirs" (see Ramsar Convention Secretariat. 2004. Ramsar handbooks for the wise use of wetlands. 2nd Edition. Handbook 1. Ramsar Convention Secretariat, Gland, Switzerland.) (see <http://www.ramsar.org/>).

In South Africa, wetlands are defined as "...land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is periodically covered with shallow water, and which land in normal circumstances supports or would support vegetation typically adapted to life in saturated soil" (National Water Act, Act No. 36 of 1998). Wetlands are also included in the definition of a watercourse within the NWA, which implies that whatever legislation refers to the aforementioned will also be applicable to wetlands. The types of features included within the definition of a watercourse include:

- "...a river or spring..."
- "...a natural channel in which water flows regularly or intermittently..."
- "...a wetland, lake or dam into which, or from which, water flows..."
- "...any collection of water which the Minister may, by notice in the *Gazette*, declare to be a watercourse..."

In addition, the NWA stipulates that "...reference to a watercourse includes, where relevant, its bed and banks...". This has important implications for the management of wetland areas and encroachment on their boundaries, as discussed further on in this report.

2.7.3. Why are they important to conserve?

Wetlands are reputed to inter alia:

- Attenuate floods;
- Retain contaminants, nutrients and sediments;
- To facilitate the recharge of groundwater resources;
- Provide an important habitat for aquatic fauna and flora; and
- Provide food, building and other materials for a variety of uses.

2.7.4. Legal framework

Wetlands are specifically mentioned in national legislation, such as the Environment Conservation Act (Act No. 73 of 1989) (ECA), National Water Act (Act No. 36 of 1998) (NWA) and National Environment Management Act (Act No. 107 of 1998)(NEMA). Internationally, wetlands have been the subject of an international agreement, namely the Ramsar Convention on Wetlands, to which South Africa is a signatory. In terms of the latter, countries must advocate wise use of all wetlands (Ramsar Convention Secretariat, 2004). Wise use in this context is referred to “...as their sustainable utilization for the benefit of mankind in a way compatible with the maintenance of the natural properties of the ecosystem” (Ramsar Convention Secretariat, 2004).

In South Africa, their importance has been recognised in Chapter 1 (National Environmental Management Principles) of the National Environment Management Act (Act No. 107 of 1998), which states that, “sensitive, vulnerable, highly dynamic or stressed ecosystems, such as coastal shores, estuaries, wetlands, and similar systems require specific attention in management and planning procedures, especially where they are subject to significant human resource usage and development pressure”. More specifically, in terms of the Environment Conservation Act (Act No. 73 of 1989) an Environmental Impact Assessment should be carried out if a development is likely to have a detrimental impact on a wetland.

In terms of Government Notice No. 26187 (Government Gazette, 26 March 2004)

“...‘**altering the bed, banks or characteristics of a watercourse**’ means the temporary or permanent alteration of a watercourse for-

- a) prospecting, mining and quarrying;
- b) agriculture;
- c) management of waste disposal sites including landfills; and
- d) construction and maintenance purposes of infrastructure such as-
 - i) railways, roads, footpaths, bridges, culverts, and other access routes;
 - ii) artificial recharge structures;
 - iii) boreholes and well-points;
 - iv) structures for water abstraction;
 - v) structures for routing water supply and other pipelines and conveyors;
 - vi) structures for creation of pools, bays and peninsulas;
 - vii) telecommunication or power cables;
 - viii) recreational camp sites, mooring sites, other anchorage facilities and slipways; or
 - ix) structures for slope stabilization and erosion protection,

but excludes any structure built for the purpose of storing water in terms of the Schedule to Government Notice R.1191 published in Government Gazette No. 20526, dated 8 October 1999 and as may be amended from time to time;...”

The following needs to be noted by the developer as reported in Government Notice No. 26187 (Government Gazette, 26 March 2004):

“2.7. (1) A person who –

- (a) owns or lawfully occupies property registered at the Deeds Office as at the date of this notice;
- (b) lawfully occupies or uses land that is not registered or surveyed; or
- (c) lawfully has access to land on which the use of water takes place,

may on that property or land alter the bed, banks or characteristics of a watercourse, if –

- (i) the alteration-
 - (aa) does not impact on a water resource or on another person’s water use, property or land; and
 - (bb) is not detrimental to the health and safety of the public in the vicinity of the activity;
- (ii) the natural migration patterns of aquatic biota and the sustainable ecological functioning of the system are interfered with;
- (iii) the alteration activity does not extend for more than **50 metres** continuously or a cumulative distance of **100 metres** on that property or land, measured along the watercourse;
- (iv) the volume of flow is not reduced except for natural evaporative losses;
- (v) strict erosion control measures are to be taken during and after construction to ensure no erosion of the bed and banks of the river takes place.;
- (vi) the water quality is not detrimentally affected; and
- (vii) all necessary measures are taken to stabilize the structure and surrounding area. This will include:-
 - (aa) rehabilitation of the riparian habitat integrity by ensuring that during re-habilitation only indigenous shrubs and grasses are used in restoring the bio-diversity;
 - (bb) rehabilitation of disturbed and degraded riparian areas to restore and upgrade the riparian habitat integrity to sustain a bio-diverse riparian ecosystem;
 - (cc) removal of alien vegetation and all new alien vegetation recruitment must be controlled; and

(dd) annual habitat assessment must be carried out to monitor the sustainability of the diversion and compliance with the above conditions. Action must be taken to rectify any impacts

(viii) any structure built fully or partially in or across a watercourse does not exceed-

(aa) a height of **10 metres**, measured from the natural level of the bed of the watercourse on the downstream face of the structure to the crest of the structure;

(bb) a width of **10 metres**, measured at the widest part of the structure; or

(cc) a length of **50 metres**, measured from one edge of the watercourse to the other; or

(dd) occur within a distance of **500 metres** upstream or downstream of another structure that alters the bed, banks or characteristics of the same watercourse, measured along the watercourse.

2.7.(2) A department of state in the national, provincial or local sphere of government may, for its own purpose and within its jurisdiction, alter the bed, banks or characteristics of a watercourse subject to the conditions set out under paragraph 2.7(1) above for-

(a) control of Stormwater;

(b) construction, maintenance and development of infrastructure;

(c) canalization and dredging of a watercourse;

(d) removal of alien vegetation;

(e) ensuring the safety of the public, livestock and property;

(f) hydrological monitoring; or

(g) flood management and potential damage.

2.8.(1) A person who uses water in terms of this authorization must submit a registration form for the registration of the water use if the alteration involves mining related activities or occurs within a distance of 1000 metres from any other alteration, measured along the water course.”

Most importantly authorization is not applicable to:

“...any wetland or any water resource within a distance of 500 metres upstream or downstream from the boundary of any wetland...”.

2.7.5. Obligations in terms of CARA

- Removal of Category 1 plants by land users regardless of where they occur on their property,
- Removal of all Category 2 and 3 plants by land users from within a 30 m buffer of the wetland and the wetland itself.

The CARA listed plants found on the property have been discussed in section 4 (vegetation) below. Dense stands of *Acacia cyclops* cover a significant area near the coast. Rows of woody material visible from the air during a site visit, would appear to indicate that the eradication of the plants is or has been in the recent past, the focus of a weed control programme.

2.7.6. Implications in relation to the STEP Project

Wetlands within the STEP project are regarded as “Critically Endangered” habitats. The Subtropical Thicket Ecosystem Planning (STEP) project is a bioregional planning tool widely accepted and used by inter alia environmental practitioners, conservation biologists, geographers and biological specialists to guide their interpretation of the sensitivity of sites to development. Although it is not believed to be legally binding, it was developed by a number of well-known and distinguished scientists, which implies that a very strong motivation needs to be proposed should the recommendations in the document be set aside. The open space system for the Metro (locally referred to as the MOSS) is a similar bioregional planning tool, but limited in geographical scope, namely the Metro. The recommendations assigned to various conservation classes within the MOSS are aligned with those in the STEP documentation. There are some differences between the MOSS and STEP with regard to vegetation mapping (i.e. in greater detail for the smaller area covered by the MOSS) and the conservation classes assigned to the

various vegetation types. As both bioregional plans cover the study area, the MOSS is given priority as the mapping is in greater detail and was completed more recently. This does not apply to wetlands, which are regarded by both bioregional plans as “Critically Endangered”. The following restrictions and opportunities apply:

Restrictions => “No further loss of natural areas and no further impacts should be allowed. Any disturbance of this Class I area should be allowed only on condition that there are net gains for the natural environment (e.g. in the portion which will remain undeveloped, restoration and its proclamation and management as a nature reserve area).”

Opportunities => “This Class I land may be suitable for eco-friendly, nature-based activities with almost no impacts such as responsible ecotourism (hiking trails etc). In those areas which have undergone severe impacts, this Class I land presents opportunities for IDP projects for restoration.” Although this aspect would not be relevant in the IDZ context.

The Coega River and its tributaries dominate the IDZ, all of which would be classified as wetlands, including the highly altered estuary in which the current salt works is located. In addition, a number of small endorheic pans are present on the higher lying areas of the coastal platform (e.g. between Aloedene and Irene). The proposed transmission lines cross the Coega River, a number of its tributaries and at least two pans (viz. at 33.7444°S 25.7002°E and 33.7474°S 25.6841°E) (Figure 1 and Figure 2).

2.8. Unusual/isolated substrates

Unusual or isolated substrates may provide refugia for species. For example, rocky outcrops could provide a refuge from fires, allow species to persist in the face of invasion by alien plant species or not frequented by less hardy species. No unusual or isolated substrates are expected to be present within the study area which is defined in this report as the entire IDZ.

2.9. Fire

Fire plays an important role in ecosystems such as fynbos, grassland and savanna. The seasonality, frequency, intensity and duration of a burn can all have an important impact on biota. Forests and thicket do not require fire, although the fringes of these habitats within a mosaic of the fire-adapted ecosystems listed above may be regulated to an extent by fire. The nature of the fire regime within the study area is unknown. Nevertheless its likely to play an important role in the maintenance of grassy fynbos within the study area.

2.10. Ecotones

Ecotones represent transitional areas between vegetation types, such as between subtropical thicket and fynbos, forest and grassland or wetlands and uplands. In theory, species diversity in these areas should be higher than in the affected habitats outside the ecotone. If it is assumed that plant species within these areas compete for resources and/or services these ecotones could be associated with natural selection amongst competing species and/or hybridization. Some fauna may also preferentially utilize the ecotones, for example Smithers (1983, p.582) stated the following with regard to the Bushpig (*Potamochoerus porcus*):

"Because of their habit of using latrines in the ecotone of forest and grassland and their habit of eating seeds and fruits, Breytenbach & Skinner (1982) accounted them as efficient dispensers of the diaspores of forest precursor species."

It is assumed for the purposes of this report that ecotones will be species rich relative to the contributing habitats, be important areas for evolutionary processes to operate and hence have an elevated conservation status relative to other habitats within the study area.

3. VEGETATION

3.1. Type, Distribution and Conservation Status of Vegetation (sensu Stewart et al 2004, CES, 1997; Finch, 1996 and Campbell, 1998)

The Nelson Mandela Metropolitan Open Plan System (NM MOSS; Stewart *et al.* 2004) recognizes a number of distinct vegetation types within the Coega IDZ. These correspond with the STEP (Subtropical Thicket Ecosystem Planning project; Cowling *et al.*, 2003, Pierce, 2003; Vlok & Euston Brown, 2002) vegetation types (Figure 1). The coastal vegetation types are Algoa Dune Thicket and Colchester Strandveld (Broad Habitat Unit = Algoa Dune Thicket), while the inland vegetation types are Grassy Ridge Bontveld, Sundays Valley Thicket, Motherwell Karroid Thicket and Sundays Doringveld Thicket (Broad Habitat Unit = Sundays Valley Thicket). Colchester Strandveld and Motherwell Karroid Thicket are endangered, whilst the remaining vegetation types are all vulnerable. These vegetation types correspond broadly with the vegetation categories described in detailed studies carried out within the Coega IDZ (CES, 1997; Finch, 1996, Campbell, 1998), which described the vegetation at a finer resolution.

The dune vegetation is comprised of three units, namely (1) Foredunes and Hummocks; (2) Dune Woodlands and (3) Dune Grasslands, which are typical of the sandy beaches along the Eastern Cape Coast. The dune vegetation tends to be highly invaded by *Acacia cyclops* (Rooikrans), with a few remnant pockets of intact vegetation remaining. They are very sensitive systems, underlain by mobile sands, which are susceptible to the formation of ‘blow-outs’ when disturbed. Colchester Strandveld and Algoa Dune Thicket would overlap broadly with the Algoa Dune Thicket, whilst the Foredune and Hummock vegetation would be a non-thicket vegetation type according to the NM MOSS.

The inland vegetation, in an undisturbed state, tends to be dominated by dense thickets within the valleys, whilst the flat topped ridges tend to be characterized by open grassland/fynbos and Karroid species interspersed with bush clumps of typically thicket

species. The thicket elements tend to be confined to deeper soils (associated with pseudo-karstic landforms), whilst the Karroid, fynbos and grassland species occur on shallower soils. Two distinct types can thus be identified, the Mesic Succulent Thicket (corresponding to the Sundays Valley Thicket of Stewart *et al.*, 2004) and the Bontveld (corresponding to the Grassy Ridge Bontveld of Stewart *et al.*, 2004). The Motherwell Karroid Thicket has not been identified as a separate vegetation unit in previous studies in relation to the IDZ.

In disturbed areas, where bush clearing has resulted in a loss of tree and shrub components, Grassy Fynbos vegetation is recognized as a secondary plant community, composed of grassland, fynbos and Karroid species with a few tree and shrub elements.

The majority of the proposed transmission line falls within the ‘inland’ vegetation types, particularly the Grassy Ridge Bontveld and Sundays Valley Thicket, while the substations fall within Grassy Ridge Bontveld (Figure 1).

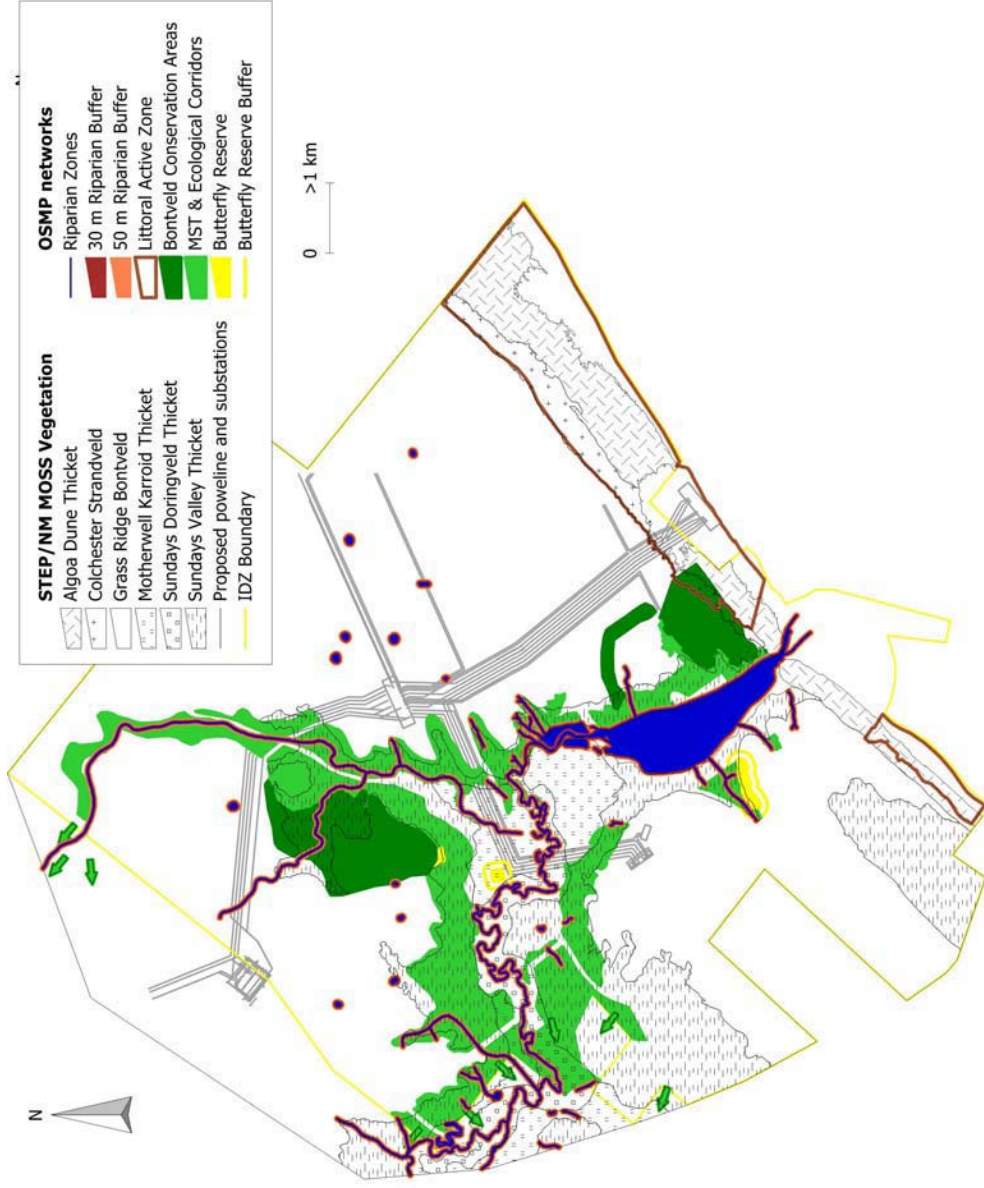


Figure 1. Vegetation types according to NM MOSS/STEP and areas of conservation importance.

3.2. Conservation Status of selected Plant Species (sensu Campbell 1998 & CES 1997 & 2001)

In total 68 species that are either rare, vulnerable, endangered, endemic, protected by one or another of the various pieces of legislation have been found to occur within the study area. An explanation of the relevant conservation criteria is given below. Of the species of special concern, 47 are recorded as being endemic, 31 are protected by the Provincial Nature Conservation Ordinance and two, four and two species are either Vulnerable, Rare or Endangered species respectively. Grassy Ridge Bontveld has the highest number of listed species (47) followed by Dune Woodland (31), Albany Valley Thicket (16) and Grassy Fynbos (13). Foredues and Dune Grasslands both have four listed species. According to the latest Interim Red Data list (January 2006), only *Euphorbia meloformis* is classified as Critically Endangered (facing an extremely high risk of extinction in the wild). The remaining species previously appearing on the red data list are no longer present. In terms of CITIES, All the *Aloe* spp., *Euphorbia* spp. and *Pachypodium* spp. are listed.

Table 1. Species of special concern known to occur within the IDZ and potentially present along the route followed by the proposed transmission lines and the footprints of the proposed substations.

Botanical Name	Family	Community						Status*				
		Dune Woodland	Grassy Ridge Bontveld	Grassy Fynbos	Albany Valley Thicket	Foredune	Dune Grassland	Endemic	IUCN (1996)	IUCN (3.1 Interim)	PNCO	NFA
<i>Adromischus cristatus</i>	Crassulaceae	Y	Y	Y				Y				
<i>Aloe africana</i>	Asphodelaceae	Y	Y					Y			Y	
<i>Aloe ciliaris</i>	Asphodelaceae		Y								Y	
<i>Aloe humilis</i>	Asphodelaceae		Y		Y						Y	
<i>Aloe lineata</i>	Asphodelaceae				Y						Y	
<i>Aloe pluridens</i>	Asphodelaceae				Y						Y	

Botanical Name	Family	Community						Status*				
		Dune Woodland	Grassy Ridge Bontveld	Grassy Fynbos	Albany Valley Thicket	Foredune	Dune Grassland	Endemic	IUCN (1996)	IUCN (3.1 Interim)	PNCO	NFA
<i>Aloe striata</i>	Asphodelaceae		Y								Y	
<i>Aristea anceps</i>	Iridaceae	Y	Y								Y	
<i>Aristea pusilla</i>	Iridaceae	Y	Y								Y	
<i>Blepharis procumbens</i>	Acanthaceae	Y	Y	Y				Y				
<i>Boophone disticha</i>	Amaryllidaceae				Y						Y	
<i>Brunsvigia gregaria</i>	Amaryllidaceae	Y						Y			Y	
<i>Bulbine frutescens</i>	Asphodelaceae		Y	Y				Y				
<i>Chasmanthe aethiopica</i>	Iridaceae					Y	Y				Y	
<i>Chondropetalum microcarpum</i>	Restionaceae	Y	Y	Y							Y	
<i>Cotyledon velutina</i>	Crassulaceae	Y	Y		Y			Y				
<i>Crassula intermedia</i>	Crassulaceae		Y		Y			Y				
<i>Crassula mesembryanthoides</i>	Crassulaceae		Y					Y				
<i>Crassula pyramidalis</i>	Crassulaceae		Y								Y	
<i>Cyrtanthus clavatus</i>	Amaryllidaceae		Y						R		Y	
<i>Cyrtanthus spiralis</i>	Amaryllidaceae	Y							V		Y	
<i>Erica glumiflora</i>	Ericaceae	Y	Y	Y				Y			Y	
<i>Euphorbia coerulescens</i>	Euphorbiaceae				Y			Y				
<i>Euphorbia fimbriata</i>	Euphorbiaceae		Y		Y			Y				
<i>Euphorbia globosa</i>	Euphorbiaceae		Y					Y	R		Y	
<i>Euphorbia gorgonis</i>	Euphorbiaceae		Y	Y				Y				
<i>Euphorbia ledienii</i>	Euphorbiaceae		Y		Y			Y				
<i>Euphorbia meloformis</i>	Euphorbiaceae		Y		Y			Y	E	CR	Y	
<i>Euphorbia polygona</i>	Euphorbiaceae		Y					Y				
<i>Euphorbia stellata</i>	Euphorbiaceae		Y					Y				
<i>Felicia echinata</i>	Asteraceae	Y				Y	Y	Y				
<i>Felicia zeyheri</i>	Asteraceae	Y						Y				
<i>Gasteria croucheri</i>	Asphodelaceae	Y						Y	V			
<i>Gladiolus maculatus</i>	Iridaceae	Y	Y								Y	
<i>Haworthia cooperi</i>	Asphodelaceae		Y								Y	
<i>Haworthia translucens</i>	Asphodelaceae		Y								Y	
<i>Hermannia sulcata</i>	Sterculiaceae	Y						Y				
<i>Hypoxis stellipilis</i>	Hypoxidaceae	Y	Y	Y	Y			Y				
<i>Hypoxis zeyheri</i>	Hypoxidaceae	Y	Y	Y				Y				
<i>Indigofera disticha</i>	Fabaceae		Y	Y				Y				
<i>Indigofera glaucescens</i>	Fabaceae	Y	Y	Y				Y				
<i>Indigofera sulcata</i>	Fabaceae	Y						Y				
<i>Kniphofia citrina</i>	Asphodelaceae	Y									Y	
<i>Lampranthus productus</i>	Mesembryanthemaceae	Y	Y					Y			Y	

Botanical Name	Family	Community						Status*				
		Dune Woodland	Grassy Ridge Bontveld	Grassy Fynbos	Albany Valley Thicket	Foredune	Dune Grassland	Endemic	IUCN (1996)	IUCN (3.1 Interim)	PNCO	NFA
<i>Lampranthus spectabilis</i>	Mesembryanthemaceae		Y		Y			Y			Y	
<i>Metalasia aurea</i>	Asteraceae		Y					Y				
<i>Muraltia squarrosa</i>	Polygalaceae	Y	Y					Y				
<i>Othonna rufibarbis</i>	Asteraceae		Y					Y				
<i>Pachypodium bispinosum</i>	Apocynaceae		Y		Y			Y			Y	
<i>Pachypodium succulentum</i>	Apocynaceae		Y								Y	
<i>Pentaschistis heptamera</i>	Poaceae		Y			Y	Y	Y				
<i>Phylica gnidioides</i>	Rhamnaceae	Y						Y				
<i>Platythra haeckeliana</i>	Mesembryanthemaceae		Y		Y			Y			Y	
<i>Polygala ericifolia</i>	Polygalaceae	Y						Y				
<i>Protasparagus crassycladus</i>	Asparagaceae		Y					Y			Y	
<i>Psoralea repens</i>	Fabaceae	Y							V			
<i>Rapanea gilliana</i>	Myrsinaceae	Y	Y					Y	E			Y
<i>Rhoiacarpos capensis</i>	Santalaceae		Y					Y				
<i>Rhombophyllum rhomboideum</i>	Mesembryanthemaceae		Y	Y				Y			Y	
<i>Satyrium membranaceum</i>	Orchidaceae			Y				Y			Y	
<i>Senecio pyramidatus</i>	Asteraceae	Y						Y				
<i>Sideroxylon inerme</i>	Sapotaceae		Y		Y							Y
<i>Silene primuliflora</i>	Caryophyllaceae					Y	Y	Y				
<i>Syncarpha recurvata</i>	Asteraceae		Y					Y	V			
<i>Thesium scandens</i>	Santalaceae	Y			Y			Y				
<i>Tritonia lineata</i>	Iridaceae	Y	Y								Y	
<i>Walafrida nitida</i>	Selaginaceae	Y						Y				
<i>Zygophyllum uitenhagense</i>	Zygophyllaceae	Y	Y	Y				Y				
TOTAL number of species		31	47	13	16	4	4	47	8	1	31	2

***Status:** The Red data categories applicable for the 1996 Red data list are (*V*)*vulnerable*, (*R*)*are* or (*E*)*ndangered* as developed by the IUCN. *Endemic* species are those that are found naturally within a specific locality or distribution range. *Protected* species are those that are protected in local legislation (indicated in brackets as: NFA – National Forests Act, PNCO – Provincial Nature Conservation Ordinance)

3.2.1. Biodiversity Act

In terms of the Biodiversity Act, the developer has a responsibility to ensure the following:

- The conservation of endangered ecosystems and restriction of activities according to the categorization of the area (not just by listed activity as specified in the EIA regulations).
- Promotion of the application of appropriate environmental management tools in order to ensure integrated environmental management of activities, thereby ensuring that all development within the area is in line with ecologically-sustainable development and protection of biodiversity.
- Limit further loss of biodiversity and conserve endangered ecosystems.

3.2.2. Conservation of Agricultural Resources Act (1983)

The actions required with regard to any plant species depend on the ‘category’ in which the plant appears in the amended regulations. In certain cases, special conditions were added that apply only to that specific species.

Plant Invaders of Category 1

These are prohibited plants that may not be kept in either rural or urban areas, except with the written permission of the executive officer, however they may be raised in an approved biocontrol reserve. These plants may no longer be planted or propagated, and all trade in their seeds, cuttings or other material that may be used for propagation is prohibited. They may not be transported or be allowed to disperse.

Plant species were included in this list for one or more of the following reasons: they might pose a serious health risk to humans or livestock, cause serious financial losses to land users, be able to invade undisturbed environments and transform or degrade natural plant communities, use more water than the plant communities they replace or be particularly difficult to control. Most of the plants in this category produce copious numbers of seeds, are wind or bird dispersed or have highly efficient means of vegetative reproduction. Whereas some of these plants were introduced inadvertently, have no obvious function to fulfill in South Africa and are generally regarded as undesirable,

many of them are popular garden or landscaping plants. What they all have in common, however, is the fact that their harmfulness outweighs any useful properties they might have. Care was taken not to include a plant in this category if part of the population of South Africa would suffer because of its absence. The ornamentals in this category ought to be reasonably easy to replace with less invasive substitutes.

Plant invaders of Category 2

These are plants with known invasive potential, but which nevertheless have certain beneficial properties that warrant their continued presence in certain circumstances. CARA makes provision for Category 2 plants to be retained in special areas demarcated for that purpose, but those occurring outside demarcated areas have to be controlled. Category 2 plants may also be retained or cultivated in biological control reserves, where the plants will serve as host plants for the breeding of biological control agents. The growing of Category 2 plants in a demarcated area qualifies as a water use, and is subject to the requirements of section 21 of the National Water Act, 1998 (Act No. 36 of 1998).

An area can only be demarcated for the growing of Category 2 plants by the Executive Officer. The land user needs to obtain a water use license; the plants have to primarily serve a commercial or utility purpose, such as a woodlot, shelter belt, building material, animal fodder, soil stabilization, medicinal or be used for personal consumption. The conditions under which they are cultivated, have to be controlled. All reasonable steps have to be taken to curtail the spreading of seeds or vegetatively reproducing material outside the demarcated area, and all specimens outside the demarcated area have to be controlled. The Executive Officer has the power to impose additional conditions to ensure the adequate control of Category 2 plants in demarcated areas.

Seed or other material used for the propagation of Category 2 plants may only be sold to, and acquired by, land users of areas demarcated for the growing of that species, or for the establishment of a biocontrol reserve. Category 2 plants may not occur within 30 m of the

1:50 year flood line of watercourses or wetlands, unless authorization has been obtained in terms of the National Water Act. The Executive Officer has the power to grant exemption from some of the above requirements.

Plant invaders of Category 3

These plants are undesirable because they are known to become invasive. Most of these species are popular ornamentals or shade trees that will take a long time to replace. A few of them were placed in this category instead of category 1 as they are not problematic in all situations. In terms of Regulation 15 of CARA, Category 3 plants will not be allowed to occur anywhere except in biological control reserves, unless they were already in existence when these regulations went into effect. These existing plants may be retained outside the 30 m buffer adjacent to the 1:50 year flood line of watercourses or wetlands. In addition, all reasonable steps need to be taken to prevent the plant from spreading, while the Executive Officer has the power to impose additional conditions or even prohibit the growing of Category 3 plants in any area where he has reason to believe that these plants will pose a threat to agricultural resources.

Material used for the propagation of these plants, such as seeds or cuttings, may no longer be planted, propagated, imported, bought, sold or traded in any way. It will, however, be legal to trade in the wood of Category 3 plants, or in other products that do not have the potential to grow or multiply. The Executive Officer has the power to grant exemption from some of the above requirements.

Control

The amended regulations stress that, when controlling plants that occur in areas where they are not allowed, methods should be used that are appropriate for the species concerned as well as to the ecosystem in which they occur. One or a combination of the following control methods may be used: uprooting, felling, cutting, burning, treatment

with registered herbicides, biological control or any other recognized and appropriate method. Repetitive follow-up actions will be mandatory until the required control has been achieved.

The aim of control is to reach a point where, ideally, the plants concerned no longer occur in that particular area or, at least, where the plants can no longer grow, produce viable seeds or spores, coppice, sprout or produce root suckers, reproduce vegetatively, propagate themselves in any other way, or spread into other areas. If this is not possible, the plants have to be contained and their multiplication limited as far as possible.

When controlling weeds and invaders, damage to the environment has to be kept to a minimum. CARA does not specify the types of environmental damage that might be caused by control actions, but a few examples would be:

- the removal of, or herbicidal damage to non-target plants;
- the chemical pollution of soil or water or any other threat to non-target organisms;
- the irresponsible use of fire;
- the creation of a fire hazard by allowing flammable material to accumulate in fire-sensitive areas;
- unnecessary or irresponsible disturbance of the soil, especially on riverbanks or slopes;
- failure to rehabilitate denuded areas, in order to prevent soil erosion and invasion by other undesirable species; and
- any other action that might upset the ecological balance of the environment.

Biological control of weeds is subject to rigorous regulations, and will be recognized by CARA as a valid control method only if it is practiced in accordance with all these regulations. Biological control involves the use of host-specific natural enemies of weeds or invaders from the plant's country of origin, to either kill or reduce the invasive potential of these plants. It may only be initiated by and carried out under the supervision

of an academic or research institute or organization established by legislation, which practises and researches biological control of weeds and invader plants. In order to prevent the waste of biocontrol research effort, money and natural enemies, CARA also lays down certain rules for the protection of biological control agents. In areas where biological control is effective, no additional control methods should be used that would harm the biocontrol agents. Provision is made for certain areas to be set aside as biological control reserves, i.e. areas in which a number of invasive plants are maintained as host plants for the biological control agents, to ensure the continued presence of the agents in that area. Only the Executive Officer may designate a biological control reserve, on condition that it is used by a biocontrol expert to rear and redistribute biocontrol agents. In such a biological control reserve, no measures may be applied that would render the biocontrol agents ineffective. Nothing contained in Regulation 15 may be used as a reason for ignoring or circumventing any other laws.

B. Indicators of Bush Encroachment

CARA also lists a number of indigenous species that are regarded as ‘Indicators of Bush Encroachment’, such as Sweet Thorn (*Acacia karroo*) and the Needle Bush (*Azima tetraantha*). Invasion by these species will lead to a decrease in the grazing potential of the affected piece of land. Bush encroachment within the study area is only likely to be a significant problem in those areas cleared for agricultural purposes. In this context bush encroachment can be seen as a positive and possible initial first step towards the eventual recovery of the vegetation to a condition resembling its Perceived Reference State.

3.2.3 Implications with regard to the Coega IDZ Open Space Management Plan

The proposed Coega Open Space Management Plan, composed of primary, secondary and tertiary networks, provides for a number of different uses. The primary network area, which allows for the conservation of a number of vegetation types and preservation of important ecological processes, has been designed to be representative of all plant

communities and ecological processes occurring within the Coega IDZ. It also provides linkages to the greater Nelson Mandela Metropolitan Open Plan System (NM MOSS).

Important constituents of the Primary network include:

- Conservation Area
 - Conservation of Bontveld – Two areas have been identified for exclusion of development, one in the north and one in the south of the Coega IDZ (Figure 1Figure).
 - Rare Butterfly Habitat – Three sites with a 100 meter wide buffer zone have been identified (Figure 2Figure).
- Ecological Processes
 - Linkages to the NM MOSS – considered essential for the survival of the northern Bontveld system and migration of species to and from the IDZ (indicated by the arrows in Figure2).
 - Mesic Succulent Thicket (Sundays Valley Thicket) on steep slopes along the banks of the Coega River is considered important for ecological processes. Fragmentation of this vegetation type must be avoided or kept to a minimum. The EIA rezoning stipulates that habitats north of the N2, excluding areas reserved for quarrying, construction of electrical substations and high voltage lines and conveyor belts to serve the Metallurgical cluster, must be protected and conserved for ecological processes. It is further stipulated that:
 - No vehicular access roads must traverse the habitats;
 - Threatened habitats must be fenced;
 - Service infrastructure must be kept out of these areas;
 - Only passive open space pursuits must be permitted; and
 - No clearing of vegetation is to be allowed.
 - Mesic Succulent Thicket on steep slopes south of the N2 must be retained to serve as a connection to the vegetation in the coastal corridor.

- Coastal Dune vegetation – The low intensity recreation area (to the east of the Coega River mouth) must be reserved for ecological processes and related activities only. This recommendation is therefore in conflict with the proposed location of the power plant in that area.
- Riparian Zone – Must be protected and excluded from development. Crossing over this area must be minimized and limited to specific areas.
- 1:100 year flood line – no physical development is permitted in line with DWAF requirements.

The proposed transmission lines and associated infrastructure are therefore potentially in conflict with the recommendations in the Coega OSMP in a number areas (indicated by red boxes in Figure 2).

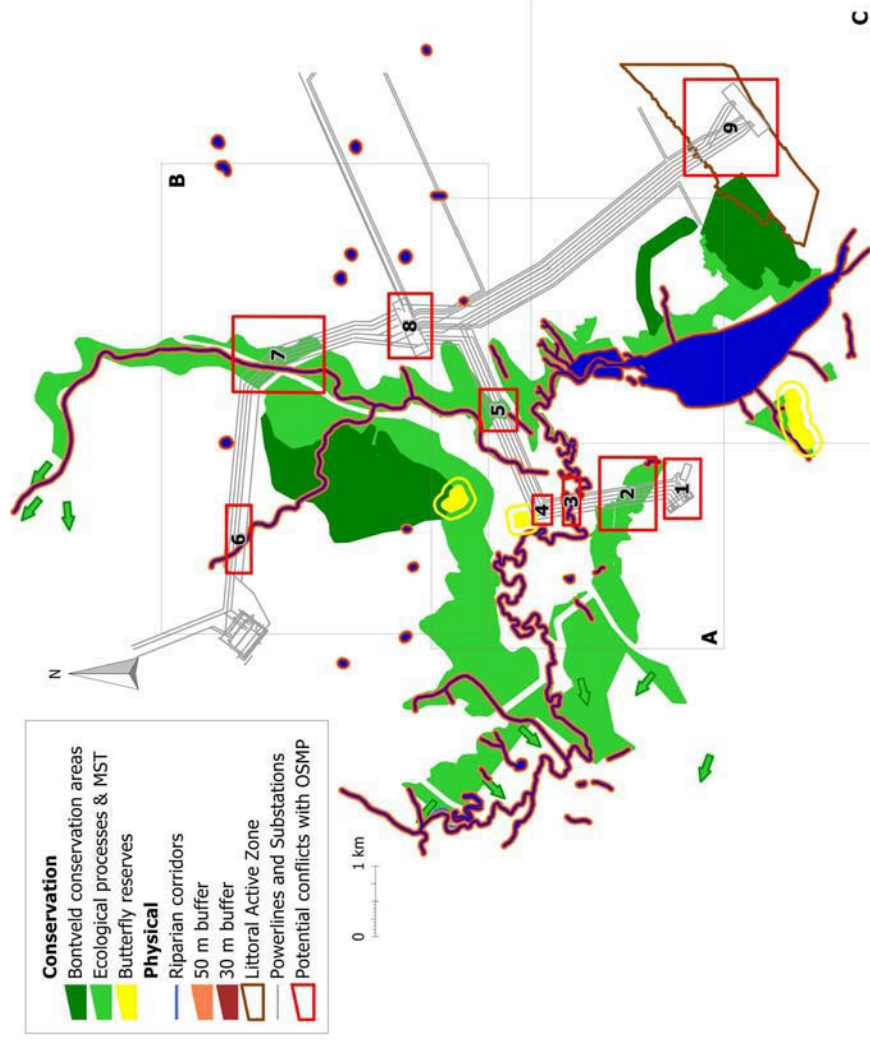


Figure 2. Implications of the development with regard to the Coega Open Space Management Plan. The boxes labeled A, B, and C correspond with Figures 3, 4, and 5 below.

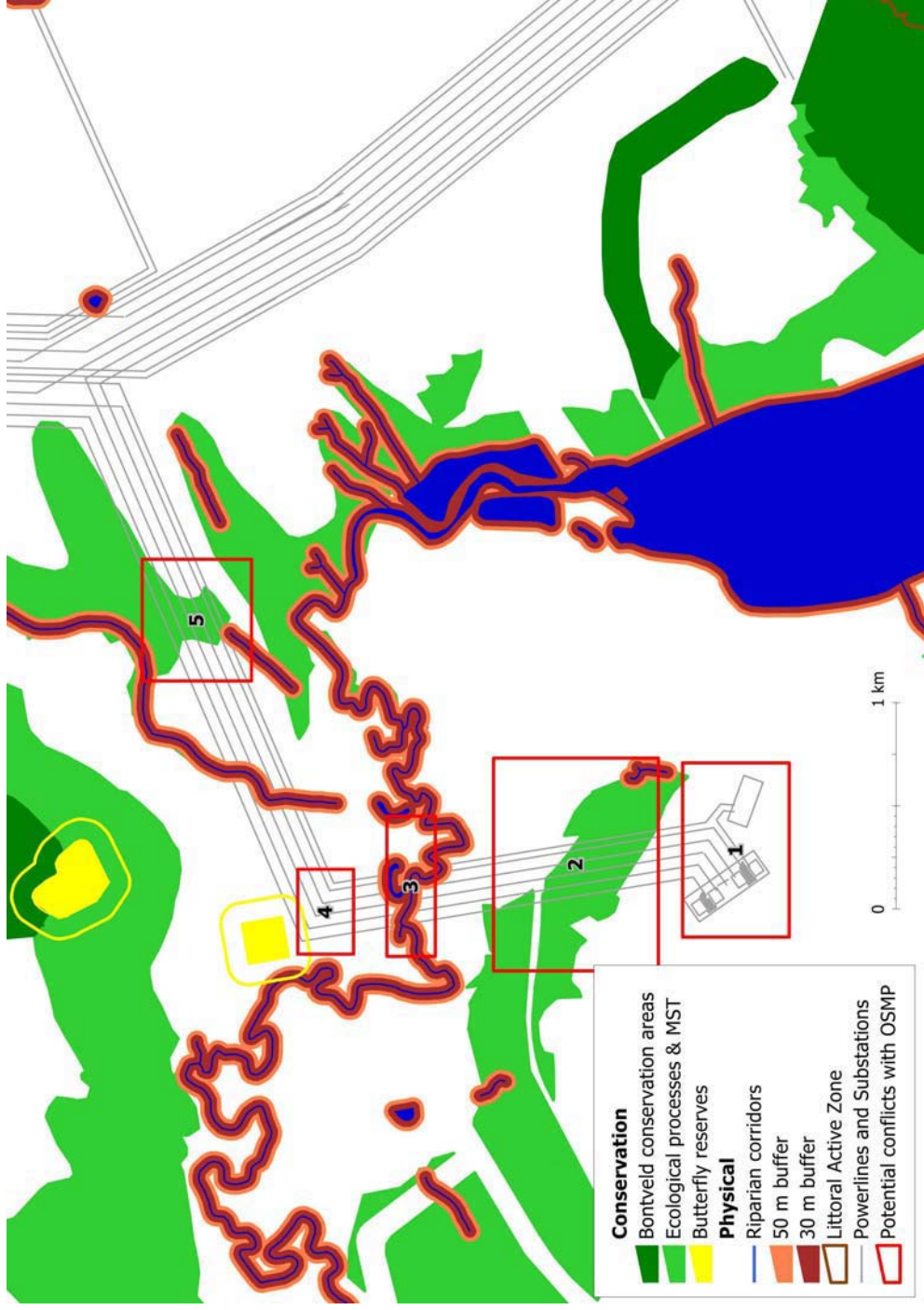


Figure 3. A map indicating the positions of problem areas 1 – 5 in relation to the Coega Open Space Management Plan.

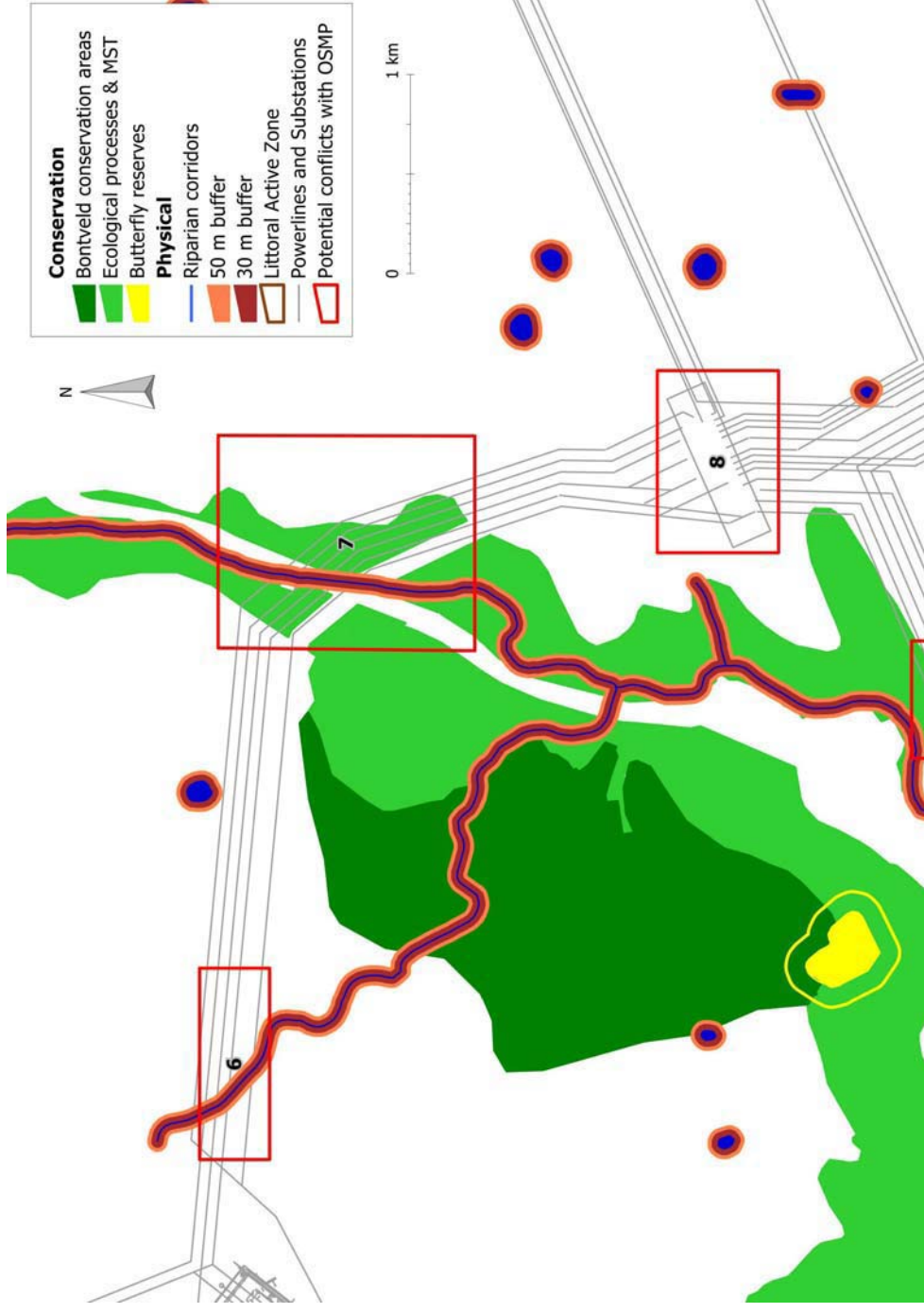


Figure 4. A map indicating the positions of problem areas 6 – 8 in relation to the Coega Open Space Management Plan.

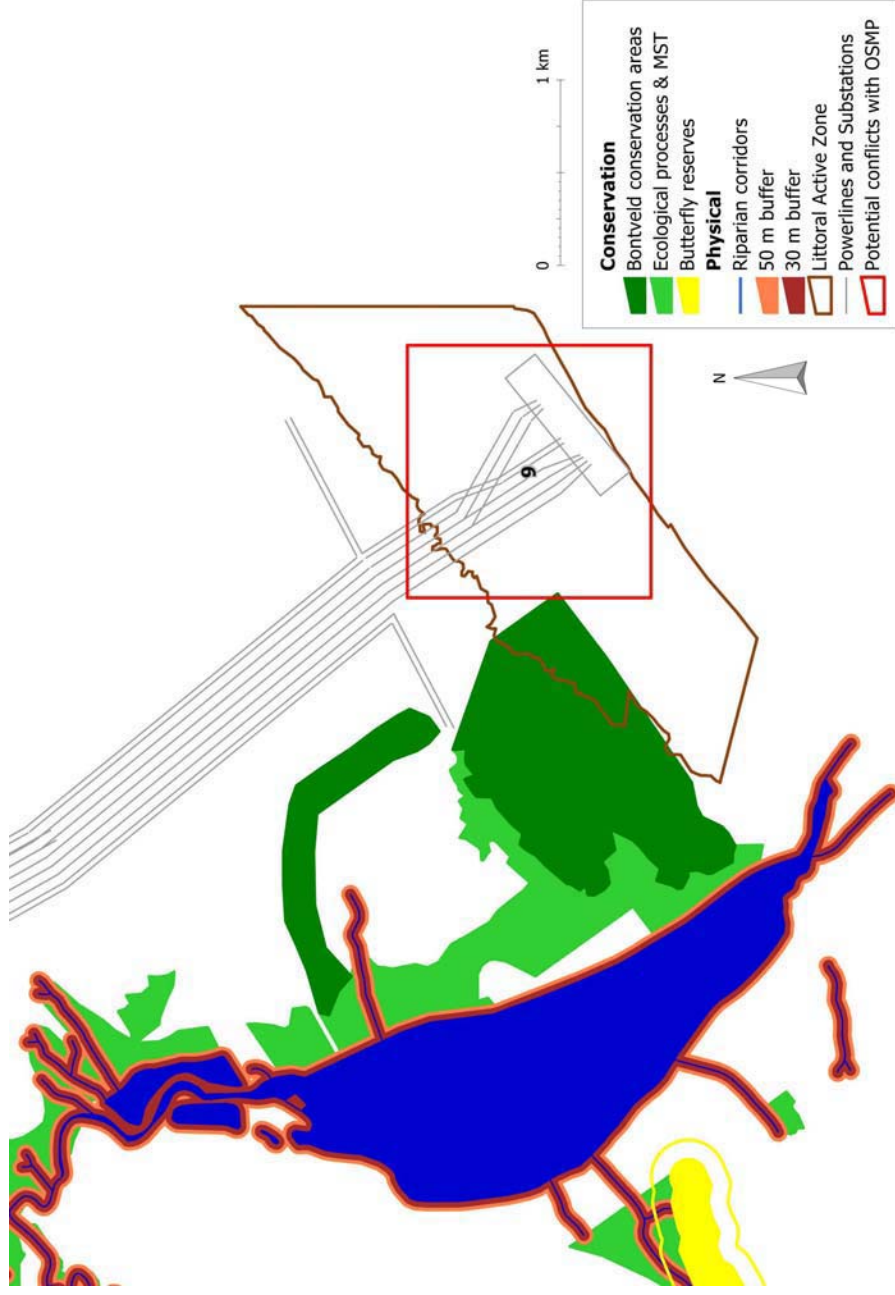


Figure 5. A map indicating the positions of problem area 9 in relation to the Coega Open Space Management Plan.

Issues of concern are as follows (indicated by the numbered red boxes in Figures 2 to 5):

1. Loss of Bontveld – whilst these footprints fall within areas demarcated for industrial development, the construction of substations will result in the permanent loss of portions of Bontveld. Substation footprints must be kept to a minimum, while species of concern must be removed or translocated to areas zoned for the conservation of Bontveld and/or landscaping purposes.
2. The transmission lines will traverse an area of Sundays Valley Thicket that forms part of the OSMP ecological corridor and linkages to the NM MOSS. No removal of vegetation must be permitted within the corridor area and structures must be placed in areas that are either degraded or are deemed by a suitably qualified Environmental Conservation Officer as having minimal impact on the corridor.
3. The transmission lines will traverse a riparian zone. The transmission lines must be sited in such a way that there is no impact on the riparian corridor.
4. The transmission line passes close to this butterfly reserve. The line must have no impact upon the reserve or 100m buffer zone. No disturbance to the reserve must be permitted during the construction and long term maintenance of the infrastructure.
5. The transmission lines will traverse an area of Sundays Valley Thicket that forms part of the OSMP ecological corridor and linkages to the NM MOSS. No removal of vegetation must be permitted within the corridor area, while infrastructure must be placed in areas that are either degraded or are deemed by a suitably qualified Environmental Conservation Officer as having minimal impact on the corridor.
6. The transmission lines will traverse a riparian zone. The lines must be placed so that there is no impact on the riparian corridor.
7. The transmission lines will traverse an area of Sundays Valley Thicket that forms part of the OSMP ecological corridor and linkages to the NM MOSS. No removal of vegetation must be permitted within the corridor area, while infrastructure must be placed in areas that are either degraded or are deemed by a suitably qualified Environmental Conservation Officer as having minimal impact on the corridor.

8. Loss of Bontveld – Even though footprints fall within areas demarcated for development, the construction of substations will result in the permanent loss of portions of Bontveld. Substation footprints must be kept to a minimum and species of concern must be removed or translocated to areas zoned for the conservation of Bontveld or for landscaping purposes.
9. Coastal Dune vegetation and critical ecosystem process areas – Any impact to these areas other than for recreational purposes is not permitted according to the Rezoning EIA.
10. Construction of access roads to establish and service the lines/substations will be associated with a loss of vegetation cover. These roads should avoid wetland areas and steep slopes wherever possible.

4. FAUNA

4.1. Conservation Status of selected Fauna

4.1.1. International Treaties

Convention on Migratory Species (Bonn Convention)

The aim of the convention is to protect migratory animals within their range of occurrence. Species of concern are listed within Appendix I or II depending on their conservation status. Appendix I covers species threatened with extinction, while Appendix II considers “...species that need or would significantly benefit from international co-operation...” (www.cms.int, downloaded 23 March 2006). The convention forms an umbrella or framework for a number of agreements, including the agreement on African-Eurasian Waterbirds. The latter agreement has not been considered in this report as a separate avifauna report has been commissioned for the environment assessment. No Appendix I species are likely to occur within the study area, while no Appendix II species are likely to be present and/or migrate to another country (e.g. Elephant, *Loxodonta africana*).

4.1.2. Red Lists

The following sources were used to determine the potential presence of Red Listed fauna within the study area:

- Butterflies (Conservation Status & Distributions - Henning & Henning, 1989; www.nu.ac.za/redlist)
- Frogs and Reptiles (CES, 2001)
- Birds (not considered as there is a separate avifauna report).
- Mammals (Conservation Status & Distributions - Friedmann & Daly, 2004)

Table 2. A summary of the key findings reported in CES (2001) with regard to the Red Listed fauna within the IDZ.

Invertebrates (Henning & Henning, 1989; Picker et al., 2002)

Two 'Rare' butterflies, namely the Coega Copper (*Aloeides clarki*) and Wineland Blue (*Lepidochrysoys bacchus*) occur within the study area (Henning & Henning, 1989; CES, 2001). Butterfly reserves have been set aside for the conservation of the former butterfly within the IDZ (Figure 2). The Wineland Blue is listed on Schedule 2 (as amended in 1976) of Ordinance 19 (1974) of the old Cape Province. The presence of the 'Vulnerable' (Picker et al., 2002) Addo Flightless Dung Beetle (*Circellium bacchus*) in the study area is unknown, although it is known to occur at Colchester (pers.obs.) close by.

Amphibians (CES, 2001)

No endemic, or species of concern is known to occur within the IDZ.

Reptiles (CES, 2001)

"The list of reptiles of special concern is very significant since it includes five endemic species (two of which are endangered), four endangered sea turtles, eight CITES-listed species banned from International Trade in Endangered Species, one rare species and four species at the periphery of their range..."

"More than a third of the species are described as relatively tolerant of disturbed environments, provided migration corridors of suitable habitat are maintained to link pristine habitats."

"The Albany adder meets all the criteria (IUCN 2000) for inclusion as Globally Endangered in the International Red List as it occurs in very low numbers, has suffered a range contraction, and the only known population is subject to obvious environmental threats...Although not recorded within the confines of the greater Coega IDZ, the species does appear to be found in association with Bontveld habitats, and the only known population is within close proximity to the Coega IDZ."

In relation to Fitzsimons longtailed seps (*Tetradactylus fitzsimonsi*): "The species may be threatened by increased fire regimes and loss of habitat. However, although the species is of conservation concern, it is not known from the Coega IDZ, and the existing habitats within the region appear unsuitable for the species."

At least one endemic and Endangered species, namely the Albany dwarf adder (*Bitis albanica*) and three other endemic species (Tasman's girdled lizard, *Cordylus tasmani*; Dwarf burrowing skink, *Scelotes anguineus* and Eastern legless skink, *Aconitias (meleagris) orientalis*) are known to occur inside or in close proximity (< 2km) to the IDZ.

Mammals (Friedmann & Daly, 2004)

Only two species regarded as Vulnerable, Endangered or Critically Endangered by Friedmann and Daly (2004) have distributions which appear to include the IDZ, namely the Black Rhino (*Diceros bicornis bicornis*) (Critically Endangered – Regional Assessment) and the Tree Hyrax (*Dendrohyrax arboreus arboreus*) (Vulnerable – Regional Assessment). Black Rhino are no longer found within the study area, while the IDZ could possibly fall within the far western extremity of the range for the Tree Hyrax. The area is therefore currently of low conservation status within the above context.

5. PRESENT ECOLOGICAL STATE

5.1. *Methods*

The Present Ecological State has been assessed in relation to the Perceived Reference State of the environment prior to European settlement in the area. The arrival of the 1820 settlers provides an approximation for the onset of this period of European settlement, although some farmers were already resident in the area during the 1700's. The extent of transformation in the environment since then has been assessed using the criteria outlined below:

Extent => Spatial extent of the transformation. Limited (3), $\leq 33\%$ of the study area; Moderate (2), $> 33\%$, but $\leq 66\%$ of the study area; Extensive (1), $> 66\%$ of the study area.

Intensity => Low (3), restoration/recovery possible without or very limited outside intervention; Moderate (2), restoration not possible, but rehabilitation possible with limited application of financial or human resources; High (1), restoration not typically possible, but rehabilitation possible with extensive application of financial and human resources.

Confidence => Low (1), based on assumptions, but no data, reports/records in the literature or experience; Moderate (2), based on limited data and/or reports/records in the literature and/or some experience; High (3), based on supporting data, reports/records in the literature or past experience.

In order to highlight the aspects that have been most and least transformed, all combined scores were given a value of 2. For example, if the score for extent is 2 (moderate), but the score for intensity is 1 (high), the combined score would be 2. In contrast if the values for intensity were the same, namely both 1, or both 3, they would be allocated these

scores respectively. The modes of the combined scores were used to determine the level of transformation of the “Ecological Processes” and “Ecosystem Services”. This approach was not followed with the “Patterns of Biodiversity”, as there were only two aspects considered.

5.2. Assumption(s)/Limitation(s)

- This approach assumes that the records/reports used are accurate.
- The approach was constrained by detailed historical biological surveys of the study area.

5.3. Assessment of the Present Ecological State

The Perceived Reference State and Present Ecological State of the study area have been summarized in Table 3 below.

Table 3. The Perceived Reference State and Present Ecological State of the study area. Impacts of unknown extent or intensity have not been scored.

PERCEIVED REFERENCE STATE	
Vegetation	See description of the vegetation in section 4. The PRS is assumed to have been very similar to that described in this segment of the report, with the exception of the impacted areas e.g. areas cleared for agricultural purposes.
Fauna	The fauna is likely to have been very similar to that found in the area today, with the exception of the presence of the larger mammalian herbivores and predators, which have now been hunted to extinction.

PRESENT ECOLOGICAL STATE						
Aspect	Extent	Intensity	Combined	Notes		
Patterns of Biodiversity	The distribution and population size of species inhabiting an area.					
Flora	2	2	1	3	2	Indigenous vegetation cover has been removed for the construction of roads, railways, buildings and other infrastructure (e.g. substations). A significant area has become heavily infested with alien vegetation (e.g. Rooikrans, <i>Acacia cyclops</i>). Indigenous plant species appear to be harvested for their medicinal value. The area is used for livestock farming (e.g. goats observed near the butterfly reserve close to Coega Hotel).
Fauna	2	3	2	3	2	All the large herbivores and predators have been lost from the study area. For example Skead (1987) reported that Black

PRESENT ECOLOGICAL STATE				
Aspect	Extent	Intensity	Combined	Notes
Ecological Processes	The interaction between species and the physical environment, inter- and intra-specific interactions.			
Barriers to gene dispersal	1	3 2	2	Rhino (<i>Diceros bicornis</i>) used to be common at Grassridge, with Buffalo (<i>Syncerus caffer</i>), Lions (<i>Panthera leo</i>) and rhino between the Coega and Swartkops rivers. Most of the small to medium-sized animals are still expected to be present. Habitat fragmentation associated with the clearing of vegetation for agricultural and other activities may be a significant barrier to gene dispersal. Roads may have formed significant barriers to gene dispersal for some flora and fauna. The erection of fences would also have prevented the movement of some fauna and hence plant propagules (i.e. as their agents of dispersal).
Corridors for gene dispersal	3	3 2	2	Fences and utility structures (e.g. transmission lines, telephone lines) that act as perches for birds may be viewed as corridors for bird mediated seed dispersal. These may not follow the dispersal routes in the PRS (e.g. they may cross drainage lines).
Geological contacts	3	3 3	3	No change anticipated over most of the study area. Roads (tared and gravel), areas covered by cement, cultivated areas, the solar salt extraction ponds and mined areas may all be regarded as changes in substrate in the study area.
Coastal dunes	3	3 2	2	The distribution and nature of the coastal dunes is expected to closely represent the reference state, apart from a major change in the vegetation cover, namely invasion by Rooikrans (<i>Acacia cyclops</i>). Invasion of the dune areas could lead to stabilization of the formerly active dunes or loss of indigenous vegetation cover on the dunes.

PRESENT ECOLOGICAL STATE

Aspect	Extent	Intensity	Combined	Notes
Climatic gradients	3	1 3	1 3	The solar salt extraction works may have increased the availability of water vapour, the availability of hygroscopic nuclei and albedo in the affected area. The nature of this impact is unknown, but may have increased the amount of rainfall in the area as a result of the some of the factors mentioned above.
Altitudinal gradients	3	3 1	3 2	No increase in absolute elevation is expected, although mining activities (e.g. brickfields) will have dramatically altered the topography and hence local slope gradients and aspects.
Rivers & wetlands	1	2 2	2 2	The solar salt extraction works is the most obvious change within the study area. Other man-made structures that would have impinged on rivers and wetlands would include inter alia weirs, road and railway bridges. Increased runoff from impervious surfaces such as roads and roofs would have altered the hydrological regime within the drainage network. There is also likely to have been a significant increase in the availability of sediment within the study area from road runoff, cultivated lands, mine spoil heaps and overgrazed areas.
Unusual/isolated substrates	3	3 1	3 2	Asphalt, roofing and cemented areas have all changed the nature of the substrates present in the study area. The impact on flora and fauna is largely unknown, although buildings and other suitable man-made structures are used by bats and birds for roosting and breeding purposes. Roadkill is likely to have affected the foraging habits of scavengers.
Fire	1	2 2	2 2	The frequency and seasonality of fires has probably changed significantly in relation to the PRS. In some instances the intensity of fires may also be greater, such as those associated

PRESENT ECOLOGICAL STATE				
Aspect	Extent	Intensity	Combined	Notes
Ecotones	1	3 2	2	with Rooikrans (<i>Acacia cyclops</i>) thickets. Habitat fragmentation and the introduction of new vegetation types (e.g. turf grass, Rooikrans thickets) is likely to have greatly increased the area covered by ecotones in relation to the PRS.
Ecosystem Services				
Carbon storage	1	3 1	2 1	Loss of vegetation cover is likely to have been offset to a limited extent by the presence of exotic vegetation such as Rooikrans and <i>Eucalyptus</i> sp. in the study area. However, the net effect is assumed to have been a decrease in the level of carbon stored in the vegetation in the study area.
Flood attenuation by wetlands.				Unknown.
Retention of contaminants, nutrients and sediments by wetlands.				Unknown.
Pest control				Insectivorous birds and parasitic invertebrates (e.g. some species of wasp) that were present in the PRS are still likely to be present, although their population sizes may be different. The extent of this difference is unknown. The control of problem plants is less certain as some phytophagous insects and vertebrates will forage on exotic plant species, but may disperse seeds or pollinate plants in the process.
Soil conservation	2	2 3	2 2	The loss of vegetation cover has probably been accompanied by accelerated erosion in some areas.
Groundwater recharge	2	2 2	1 2	Loss of vegetation cover would have decreased the level of infiltration of rainfall and hence level of groundwater

PRESENT ECOLOGICAL STATE				
Aspect	Extent	Intensity	Combined	Notes
Ecotourism potential	2	2 2	2	recharge within the study area. Exotic plants such as <i>Eucalyptus</i> sp. that are known to use a lot of water may have further exacerbated this situation. The loss of some indigenous vegetation cover, invasion by exotic plant species (e.g. Rooikrans, <i>Acacia cyclops</i>), loss of the megaherbivores and predators and presence of existing infrastructure (e.g. roads, railways, brickworks and solar salt extraction works) would all have detracted from the ecotourism potential of the area.
Medicinal plants	1	2 3	2	Medicinal plants appear to be collected from within the study area. A lady was present collecting plants during a site visit. The extent of this collecting is unknown.
Food	1	1 3	2	The value of the study area as a source of food is expected to be insignificant. The solar salt extraction works as a physical component of the landscape was not taken into consideration in this regard.
Pollination				The species of invertebrate and vertebrate pollinators present in the PRS are all expected to still be present within the study area. The size of their populations in relation to the PRS is unknown.
Fuelwood				The extent to which the study area is used as a source of fuelwood is unknown, but some collection would almost certainly take place.
Seed dispersal	1	3 2	1 2	The efficacy of bird mediated seed dispersal is probably little changed from the PRS, in contrast to those species that would have been utilized by megaherbivores such as rhino and elephant. Bush clearing and hence the loss of forage plants may have been associated with a drop in the resident

PRESENT ECOLOGICAL STATE				
Aspect	Extent	Intensity	Combined	Notes
Grazing and browsing	2	2	2	population size of some species. Goats were observed within the study area during a site visit. The area has almost certainly been used extensively for raising livestock in the past. For example, stock camps are visible in some aerial photographs adjacent to farmsteads.
Building materials				The extent to which the area has been used as a source of buildings materials, such as poles and reeds, is unknown, although residents have almost certainly be collected in the past.

The Present Ecological State in relation to the patterns of biodiversity for flora and fauna, ecological processes and ecosystem services can in each instance be considered moderately transformed.

6. ASSESMENT OF IMPACTS

6.1. Methods

The potential impacts associated with the proposed development are listed in tables 4 to 6. The impacts have been rated according to the scheme outlined below:

Extent

Widespread: Impact will extend beyond one of the following, 100 km, a quaternary catchment, or local municipality.

Neighbourhood: The impact will extend beyond the area proposed for development, but not beyond any of the following, 100 km, a quaternary catchment or local municipality.

Local: The impact will be confined to the proposed development area.

Duration

Permanent: No restoration possible, the impact is irreversible for practical purposes.

Long: > 10 years

Moderate: < 10 years

Short: < 1 year

Intensity/Magnitude

High: Most of one of the following will be lost, the habitat for a species, population of a species, or area of special interest.

Moderate: < 50 % of all of the following will be lost, the habitat for a species, population of a species, or area of special interest.

Low: The impact on any of the following is minor, the habitat for a species, population of a species, or area of special interest.

Probability

High: > 75 %

Moderate: 25 - 75 %

Low: < 25 %

Significance

High (+): The impact is likely to be of national significance.

High (-): The impact is of critical importance to the viability of the project. The impact could be a fatal flaw for the project unless successfully avoided, mitigated or offset.

Moderate (+): The impact is likely to be of regional importance (e.g. municipality).

Moderate (-): The impact is likely to be of regional importance (e.g. municipality).

Low (+): The impact is likely to be of limited importance and largely restricted to the site/study area.

Low (-): The impact is likely to be of limited importance and largely restricted to the site/study area.

Confidence

Confidence => Low (1), based on assumptions, but no data, reports/records in the literature or experience; Moderate (2), based on limited data and/or reports/records in the literature and/or some experience; High (3), based on supporting data, reports/records in the literature or past experience.

6.2. Assumption(s)/Limitation(s)

- The assessments assume the recommendations will be adopted by the project proponents.
- The assessment is based on two site visits of short duration.

6.3. Direct

The assessment of direct impacts in relation to the construction and operational phases is presented in Table 4 below. Only one impact is likely to be highly significant prior to mitigation, namely the establishment of a power plant in the LAZ. This will have to be investigated and assessed in a separate EIA for the power plant. The remaining seven impacts prior to mitigation will be either moderate (n = 2) or low (n = 6). Successful mitigation will reduce both the moderate impacts to impacts of low significance. By moving the location of the power plant inland the impact on the LAZ will be largely avoided, apart from the possible need for water from the sea for cooling purposes. The impact in the LAZ will be reduced to one of low significance in the process. However, moving the plant inland will shift the impact inland. An offset will probably have to be negotiated with environmental authorities for the establishment of the plant at a new location in the IDZ as the impacts related to the power plant will be greater than those of the transmission lines.

Table 4. Potential direct impacts associated with construction and operational phases of the proposed development.

Extent	Duration	Intensity/Magnitude	Probability	Significance	Confidence
CONSTRUCTION PHASE					
1. Loss of vegetation cover.					
Local	Permanent	Minor	High	Moderate	Moderate
Recommendation(s):	Keep physical disturbance of the substation/power plant and tower footprints to a minimum. Wherever practical trim rather than remove trees and shrubs when stringing the conductors.				
2. Loss of plant species of conservation importance.					
Local	Permanent	Minor	Low	Moderate	Low
Recommendation(s):	This is only likely to be applicable to the substation/power plant and tower footprints. Ideally, arrange for the nursery doing the plant rescue for the IDZ to be on standby when the towers are erected. Transplanting them				

	within the corridor would be the preferred option in this regard.		
3. Compaction of the soil during the construction phase.			
Local	Permanent	Minor	High
			Low
Recommendation(s):	Ensure that heavy construction vehicles stay on existing roads and tracks and avoid areas such as wetlands that are likely to have easily compactable soils.		
4. Loss of wetland areas as a result of construction of the transmission line in a river bed, floodplain, endorheic pan or other wetland area.			
Local	Permanent	Minor	Low
			Low
Recommendation(s):	No electrical infrastructure must be sited in wetland areas, although conductors may pass overhead.		
5. Alteration of the fire regime.			
Local	Short	Minor	Low
			Low
Recommendation(s):	Inform contractors and construction workers that no fires should be made and the fire risk posed by smoking. Have fire fighting measures at hand to prevent extinguish any unwanted fires.		
OPERATIONAL PHASE			
1. Loss of coastal dune cover and hence sediment supply to beaches.			
Local	Permanent	Moderate	High
			High
Recommendation(s):	Do not locate the power plant within the LAZ. Locate the plant further inland away from the LAZ. If the plant is to remain within the LAZ a full EIA will probably be required as the area appears to fall outside the IDZ and hence the scope of previous environmental studies. Similarly, while this impact has been assessed in this study, it is only relevant in relation to the termination of the line at the OCGT.		
2. Disruption of flow regime in rivers/wetlands.			
Local	Permanent	Minor	Low
			Low
Recommendation(s):	Avoid locating any towers within rivers or wetland areas. If this is done there will probably be no impact on these habitats.		
3. Alteration of the fire regime.			
Local	Permanent	Minor	Low
			Low
Recommendation(s):	Sparks from the conductors or other electrical installations may ignite veld fires. Ensure that this is taken into consideration during the design of the line and substations and, if available, counter measures put in place.		

6.4. Indirect

The assessment of indirect impacts in relation to the construction and operational phases is presented in Table 5 below. The significance of all the impacts is expected to be low prior to mitigation.

Table 5. Potential indirect impacts associated with the construction and operational phases of the project.

Extent	Duration	Intensity/Magnitude	Probability	Significance	Confidence
CONSTRUCTION PHASE					
1. Habitat fragmentation as a result of the loss of vegetation cover					
Local	Permanent	Minor	Low	Low	High
Recommendation(s): Keep removal of vegetation to a minimum.					
2. Loss of indigenous habitat for indigenous fauna.					
Local	Permanent	Minor	High	Low	High
Recommendation(s): Loss of vegetation cover implies a loss of habitat. Keep the removal of vegetation to a minimum.					
3. Reduction in the quantity of carbon stored in vegetation.					
Local	Permanent	Minor	High	Low	High
Recommendation(s): The removal of vegetation and hence plant biomass will lead to a decrease in the amount of fixed carbon in the tower footprints and in the corridor underneath the conductors. Keep the removal of vegetation to a minimum wherever possible.					
4. Increase in soil erosion as a result of the loss of vegetation cover.					
Local	Short	Minor	High	Low	High
Recommendation(s): Ensure that the loss in vegetation cover is kept to a minimum. Disturbed areas should be rehabilitated as soon as is practically possible.					
5. Harvesting of medicinal plants by construction workers.					
Local	Short	Minor	Low	Low	Low
Recommendation(s): Discourage the harvesting of medicinal plants by construction workers through a briefing session with the site foreman or the workers themselves.					
6. Harvesting of fuelwood.					

Local	Short	Minor	Moderate	Low	Moderate
Recommendation(s):	Discourage the harvesting of fuelwood by construction workers through a briefing session with the site foreman or the workers themselves.				
7. Increased mortality of terrestrial fauna associated with excavations during the construction phase.					
Local	Short	Minor	Low	Low	Moderate
Recommendation(s):	The developers should ensure that someone is responsible for checking trenches and steep sided excavations daily for any fauna that may have fallen into them. This will be particularly important after rains or if there is a shallow water table, as water filled excavations could be particularly hazardous to some fauna. This role would typically be carried out by an Environmental Control Officer.				
8. Hunting of indigenous local fauna.					
Local	Short	Minor	Moderate	Low	Moderate
Recommendation(s):	Construction workers should be informed that hunting of wild animals (with very limited exceptions) will not be allowed under the future Eastern Cape Environmental Conservation Act (now Bill). This would also be in contravention of the COEGA IDZ Environmental Management Plan (EMP), and Eskom’s generic EMP. Any acts of this nature would be against the intent of the law and hence should be discouraged.				
OPERATIONAL PHASE					
1. Barrier to gene dispersal.					
Local	Permanent	Minor	Low	Low	Low
Recommendation(s):	Fragmentation of habitat through the removal of vegetation cover may make it difficult for some plants to disperse effectively. For example, small mammals that may prefer the cover provided by thicket may not forage and hence disperse seed of their favoured plant species in open areas. The developers should ensure that the removal of vegetation is kept to a minimum.				
2. Corridor for gene dispersal.					
Local	Permanent	Minor	High	Low	High
Recommendation(s):	By perching and defecating from the towers and conductors birds will probably disperse seeds preferentially down the transmission lines e.g. Rookkrans (<i>Acacia cyclops</i>). Very difficult to practically impossible to mitigate (in relation to the spread of exotic species), but anti-perching				

	<p>devices may be deployed on the towers. Exotic vegetation must be removed from the transmission line corridor and from within substation boundaries.</p>		
3. Increase in the area available for the grazing of livestock.			
Local	Permanent	Minor	High
Recommendation(s):	Moderate	Low	High
	<p>Removal and trees and shrubs will probably increase the grazing area available to livestock. Enhancement of this benefit is not advisable as it may include removal of indigenous vegetation cover.</p>		
4. Increase in erosion on steep slopes as a result of the construction of maintenance tracks.			
Local	Permanent	Minor	Moderate
Recommendation(s):	High	Low	Moderate
	<p>Avoid establishing roads on steep slopes. Use existing roads and tracks for future maintenance of the line wherever possible. If establishment of tracks on steep slopes is unavoidable, ensure that adequate provision is made for runoff.</p>		
5. Impact of night lights on fauna in study area associated with substations (e.g. bats and nocturnally foraging birds such as owls and nightjars).			
Local	Permanent	Minor	High
Recommendation(s):	High	Low	High
	<p>None. Insects attracted to lighting are expected to attract foraging bats and other fauna.</p>		

6.5. Cumulative

The potential cumulative impacts on the environment are summarized in Table 6. One additive and two neutralizing impacts were identified.

Table 6. An assessment of the potential cumulative impacts associated with the proposed development.

CUMULATIVE IMPACTS

ADDITIVE IMPACT

1. Loss of vegetation cover for the substations, tower footprints and to a lesser extent under the conductors will compound the loss of vegetation within the IDZ to roads, buildings and other infrastructure. This additive impact would be of low significance within the context of future development in the IDZ.

NEUTRALIZING IMPACT

1. Creation of the corridor for the transmission lines free of other development. If the rest of the IDZ is eventually blanketed with development this corridor will be the only area available outside road reserves for the movement of wildlife and hence gene dispersal. It will also allow most of the indigenous vegetation that currently occurs on site to remain free of physical disturbance once the construction phase is completed. Much smaller corridors will persist in the form of road reserves within the IDZ. This should be seen as a very high, significant, positive impact, within the context of the future development of the IDZ.
2. The dispersal of exotic plants down the transmission lines by birds may be offset by the removal exotic vegetation and maintenance of the corridor by the land users or other parties.

7. CONCLUSIONS

The following can be concluded with regard to the proposed development:

- No infrastructure should be placed within the Littoral Active Zone (LAZ). This would require the relocation of the power plant to a site further inland, or to another location. Although not part of this EIA, the OCGT power plant project and this EIA are closely linked.
- The current location of the power plant in the LAZ appears to fall outside the IDZ and hence in all likelihood, the areas previously evaluated in earlier environmental assessments.
- No towers or other infrastructure must be located within wetland areas, with the exception of the conductors, as long as these address any concerns raised in the avifauna report.
- If the IDZ develops as envisaged and the corridor beneath the transmission lines is kept free from other developments, it could become a highly significant corridor for the conservation and dispersal of organisms. It would also consequently become an important component in the open space system within the IDZ.
- The endemic and Critically Endangered, *Euphorbia meloformis*, is found within Grassy Ridge Bontveld and Albany Valley Thicket in the IDZ. Great care needs to be taken to ensure its conservation.
- At least one endemic and Endangered species, namely the Albany dwarf adder (*Bitis albanica*) and three other endemic species (Tasman's girdled lizard, *Cordylus tasmani*; Dwarf burrowing skink, *Scelotes anguineus* and Eastern legless skink, *Acontias (meleagris) orientalis*) are known to occur inside or in close proximity (< 2km) to the IDZ.
- If any excavation occurs during the construction phase, these need to be monitored at frequent intervals, particularly after rains, in order to ensure there are no fatalities of inter alia, the endemic or Endangered species.

- A suitable qualified botanical specialist must assist in final placement of the infrastructure for the transmission lines in order to ensure that the impact on the vegetation, particularly in sensitive areas is minimised.
- Permits are required from the relevant authorities for the removal of species of concern as per legislative requirements.
- Species will require translocation during construction phase. The relevant parties involved in relocating plants for the Coega IDZ must be contacted and given sufficient time to locate, rescue and relocate plants before construction of the power lines and substations commences.
- No roads must be constructed or vegetation cleared in areas demarcated as primary networks in the Open Space Management Plan.
- No persons must enter demarcated sensitive areas such as the butterfly reserves and other primary network areas during construction and maintenance of the transmission lines and substations, wherever practically possible.
- The placement of towers must occur outside of areas demarcated as primary networks (including vegetation and Riparian Corridors) in the Open Space Management plan.
- Removal and follow-up treatment of alien invasive plants must take place as per the requirements of CARA.
- General recommendations applicable to the Coega IDZ EIA and Coega IDZ Open Space Management Plan must be honoured.

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APPENDIX F
AVIFAUNAL STUDY



Endangered Wildlife Trust

www.ewt.org.za

**Bird Impact Assessment Study
Scoping Report
Coega Electrification Project
April 2006**

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EXECUTIVE SUMMARY

Eskom propose to construct a number of new transmission and distribution power lines and associated substations in the Coega Industrial Development Zone. The EWT was appointed to conduct a specialist avifaunal impact assessment as part of the overall EIA.

The following are the impacts assessed to be of MEDIUM or greater “magnitude and significance” and recommended mitigation measures:

Collision with overhead cables:

Impacts:

- Cape Cormorant in the area close to the Power Station Substation (see FIGURE 5)
- Greater Flamingo and Lesser Flamingo, particularly at night on the section of line between the N2 and the Gas Power Station Substation (see FIGURE 5)
- Peregrine & Lanner Falcon (see FIGURE 5) in the area close to the Gas Power Station Substation
- Assorted non Red Data water bird species in close proximity to water (see FIGURE 5)

Mitigation: The day time collision risk is likely to be “self mitigating” due to the presence of so many lines together. This should greatly increase the visibility of the lines to birds in the area. No additional marking of the line is recommended. The nocturnal collision risk involving the flamingoes is however obviously different. This impact would normally be mitigated through marking the line with “bird lights”. However in this study area, where the surrounding area is soon to be developed to such a large extent it is not believed that this is necessary at this stage. It is rather recommended that thorough monitoring (atleast once a month) of the entire line be carried out, starting as soon as the conductors and earth wires are strung during construction. If collision mortalities are detected then the relevant sections of line will have to be marked with bird lights immediately. Marking will need to be done on the two outer 400kV lines.

Electrocution on pylons/towers:

Impacts:

- Assorted non Red Data eagles and herons – depending on the exact tower structure used for the 132kV line, which has yet to be finalized by Eskom.

Mitigation: Once the tower structures are finalized for the 132kV lines, EWT will need an opportunity to comment on whether the structure poses an electrocution risk or not.

Disturbance:

Impacts:

- Damara Tern and African Black Oystercatcher in dune areas (see FIGURE 5)
- Half-collared Kingfisher in riparian or riverine areas (see FIGURE 5)

Mitigation: Construction and maintenance of both the overhead lines and the Power Station Substation will result in disturbance of avifauna particularly in the dune fields, and to a lesser

extent in the riparian areas. Firstly it is recommended that if possible the dune fields area be avoided altogether, although if the Gas Power Station is situated right on the coast, it will probably not be possible. Failing that, it is recommended that all construction and maintenance activities be undertaken in conformance with generally accepted environmental best practice guidelines, in order to minimize the impact on avifauna. Activities such as driving and earth moving in the dune area should be kept to an absolute minimum. These last two points would apply to the riparian areas as well.

Whilst the Gas Power Station itself falls outside of the scope of this study, this will potentially also have a large effect on the birds of the area, and it is highly recommended that a specialist avifaunal impact study be conducted as part of the EIA for this development.

Habitat destruction:

Impacts:

- Damara Tern and African Black Oystercatcher in dune areas (see FIGURE 5)

Mitigation: Same as for disturbance above.

Impact on quality of supply:

Impacts:

- Assorted non Red Data eagle species, ibises, corvids and herons – depending on the exact tower structure used, which has yet to be finalized by Eskom

Mitigation: Once the tower structures for both lines are finalized, EWT will need an opportunity to examine the technical drawings and determine whether faulting due to birds is likely. If it is anticipated to be a problem, EWT will provide suitable recommendations on how to mitigate.

1. INTRODUCTION

1.1 Background to the current study

Eskom plan to install transmission and distribution lines, electrical substations and related infrastructure within designated areas of the Coega Industrial Development Zone near Port Elizabeth. Eyethu Engineers were appointed as the main consultants to conduct the EIA for the project, and subsequently appointed the Endangered Wildlife Trust (EWT) to carry out the specialist avifaunal impact assessment.

The specific proposed activities are as follows:

- 1) Structural changes and upgrading of the existing Grassridge Substation
- 2) Construction of a new substation called Dedisa in the IDZ, including a micro wave tower for telecoms and operation.
- 3) Construction of a new substation at the proposed aluminium smelter site, including a micro wave tower for telecoms and operation.
- 4) Construction of a new substation at the proposed Gas Power Station site, including a micro wave tower for telecoms and operation.
- 5) Construction of 3 x 400kV lines connecting the existing Grassridge Substation and the new Dedisa Substation over a distance of approximately 6 kms.
- 6) Construction of 1 x 400kV line connecting the existing 220kV traction line (which will be upgraded) to the new Dedisa Substation - a distance of approximately 2.5 kms.
- 7) Construction of 2 x 132kV lines between Grassridge Substation and the new Dedisa Substation - a distance of approximately 6 kms.
- 8) Construction of 2 x 400kV lines and 2 x 132kV lines between the new Dedisa Substation and the new Smelter Substation - a distance of approximately 4 kms.
- 9) Construction of 2 x 400kV lines between the new Power Station Substation and the new Smelter Substation - a distance of approximately 9 kms.
- 10) Construction of 3 x 400kV, and 4 x 132kV lines between the new Dedisa Substation and the new Power Station Substation - a distance of approximately 7 kms.
- 11) Construction of 1 x 400kV and 2 x 132kV lines between the new Dedisa Substation in a north easterly direction to the eastern boundary of the IDZ a distance of approximately 3 kms.

There are no alternatives for the specific activities of this project as the infrastructure corridors have been pre determined during the planning process for the Coega IDZ. The layout of the above described list of new installations can be viewed below in FIGURE 1.

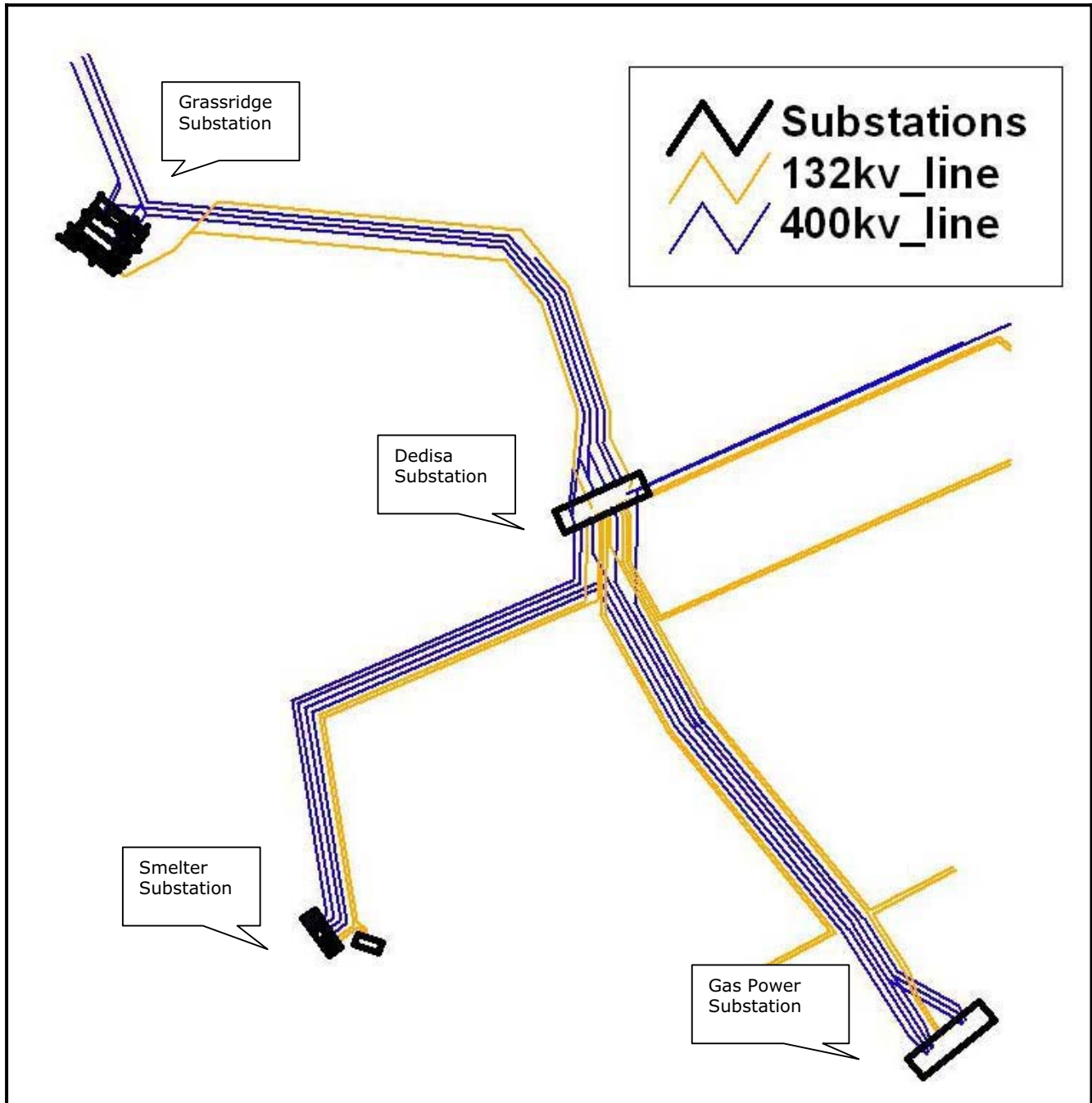


FIGURE 1 – Layout of the proposed new installations (shape files obtained from Eyethu Engineers)

1.2 Terms of reference

The terms of reference for the EWT study, as per the original quotation were as follows:

- Mapping of sensitive areas
- Description of existing environment, bird communities, micro habitats
- List and describe expected impacts
- Highlight and discuss gaps in baseline data

- Assessment and evaluation of impacts
- Recommend relevant mitigation measures
- Indicate a monitoring program if necessary

1.3 Sources of information

The study made use of the following data sources:

- Bird distribution data of The Atlas of southern African birds (Harrison *et al*, 1997), obtained from the Avian Demography Unit of the University of Cape Town, in order to ascertain which bird species occur in the study area. A data set was obtained for the square 3325DC, which is combined with 3425BA by the bird atlas project. Although the study area also falls within the square 3325DA. It is felt that the atlas data for 3325DC is a better reflection of the study area as it includes the estuary and coastal dune areas which are critical to this study.
- The conservation status of all bird species occurring in the aforementioned quarter degree squares was then determined with the use of The Eskom Red Data book of birds of South Africa, Lesotho and Swaziland (Barnes, 2000).
- The power line bird mortality incident database of the Eskom/Endangered Wildlife Trust Strategic Partnership (1996 to present) was consulted to determine which of the species occurring in the study area are typically impacted upon by power lines and the extent to which they are impacted on.
- The experience of the author in investigating bird mortalities on existing power lines across South Africa since 1999 was also used extensively.
- A description of the vegetation types occurring in the study area was obtained from The Atlas of Southern African birds (Harrison *et al*, 1997).
- Information on the micro habitat level was obtained first hand through the field trip which involved flying the study area with helicopter.
- The field investigation enabled the acquisition of a first hand perspective of the study area and any relevant issues.
- The report "The Important Bird Areas of Southern Africa" (Barnes 1998) was extensively reviewed in order to obtain background information on bird abundance and distribution on the broader area.

1.4 Assumptions & limitations

- This study made the major assumption that the development proposed for the Coega Industrial Development Zone will in fact go ahead as planned. This will mean that most of the proposed power line length will run through developed industrial type areas. If for any reason this proposed development does not go ahead, and the study area remains relatively untransformed, this will affect the conclusions of this study significantly.
- This study made the assumption that the sources of information discussed above are reliable.

- No long term, verified data of species distribution on the *micro habitat* level along the proposed power line route exists, except what was observed during the field visit.

General comment: Predictions in this study are based on experience of these and similar bird species in different parts of South Africa. Bird behaviour can not be reduced to formulas that will hold true under all circumstances. However, power line impacts can be predicted with a fair amount of certainty, based on experience gained by the authors through the investigation of more than 400 localities in southern Africa where birds have interacted with power lines since 1996.

2. DESCRIPTION OF BASELINE CONDITIONS

2.1 Vegetation description

It is widely accepted within the ornithological community that vegetation structure is more critical in determining bird habitat, than the actual plant species composition (in Harrison *et al* 1997). The description of vegetation presented in this study therefore concentrates on factors relevant to the bird species present, and is not an exhaustive list of plant species present.

The following description of the vegetation types makes extensive use of information presented in the Atlas of southern African birds (Harrison *et al*, 1997). This source presents a vegetation classification intermediate between that of Acocks' 70 "Veld types" (1953) and Rutherford & Westfall's seven "biomes" (1986). It is important to note that no new vegetation unit boundaries were created - use was made only of previously published data. TABLE 1 shows that 3325DC is split more or less evenly between "fynbos" (56%) and "valley bushveld" (44%).

TABLE 1 – Vegetation composition of 3325DC & 3425BA (Harrison *et al* 1997)

Biome	Vegetation type	% composition
Fynbos	Fynbos	56
Woodland	Valley bushveld	44

The vegetation in the study area has been assessed in detail by other studies pertaining to the proposed electrification project. Of particular interest is the "Bontveld" which is a form of thicket vegetation that has been previously identified as being highly sensitive. Remnant patches of this remain in the broader study area and two areas have been identified for its conservation within the Industrial Development Zone (IDZ) (FIGURE 2). One is situated within the Core Development Area just west of the proposed Power Station substation, and the other is south east of Grassridge Substation in the area just south of the planned airport.

It is anticipated that much of the study area will be transformed and developed for the IDZ. The layout of the remaining open areas can be seen in FIGURE 2 under "OSMP". Some areas such as the riparian areas and ecological corridors will remain and the proposed power lines cross these areas in several places. An exhaustive discussion of the vegetation currently present in the study

area is therefore not considered necessary. For the purposes of this study then, more emphasis has been placed on what will remain in terms of habitat for avifauna, than what is currently present.

To this end, the Coega IDZ Open Space Management Plan layout map was obtained from Illgner & Pote (2006) and carefully examined. This plan should give an indication of what will remain after the IDZ is developed as planned.

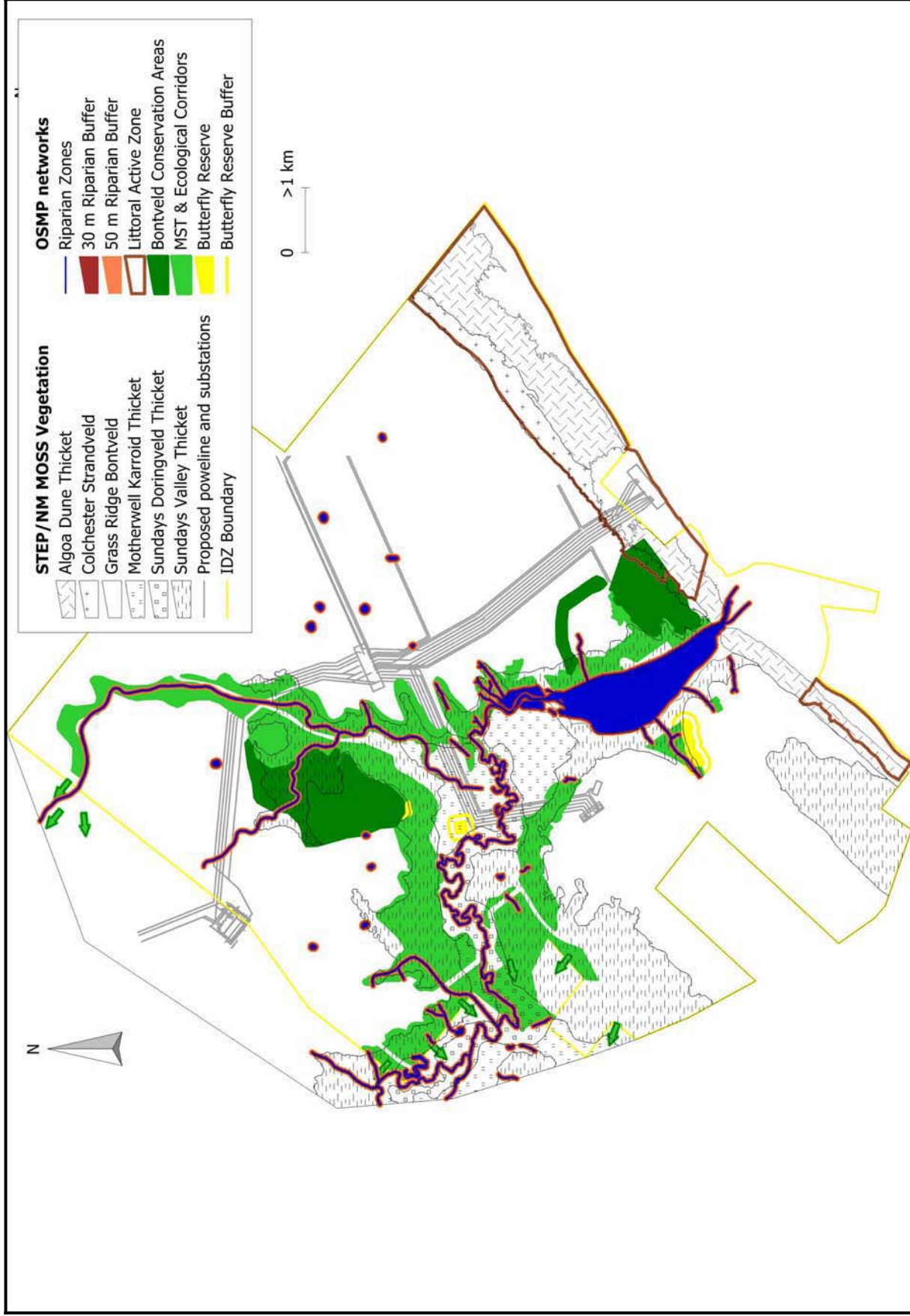


FIGURE 2 – Layout of the Industrial Development Zone Open Space Management Plan – map obtained from Illgner & Pote (2006)

2.2 Bird micro habitats

Whilst much of the bird species distribution in the study area could normally be explained in terms of broad vegetation descriptions, there are many differences in bird species distribution and density that correspond to differences in habitat at the micro level. These “bird micro habitats” are evident at a much smaller spatial scale than the broader vegetation types or biomes and are determined by factors such as land use, vegetation and manmade infrastructure. They can largely only be identified through a combination of field investigation and experience and it is therefore extremely important to visit the study area first hand.

Since much of the natural vegetation currently present in the study area will be transformed as discussed above, the following description of micro habitats that will remain available to birds after the proposed transformation is all the more relevant. The bird micro habitats described below were identified during the field investigation. Examples can be seen in APPENDIX A and the positioning of some of them in the study area can be seen in FIGURE 2 above. Species likely to utilize these micro habitats can be seen in TABLE 2.

2.2.1 Rivers/drainage lines

Most rivers in southern Africa are in the east and extreme south, in the higher rainfall areas. Thirteen species of water bird are mostly restricted to riverine habitat in southern Africa. The map distribution of these species correlates with the river courses in southern Africa. In this study area, several smallish streams were identified. These streams serve as important habitat for some species as well as important flight paths for many bird species even when dry.

2.2.2 Estuary

Estuaries are coastal wetland systems typically associated with river mouths. They represent the interface between freshwater and salt water systems. Most estuaries occur on the east coast of South Africa. In this study area the Coega River estuary is of great importance to a number of bird species including the Red Data species shown in TABLE 2.

2.2.3 Salt works

Salt works are an important type of artificial wetland. Species that benefit from these areas are Chestnut-banded Plover and the Greater and Lesser Flamingoes. Although the salt works at Coega will apparently be discontinued when the full IDZ development takes place, it seems likely that the physical characteristics (ie extensive shallow water areas) of the site will not be altered significantly meaning that it will continue to represent important habitat to these bird species.

2.2.4 Shoreline

The coast line of South Africa represents the interface between land and sea and is characterized by an exposed shoreline with strong wave action. The average tidal range is 1 metre so the inter-tidal zone is relatively narrow. There are relatively few bays providing sheltered shorelines along the coast. In this study area the coast line consists mainly of sandy beaches. Although the shore itself will not be traversed by the proposed power lines, its close proximity will influence the presence, abundance and movement of various bird species and so is relevant to this study.

2.2.5 Natural vegetation – bontveld, fynbos, remnant valley bushveld

This has been discussed above under vegetation description – areas of natural vegetation that will remain once the IDZ is developed can be seen in FIGURE 2.

2.2.6 Coastal Dune Area

This is the area immediately above or inland of the high water mark. It is currently earmarked for a “low intensity recreation area” with boardwalks, trails and look out spots. It appears however that this would clash with the construction of the proposed 9 overhead power lines supplying the Gas Power Station. This area is likely to be used by some Red Data species, particularly for breeding – as shown in TABLE 2 below.

Tinley (1985) had the following to say about this area, often called the Littoral Active Zone in Illgner & Pote (2006) - "Roads, railways, bridges, powerlines, parking lots, houses and any other immovable structure must not be placed within reach of the littoral active zone." This more or less clarifies the sensitivity of this micro habitat in terms of broader ecology, which would obviously include avifauna.

2.3 Bird species present in the study area

TABLE 2 below shows the Red Data bird species reported for 3325DC (Harrison *et al* 1997). The report rates are essentially a percentage of the number of counts conducted in the square that recorded that particular species. A report rate of 0 means that the species was recorded in the square but not sufficiently to constitute a 1 % report rate.

A total of 32 Red Data species were recorded, including two “endangered”, eight “vulnerable” and 22 “near threatened”. In addition, the White Stork was included as although it is not a Red Data species, it is protected internationally under the Bonn Convention on Migratory Species. The square was extremely well counted during the atlas project – number of cards submitted is 843, and this revealed a total of 325 species.

TABLE 2 – Report rates for Red Data bird species recorded in 3325DC & 3425BA (Harrison *et al* 1997)

Species	Cons Status	Micro habitat	Report rate
# cards			843
# species			325
ROSEATE TERN	E	Marine – may occur on mainland	3
DAMARA TERN	E	Marine – breeds in dunefields	1
JACKASS PENGUIN (AFRICAN PENGUIN)	V	Marine – seldom on mainland	5
SHY ALBATROSS	V	Marine – mostly offshore	0
CAPE GANNET	V	Marine – seldom mainland	18
CAPE VULTURE	V	Grasslands	0
MARTIAL EAGLE	V	Woodland	0
AFRICAN MARSH HARRIER	V	Wetland, grassland	2
LESSER KESTREL	V	Grassland	0
BLUE CRANE	V	Grassland, wetland	2
BLACK-BROWED ALBATROSS	NT	Marine – mostly offshore	0
YELLOW-NOSED ALBATROSS	NT	Marine – mostly offshore	0
NORTHERN GIANT PETREL	NT	Marine – mostly offshore	0
WHITE-CHINNED PETREL	NT	Marine – breeds on islands	2
WHITE PELICAN	NT	Estuary	0
CAPE CORMORANT	NT	Marine, beach, estuary, salt works	26
BLACK STORK	NT	Estuary, river	8
YELLOW-BILLED STORK	NT	Estuary, river	2
GREATER FLAMINGO	NT	Estuary, salt works	22
LESSER FLAMINGO	NT	Estuary, salt works	14
SECRETARYBIRD	NT	Grassland, woodland	0
BLACK HARRIER	NT	Wetland, grassland, fynbos	1
PEREGRINE FALCON	NT	Grassland, may hunt on shore & in coastal dunes	2
LANNER FALCON	NT	Grassland, may hunt on shore & in coastal dune areas	9
PAINTED SNIPE	NT	Wetland	0
AFRICAN BLACK OYSTERCATCHER	NT	Coastal, beach, estuary	29
CHESTNUT-BANDED PLOVER	NT	Salt works, estuary	0
BLACK-WINGED PLOVER	NT	Grassland	0
CASPIAN TERN	NT	Beach, estuary, salt works	19
HALF-COLLARED KINGFISHER	NT	Riverine	5
KNYSNA WOODPECKER	NT	Forest	5

BUSH BLACKCAP	NT	Forest	0
WHITE STORK	BONN	Wetland, riparian	2

E = Endangered

V = Vulnerable

NT = Near threatened

BONN = Protected internationally under the Bonn Convention on Migratory Species

The species in TABLE 2 above can be separated into those larger species which may interact with the proposed power lines “directly” through collision or electrocution as well as “indirectly” through disturbance and habitat destruction, - and those smaller species which are likely to interact only through “indirect” mechanisms. Taking all of these factors (and others) into account, the species of most concern in this study at a desk top level, before examining the actual impacts, are the following: Damara Tern, Cape Cormorant, Greater Flamingo, Lesser Flamingo, Peregrine Falcon, Lanner Falcon, African Black Oystercatcher.

In addition to the report rate and conservation status of the species, a brief description of the where the species will most likely be found is also contained in TABLE 2. A large number of the species in TABLE 2 are essentially marine species and are unlikely to be found in the study area, - such as the albatrosses and petrels. The species which may occur in the study area, and have a report rate > 0, have been shaded in TABLE 2. These are the species that are contained in APPENDIX B, where the impacts of the proposed power lines on each individual species is assessed and described in detail according to a set of standard criteria (shown in APPENDIX E).

In addition to the Red Data species presented in TABLE 2, the impact of the proposed power line infrastructure on the non Red Data species recorded in the study area has also been assessed and described in APPENDIX C, on the basis of broad groupings of species.

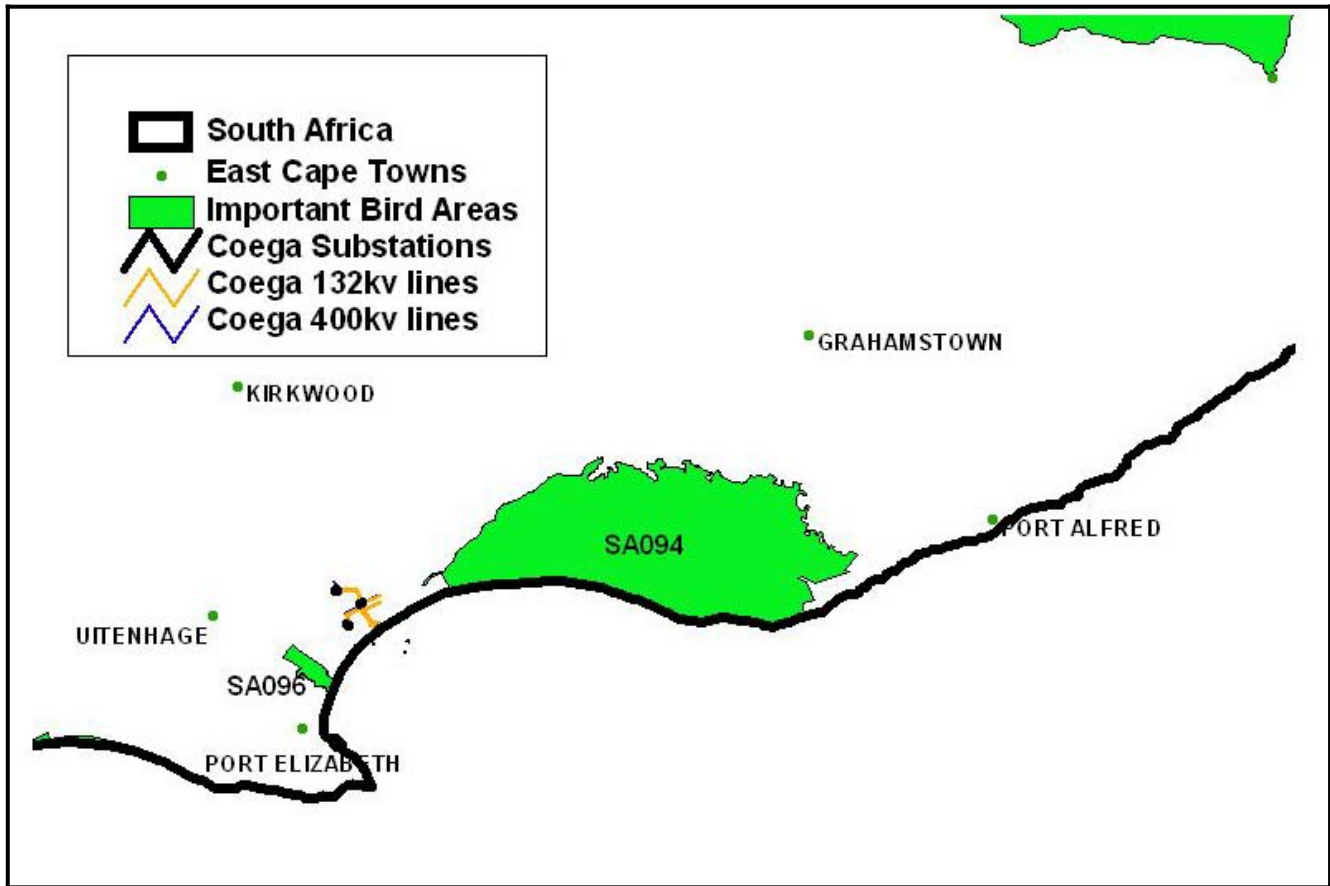


FIGURE 3 – Position of Important Bird Areas (Barnes 1998) relative to the Coega study area

Two Important Bird Areas (IBA) - SA094 Alexandria Coastal Belt and SA096 Swartkops Estuary, Redhouse and Chatty Saltpans exist relatively close to the Coega area (see FIGURE 3). Descriptions of the avifauna present at these sites, and the rationale behind their declaration as IBA's therefore bears relevance to the current study.

SA094 is stated to hold approximately 17% of South Africa's breeding population of Damara Tern, and 2% of the global breeding population of African Black Oystercatcher on the unvegetated dunes. The open beaches and dunes hold large numbers of waders in summer, which are extensively hunted by Peregrine and Lanner Falcons. The area in the vicinity of the proposed Gas Power Station is relatively similar to that habitat within SA094, so it seems safe to assume that the above information could equally apply to the current study area.

SA096 (which comprises the Swartkops estuary itself and salt pans) is similarly important for species such as African Black Oystercatcher, White-breasted Cormorant, Kelp Gull, Caspian Tern, Grey-headed Gull to mention only a few. Greater and Lesser Flamingo use the area extensively with up to 504 Lesser and 1004 Greater Flamingoes being recorded to date (Barnes 1998). Once again much of this information could be useful to the current study. Of particular importance is the presence of flamingoes as this means that they will in all likelihood move between this site (Swartkops Estuary) and the Coega Estuary.

3. PREDICTIVE METHODS

The following methods were employed in predicting the impacts of the proposed power line on birds:

- A 1:50 000 map of the study area was obtained showing existing infrastructure and the proposed alignments. This was used as far as possible in order to identify potential sensitive areas along the corridors e.g. river crossings, wetlands, dams etc.
- The Atlas of southern African Birds (ASAB) (Harrison *et al* 1997) species lists and vegetation classifications for 3325DC & 3425BA, within which the alternatives are located were obtained from the Avian Demography Unit at the University of Cape Town. These were used to determine which power line sensitive species were recorded in the area during the Atlas period, and which species could potentially occur there in future.
- The area was visited for a few hours to obtain a first-hand perspective of the proposed routes and birdlife. The area was flown by helicopter to obtain an aerial view.
- The impacts were predicted on the basis of extensive experience since 1996 in gathering and analysing data on wildlife impacts with power lines throughout southern Africa (see van Rooyen & Ledger 1999 for an overview of methodology), supplemented with local knowledge and first hand data.

4. EVALUATION OF IMPACTS

4.1 Generic description of impacts

Because of their size and prominence, electrical infrastructures constitute an important interface between wildlife and man. Negative interactions between wildlife and electricity structures take many forms, but two common problems in southern Africa are electrocution of birds (and other animals) and birds colliding with power lines. (Ledger & Annegarn 1981; Ledger 1983; Ledger 1984; Hobbs & Ledger 1986a; Hobbs & Ledger 1986b; Ledger *et.al.* 1992; Verdoorn 1996; Kruger & Van Rooyen 1998; Van Rooyen 1998; Kruger 1999; Van Rooyen 1999; Van Rooyen 2000). Other problems are electrical faults caused by bird excreta when roosting or breeding on electricity infrastructure, (Van Rooyen & Taylor 1999) and disturbance and habitat destruction during construction and maintenance activities.

Electrocutions

Electrocution of birds on overhead lines is an emotional issue as well as an important cause of unnatural mortality of raptors and storks. It has attracted plenty of attention in Europe, USA and South Africa (APLIC 1994; van Rooyen & Ledger 1999). However, in the context of overhead lines above 132 kV, electrocutions are not a major issue. Electrocution refers to the scenario where a bird is perched or attempts to perch on the electrical structure and causes an electrical short circuit by physically bridging the air gap between live components and/or live and earthed components (van Rooyen 2004). Due to the large size of the clearances on most overhead lines of above

132kV, electrocutions are generally ruled out as even the largest birds cannot physically bridge the gap between dangerous components. In fact, transmission lines have proven to be beneficial to many birds, including species such as Martial Eagles *Polemaetus bellicosus*, Tawny Eagles *Aquila rapax*, African White-backed Vultures *Gyps africanus*, and even occasionally Verreaux's Eagles *Aquila verreauxii* by providing safe nesting and roosting sites in areas where suitable natural alternatives are scarce (van Rooyen 2004). Cape Vultures have also taken to roosting on power lines in certain areas in large numbers (van Rooyen 2004a), while Lappet-faced Vultures are also known to using power lines as roosts, especially in areas where large trees are scarce (pers.obs.).

Collisions

Collisions are the biggest single threat posed by transmission lines to birds in southern Africa (van Rooyen 2004). Most heavily impacted upon are bustards, storks, cranes and various species of water birds. These species are mostly heavy-bodied birds with limited maneuverability, which makes it difficult for them to take the necessary evasive action to avoid colliding with power lines (van Rooyen 2004, Anderson 2001).

Unfortunately, many of the collision sensitive species are considered threatened in southern Africa. FIGURE 4 below shows the number of collisions reported per species on transmission lines from August 1996 to present (EWT Database). Most of the heavily affected species are Red Data species. It should be noted that these are only the reported mortalities, it is suspected that a large number of mortalities go unreported.

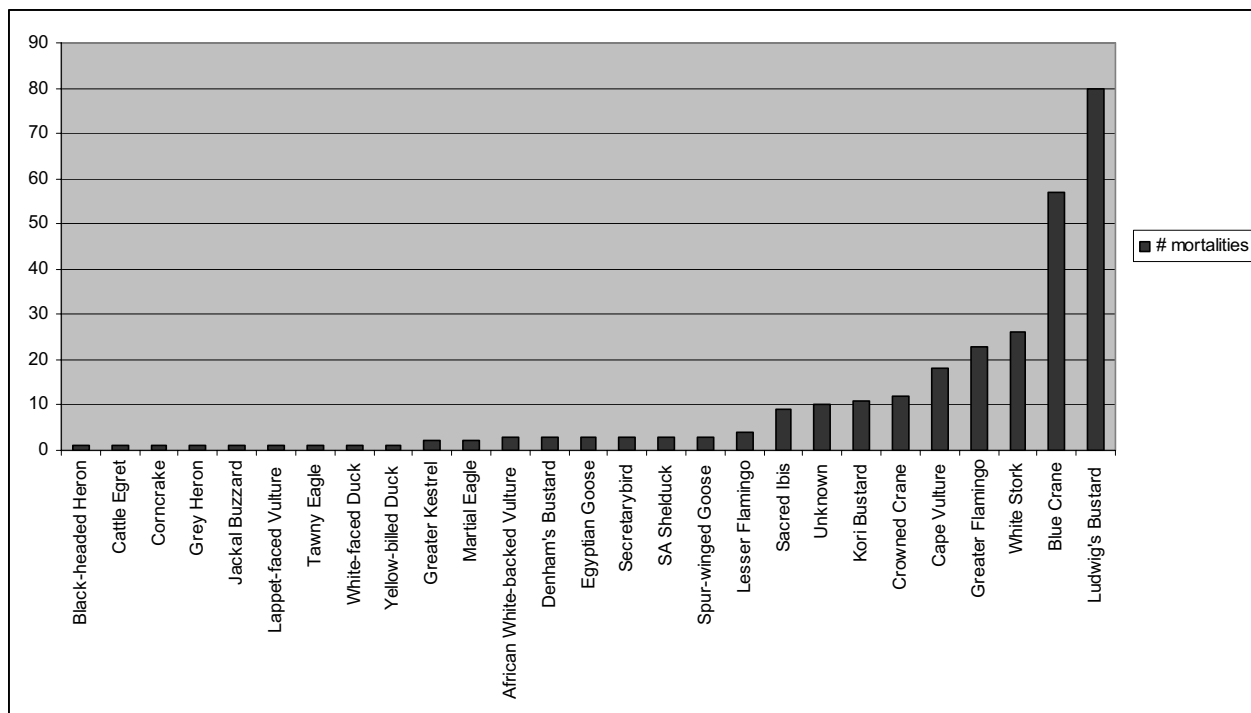


FIGURE 4 – Number of reported collisions per species on transmission lines from August 1996 to the present (EWT Database).

The Red Data species vulnerable to power line collisions are generally long living, slow reproducing species under natural conditions. Using computer modeling, the South African Crane Working Group recently estimated that an annual mortality rate of 150 adult Blue Cranes could reduce the eastern population of Blue Cranes (app. 2000 individuals in Mpumalanga and KwaZulu-Natal) by 90% by the end of the 21st century (McCann *et al* 2001). At that stage the population would be functionally extinct.

From the figures quoted above, it is clear that power lines are a major contributory cause of avian mortality among power line sensitive species, especially Red Data species. Furthermore, the cumulative effects of power lines and other sources of unnatural mortality might only manifest itself decades later, when it might be too late to reverse the trend. It is therefore imperative to reduce any form of unnatural mortality in these species, regardless of how insignificant it might seem at the present moment in time.

FIGURE 4 shows that the Greater Flamingo currently has the 4th highest number (23) of reported mortalities through collision (EWT Database) and the Lesser Flamingo lies 10th (4). These two species are highly vulnerable to collision with overhead lines – particularly due to their habit of migrating and flying at night.

The Peregrine and Lanner Falcon are also vulnerable to collision – despite there not having been recorded mortalities in FIGURE 4 (this may be due to low detection rates for such a small species). This is predominantly due to their incredibly high speed flight during hunting (stooping) which makes them extremely vulnerable to any obstructions in their path, and they are also 100% focused on the prey at this time.

Habitat destruction

During the construction phase and maintenance of power lines and associated infrastructure, some habitat destruction and alteration inevitably takes place. This happens with the construction of access roads, and the clearing of servitudes. Servitudes have to be cleared of excess vegetation at regular intervals in order to allow access to the line for maintenance, to prevent vegetation from intruding into the legally prescribed clearance gap between the ground and the conductors and to minimize the risk of fire under the line which can result in electrical flashovers.

In this study area, sensitive areas are the riparian areas (already identified by FIGURE 2 as buffer areas) and the coastal dune areas. The Grassridge, Dedisa and Smelter Substations are on relatively degraded sites and so habitat destruction will not be significant. The Gas Power Station Substation is however in a sensitive area and habitat destruction will be considered further below.

Disturbance

Activities during the construction and maintenance phases may have an impact on birds breeding, foraging and roosting in or in close proximity to the servitude. Again the most sensitive areas are the riparian areas and the coastal dune fields. In terms of the substations, again the only sensitive one is the Gas Power Station Substation.

Impact of birds on the quality of electrical supply

Through perching, roosting and nesting on power line towers or on infrastructure at substations, many of the larger bird species can cause electrical faults through their faeces, and nesting material. At this stage the tower structures for the lines have not been finalized by Eskom. Indications are that they will be self supporting towers for both size lines. Assessment of the risk of birds impacting on quality of supply will only be possible once the exact tower structure is finalised.

Impact of power lines on seed dispersal by birds

This is not an impact of the proposed activities on avifauna. It is rather an impact of the proposed activities on the distribution and abundance of various vegetation types and plant species, and the ecological functions that are associated. Birds are simply the mechanism through which this impact functions. It is anticipated that due to numerous bird species habit of perching on power lines – both towers and conductors – this will result in some increased seed dispersal into the areas below the lines or the servitudes. This may result in an aggregation of certain plant species (possibly alien species) in the Eskom servitudes. The significance of this impact has been assessed in the Ecological Specialist Study for this project and is not discussed further in this study.

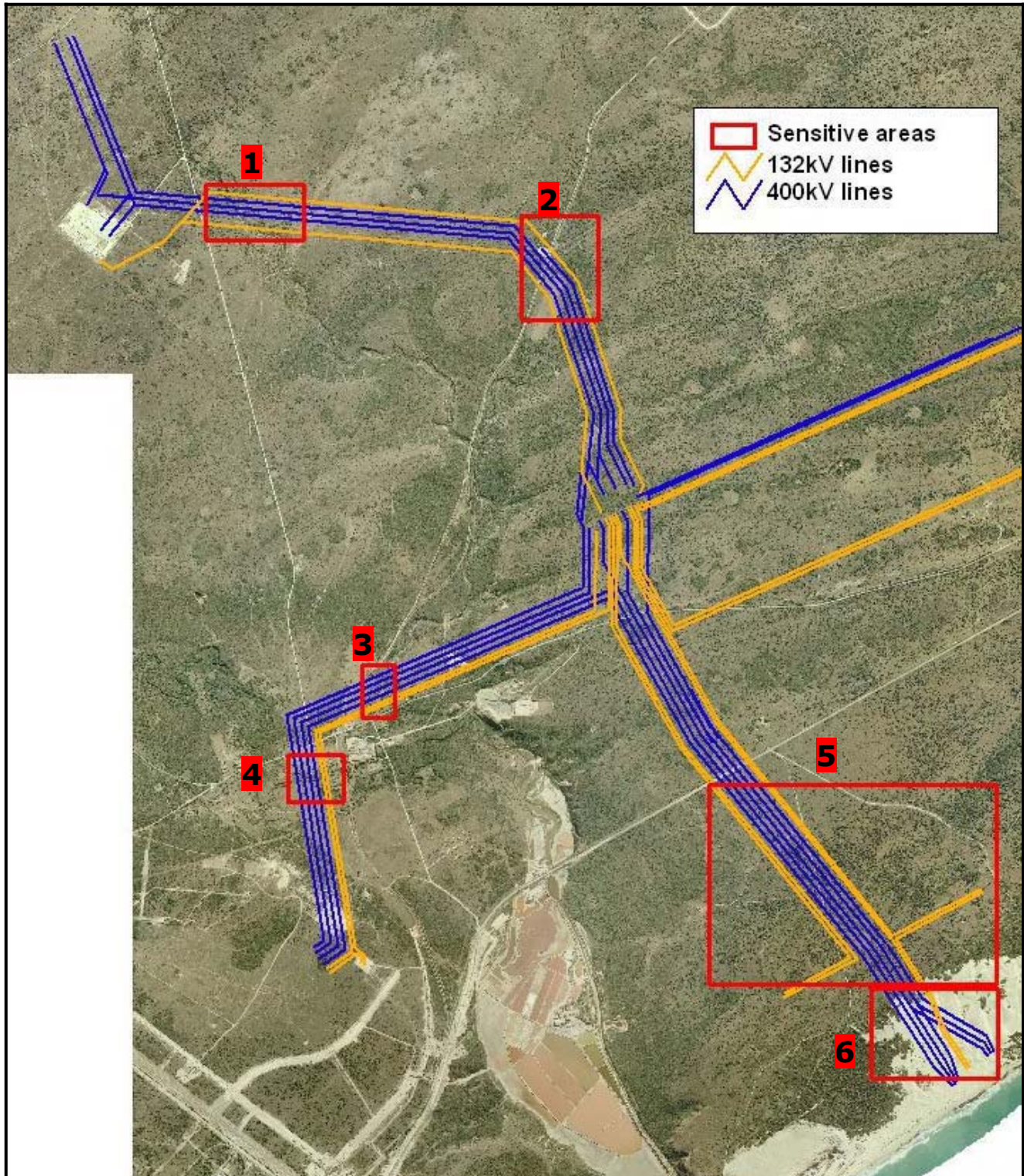


FIGURE 5 – Position of sensitive areas in the study area in terms of avian interactions with proposed power lines

Sensitive area 1 – 4: Stream crossing, riparian area. Collision and disturbance of various species will be a concern

Sensitive area 5: This section of line has been identified as a collision risk for flamingoes, it is approximately 2.4km from the estuary and salt works where the flamingoes forage. The relevant length of line is approximately 2.3km long, stretching from the N2 highway to the start of the dune fields section.

Sensitive area 6: This is the coastal dune fields area. It is extremely sensitive in terms of disturbance and habitat destruction, and also a possible collision risk involving species such as Peregrine and Lanner Falcons.

4.2 Evaluation of expected impacts on bird species in this study area & suggested mitigation measures

Generally speaking, it is unavoidable that birds get killed through interaction with infrastructure, including power lines, despite the best possible mitigation measures. It is therefore important to direct risk or impact assessments and mitigation efforts towards species that have a high biological significance, in order to achieve maximum results with the available resources at hand. A pure scientific approach would only consider the effects of deaths on the sustainability of the population, but society places other values on certain species, e.g. aesthetic or commercial, which cannot be accounted for in a pure scientific approach.

The following are the impacts assessed to be of MEDIUM or greater "magnitude and significance" in APPENDICES B & C:

Collision with overhead cables:

Impacts:

- Cape Cormorant in the area close to the Power Station Substation (see FIGURE 5)
- Greater Flamingo and Lesser Flamingo, particularly at night on the section of line between the N2 and the Gas Power Station Substation (see FIGURE 5)
- Peregrine & Lanner Falcon (see FIGURE 5) in the area close to the Gas Power Station Substation
- Assorted non Red Data water bird species in close proximity to water (see FIGURE 5)

Mitigation: The day time collision risk is likely to be "self mitigating" due to the presence of so many lines together. This should greatly increase the visibility of the lines to birds in the area. No additional marking of the line is recommended. The nocturnal collision risk involving the flamingoes is however obviously different. This impact would normally be mitigated through marking the line with "bird lights". However in this study area, where the surrounding area is soon to be developed to such a large extent it is not believed that this is necessary at this stage. It is rather recommended that thorough monitoring (atleast once a month) of the entire line be carried out, starting as soon as the conductors and earth wires are strung during construction. If collision

mortalities are detected then the relevant sections of line will have to be marked with bird lights immediately. Marking will need to be done on the two outer 400kV lines.

Electrocution on pylons/towers:

Impacts:

- Assorted non Red Data eagles and herons – depending on the exact tower structure used for the 132kV line, which has yet to be finalized by Eskom.

Mitigation: Once the tower structures are finalized for the 132kV lines, EWT will need an opportunity to comment on whether the structure poses an electrocution risk or not.

Disturbance:

Impacts:

- Damara Tern and African Black Oystercatcher in dune areas (see FIGURE 5)
- Half-collared Kingfisher in riparian or riverine areas (see FIGURE 5)

Mitigation: Construction and maintenance of both the overhead lines and the Power Station Substation will result in disturbance of avifauna particularly in the dune fields, and to a lesser extent in the riparian areas. Firstly it is recommended that if possible the dune fields area be avoided altogether, although if the Gas Power Station is situated right on the coast, it will probably not be possible. Failing that, it is recommended that all construction and maintenance activities be undertaken in conformance with generally accepted environmental best practice guidelines, in order to minimize the impact on avifauna. Activities such as driving and earth moving in the dune area should be kept to an absolute minimum. These last two points would apply to the riparian areas as well.

Whilst the Gas Power Station itself falls outside of the scope of this study, this will potentially also have a large effect on the birds of the area, and it is highly recommended that a specialist avifaunal impact study be conducted as part of the EIA for this development.

Habitat destruction:

Impacts:

- Damara Tern and African Black Oystercatcher in dune areas (see FIGURE 5)

Mitigation: Same as for disturbance above.

Impact on quality of supply:

Impacts:

- Assorted non Red Data eagle species, ibises, corvids and herons – depending on the exact tower structure used, which has yet to be finalized by Eskom

Mitigation: Once the tower structures for both lines are finalized, EWT will need an opportunity to examine the technical drawings and determine whether faulting due to birds is likely. If it is anticipated to be a problem, EWT will provide suitable recommendations on how to mitigate.

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APPENDIX G
CULTURAL HERITAGE SPECIALIST STUDY

HERITAGE RESOURCE SCOPING ASSESSMENT OF
INTEGRATION OF ELECTRICAL INFRASTRUCTURE,
COEGA INDUSTRIAL DEVELOPMENT ZONE, PORT ELIZABETH,
EASTERN CAPE

Assessment and report by



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for

Eyethu Engineers

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24 March 2006

Introduction

eThembeni Cultural Heritage was appointed by Eyethu Engineers to undertake a heritage impact assessment of the area affected by the proposed integration of electrical infrastructure within the Coega Industrial Development Zone, in terms of the South African Heritage Resources Management Act No 25 of 1999. Section 38(1) of the Act requires such an assessment in case of:

- (a) the construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300 m in length;
- (b) the construction of a bridge or similar structure exceeding 50 m in length;
- (c) any development or other activity which will change the character of a site –
 - (i) exceeding 5 000 m² in extent; or
 - (ii) involving three or more existing erven or subdivisions thereof; or
 - (iii) involving three or more erven or subdivisions thereof which have been consolidated within the past five years; or
- (d) the costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority;
- (e) the re-zoning of a site exceeding 10 000m² in extent; or
- (f) any other category of development provided for in regulations by SAHRA or a provincial heritage resources authority.

A heritage impact assessment is not limited to archaeological artefacts, historical buildings and graves. It is far more encompassing and includes intangible and invisible resources such as places, oral traditions and rituals. In the KwaZulu-Natal Heritage Act 1997 a heritage resource is defined any place or object of cultural significance i.e. of aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance. This includes the following wide range of places and objects:

- (a) places, buildings, structures and equipment;
- (b) places to which oral traditions are attached or which are associated with living heritage;
- (c) historical settlements and townscapes;
- (d) landscapes and natural features;
- (e) geological sites of scientific or cultural importance;
- (f) archaeological and palaeontological sites;
- (g) graves and burial grounds, including -
 - (i) ancestral graves,
 - (ii) royal graves and graves of traditional leaders,
 - (iii) graves of victims of conflict,
 - (iv) graves of important individuals,
 - (v) historical graves and cemeteries older than 60 years, and
 - (vi) other human remains which are not covered under the Human Tissues Act, 1983 (Act No.65 of 1983 as amended);
- (h) sites of significance relating to the history of slavery in South Africa
- (i) movable objects, including -
 - (i) objects recovered from the soil or waters of South Africa including archaeological and palaeontological objects and material, meteorites and rare geological specimens;
 - (ii) ethnographic art and objects;
 - (iii) military objects;
 - (iv) objects of decorative art;
 - (v) objects of fine art;
 - (vi) objects of scientific or technological interest;
 - (vii) books, records, documents, photographic positives and negatives, graphic, film or video material or sound recordings; and
 - (viii) any other prescribed categories, but excluding any object made by a living person.

Other sections of the Act with relevance are:

Structures

34 (1) No person may alter or demolish any structure or part of a structure which is older than sixty years without a permit issued by the relevant provincial heritage resources authority.

(2) Within three months of the refusal of the provincial heritage authority to issue a permit, consideration must be given to the protection of the place concerned in terms of one of the formal designations provided for in Part 1 of this Chapter.

(3) The provincial heritage resources authority may at its discretion, by notice in the Provincial Gazette, make an exemption from the requirements of subsection (1) within a defined geographical area, or for certain defined categories of site within a defined geographical area, provided that it is satisfied that heritage resources falling into the defined area or category have been identified and are adequately provided for in terms of the provisions of Part 1 of this Chapter.

(4) Should the provincial heritage resources authority believe it to be necessary it may, following a three-month notice period published in the Provincial Gazette, withdraw or amend a notice under subsection (3).

Definitions

2 (xxxii) “place” includes –

- (a) a site, area or region;
- (b) a building or other structure which may include equipment, furniture, fittings and articles associated with or connected with such building or other structure;
- (c) a group of buildings or other structures which may include equipment, furniture, fittings and articles associated with or connected with such group of buildings or other structures;
- (d) an open space, including a public square, street or park; and
- (e) in relation to the management of a place, includes the immediate surroundings of a place.

This report comprises the scoping section of a heritage impact assessment.

Nature and description of proposed activities (information provided by client)

Eskom transmission and the Coega Development Corporation propose the installation of electrical infrastructure within the Coega Industrial Development Zone (IDZ) near Port Elizabeth in the Eastern Cape. The project includes the installation of 400kV and 132kV power lines, substations for stepping down the power for end users, radio towers for communications and the upgrade of the existing Grassridge substation.

Some of the proposed power lines within the IDZ will link up to a proposed Combined Cycle Gas Turbine Power Station, which is proposed at a future date and will require a separate Environmental Impact Assessment.

The installation of electrical infrastructure on this scale is a listed activity in terms of current environmental legislation, requiring that the proponent undertake an Environmental Impact Assessment process ahead of any construction activities. Accordingly, Eskom and Coega (joint project proponents) have appointed Eyethu Engineers cc to undertake this process.

The aim of the project is to obtain a Record of Decision from the National Department of Environmental Affairs and Tourism regarding the installation and integration of electrical infrastructure within the Coega IDZ.

Site description and environmental issues

Maps indicating the location of the Coega IDZ are included in the background information document accompanying this report.

Methodology

An eThembeni staff member investigated the proposed development area on 17 February 2006, accompanied by various subject specialists and Eyethu Engineers, Eskom and Coega Development Corporation staff members. The study area was traversed by helicopter to inspect the general topography, development area boundaries and proposed power line servitude options.

We consulted various provincial databases, including historical, archaeological and geological sources and undertook a limited literature review.

Background information

In accordance with current legislation, no construction work associated with the proposed activities had started prior to our visit.

The general area is one of variable heritage resource significance, with sites recorded from both the Stone and Iron Ages. The following tables provide a brief summary of archaeological time periods:

E arly	1.5 million to 180 000 years ago	Only stone artefacts remain from
S tone		this time period, including large
A ge		choppers, cleavers and hand axes
M iddle	180 000 to 35 000 years ago	Stone tools smaller than in ESA;
S tone		include blades and flakes; human
A ge		and animal remains also found
L ater	35 000 years ago to the time	Variety of artefacts made from
S tone	of European settlement	organic and inorganic materials;
A ge		human remains, shell middens etc

E arly	400 – 500 AD	Mzonjani phase
I ron	500 – 700 AD	Msuluzi phase
A ge	700 – 900 AD	Ndondondwane phase
	900 – 1200 AD	Ntshekane phase
L ate	1200 – 1500 AD	Settlement by Nguni speakers
I ron	1500 – 1700 AD	Introduction of maize
A ge	1700 – 1850 AD	Pre-European settlement
	1850 AD to present	Historical

A range of heritage resources has been recorded within and adjacent to the study area. These include Early, Middle and Later Stone Age sites, Early and Late Iron Age sites and sites from the historical period.

Early and Late Iron Age sites occurring between the Great Kei and Great Fish River valleys are of particular significance as they represent the most southerly and westward expansion of black farming communities prior to the colonial contact period. The region is further significant in historic times as a frontier between hunter-gatherers, pastoralists, Nguni-speaking farming communities and European settlers. As a consequence of contact between people on the frontier, historical sites occur widely throughout the area and include domestic, trade, war and battle sites and trade routes.

Recommendations

Ground surveys of the final power line servitudes will have to be undertaken once the tower positions have been finalised by Eskom.

Conclusion

We have submitted this report to the South African Heritage Resources Management Agency for their information. The client may liaise with Ms Mary Leslie at SAHRA's Cape Town office (telephone 021 462 4502).

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APPENDIX

SIGNIFICANCE AND VALUE OF HERITAGE RESOURCE SITES

The following guidelines for determining site significance were developed by the South African Heritage Resources Agency in 2003. We use them in conjunction with tables of our own formulation (see that for the Southern African Iron Age, below) when considering intrinsic site significance and significance relative to development activities, as well as when recommending mitigatory action.

Type of Resource
Place
Structure
Archaeological Site
Palaeontological Site
Geological Feature
Grave

Type of Significance

1. Historical Value

It is important in the community, or pattern of history

- Importance in the evolution of cultural landscapes and settlement patterns
- Importance in exhibiting density, richness or diversity of cultural features illustrating the human occupation and evolution of the nation, Province, region or locality.
- Importance for association with events, developments or cultural phases that have had a significant role in the human occupation and evolution of the nation, Province, region or community.
- Importance as an example for technical, creative, design or artistic excellence, innovation or achievement in a particular period

It has strong or special association with the life or work of a person, group or organisation of importance in history

- Importance for close associations with individuals, groups or organisations whose life, works or activities have been significant within the history of the nation, Province, region or community.

It has significance relating to the history of slavery

- Importance for a direct link to the history of slavery in South Africa.

2. Aesthetic Value

It is important in exhibiting particular aesthetic characteristics valued by a community or cultural group

- Importance to a community for aesthetic characteristics held in high esteem or otherwise valued by the community.
- Importance for its creative, design or artistic excellence, innovation or achievement.
- Importance for its contribution to the aesthetic values of the setting demonstrated by a landmark quality or having impact on important vistas or otherwise contributing to the identified aesthetic qualities of the cultural environs or the natural landscape within which it is located.
- In the case of an historic precinct, importance for the aesthetic character created by the individual components which collectively form a significant streetscape, townscape or cultural environment.

3. Scientific Value

It has potential to yield information that will contribute to an understanding of natural or cultural heritage

- Importance for information contributing to a wider understanding of natural or cultural history by virtue of its use as a research site, teaching site, type locality, reference or benchmark site.
- Importance for information contributing to a wider understanding of the origin of the universe or of the development of the earth.
- Importance for information contributing to a wider understanding of the origin of life; the development of plant or animal species, or the biological or cultural development of hominid or human species.
- Importance for its potential to yield information contributing to a wider understanding of the history of human occupation of the nation, Province, region or locality.

It is important in demonstrating a high degree of creative or technical achievement at a particular period

- Importance for its technical innovation or achievement.

4. Social Value

It has strong or special association with a particular community or cultural group for social, cultural or spiritual reasons

- Importance as a place highly valued by a community or cultural group for reasons of social, cultural, religious, spiritual, symbolic, aesthetic or educational associations.
- Importance in contributing to a community's sense of place.

Degrees of Significance

Rarity

It possesses uncommon, rare or endangered aspects of natural or cultural heritage

- Importance for rare, endangered or uncommon structures, landscapes or phenomena.

Representivity

It is important in demonstrating the principal characteristics of a particular class of natural or cultural places or objects

Importance in demonstrating the principal characteristics of a range of landscapes or environments, the attributes of which identify it as being characteristic of its class.

Importance in demonstrating the principal characteristics of human activities (including way of life, philosophy, custom, process, land-use, function, design or technique) in the environment of the nation, Province, region or locality.

Sphere of Significance	High	Medium	Low	
International	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
National	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Provincial	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Regional	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Local	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Specific Community	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-----

What other similar sites may be compared to this site?

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Southern African Iron Age

	Significance		
	- low	- medium	- high
Unique or type site			Yes
Formal protection			Yes
Spatial patterning	?Yes	?Yes	?Yes
Degree of disturbance	75 – 100%	25 – 74%	0 – 24%
Organic remains (list types)	0 – 5 / m ²	6 – 10 / m ²	11 + / m ²
Inorganic remains (list types)	0 – 5 / m ²	6 – 10 / m ²	11 + / m ²
Ancestral graves			Present
Horizontal extent of site	< 100m ²	101 – 1000m ²	1000 + m ²
Depth of deposit	< 20cm	21 – 50cm	51 + cm
Spiritual association			Yes
Oral history association			Yes
➤ Research potential			High
➤ Educational potential			High

Please note that this table is a tool to be used by qualified cultural heritage managers who are also experienced site assessors.

APPENDIX C

ESKOM TRANSMISSION GENERIC ENVIRONMENTAL MANAGEMENT PLAN FOR CONSTRUCTION ACTIVITIES

TRANSMISSION SERVICES



ENVIRONMENTAL MANAGEMENT PROGRAMME

EMP

Substation construction/refurbishment work

J Geeringh (Pr Sci Nat)
Senior Environmental Advisor
Tx Services, Land & Rights focus area

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- 4.2. NATURAL DRAINAGES (New sites and extensions)
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11. METHOD STATEMENTS FOR SPECIAL WORKS

12. SITE DOCUMENTATION / MONITORING / REPORTING

REFERENCES

PRO-FORMA

QUESTIONNAIRE

1. SCOPE

The scope of this document is to give guidelines, to all personnel executing the project, regarding the environmental conditions, standards and legislative requirements that must be adhered to. This document shall be included as part of the contract and supplementary to Transmission's specifications for the contract.

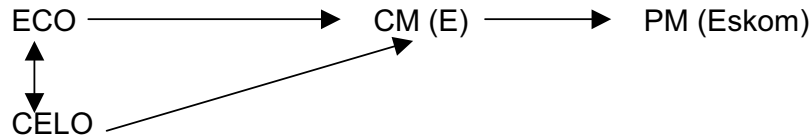
The Environmental Management Programme (hereafter referred to as **EMP**) must thus be part of the enquiry document to make the recommendations and constraints, as set out in this document, enforceable under the general conditions of contract.

The EMP has a long-term objective to ensure that:

- 1) Environmental Management considerations are implemented from the design phase of the project,
- 2) The Contractor is able to and shall include any costs of compliance with this EMP into the tender price
- 3) Precautions against environmental damage and claims arising from such damage are taken timeously, and
- 4) The completion date of the contract is not delayed due to environmental problems with the Landowner, Regional staff, Communities or Regulatory Authorities arising during the course of the project execution,
- 5) The asset created conforms to environmental standards required by ISO 14001 and Transmission Policy.

The Project Manager and Contractor must take into consideration that this EMP will be implemented and amended as required for the duration of the contract. The management of the environment changes over time and therefore the document shall be updated regularly to ensure environmental management is implemented during all phases of a project.

Reporting Structure.



ECO: - Environmental Control Officer (Can be the Eskom Site Supervisor on small projects)

CM: - Contract Manager (Eskom)

CELO: - Contractor Environmental Liaison Officer (Can be the Contractor Site Supervisor on small projects)

PM: - Project Manager (Eskom)

Responsibility Matrix.

Function	Name + Tel	Responsibility
Project Manager (PM)		Overall management of project and EMP implementation
Site Supervisor/ Contract Manager (CM)		Oversees site works, liaison with Contractor, PM and ECO
Environmental Control Officer (ECO)		Implementation of EMP and liaison between Eskom, Contractor and the Landowner
Contractor (C)		Implementation and compliance with recommendations and conditions of the EMP, Appoints / delegates a dedicated person to work with ECO
Tx Services Environmental Advisor (Eskom)	John Geeringh 011 800 2465 083 632 7663	Environmental advice and auditing

(Table to be completed upon contact award)

2. INTRODUCTION

The construction, refurbishment or upgrading of Transmission Substations can have a major impact on the environment. Construction of a new substation and upgrading of an existing facility is also regulated by legislation under the Environment Conservation Act, 73 of 1989. It is thus imperative that precautions are taken to ensure that environmental damage is minimised. This will take a concerted effort from Eskom and the Contractor and detailed planning is of the utmost importance.

The Environmental Control Officer (ECO) on site shall, in conjunction with the Contractor, ensure that all site staff are informed of the details of this document as well as the conditions, if any, of the Record of Decision (ROD) issued by the Department of Environmental Affairs and Tourism (DEAT). For all construction and upgrading of substation sites that require new land take, a ROD is obtained from DEAT after completion of the Environmental Impact Assessment (EIA) for the project.

The ECO shall convey the contents of this document to the Contractor site staff and discuss the contents in detail with the Project Manager and Contractor.

Good relations with the Landowner / legal occupier (hereafter referred to as **Landowner**), Regional staff and Communities need to be established and sustained. This will help in the solving of problems and the prevention thereof. Lines of communication should always be open to ensure proper and timeous reaction to complaints. The contact numbers of the ECO and / or Eskom Site Supervisor shall be made available to the Landowner (for new substation sites and extensions) and Regional staff (for all projects). The reputation of both the Contractor and Eskom is at stake and should be the drive for everybody involved to perform in excellence.

During the construction period for new substations and extensions environmental personnel, to determine compliance with the recommendations of the EMP and conditions of the ROD shall conduct Environmental Audits. The Regional Environmental Advisor shall audit refurbishment and upgrading projects upon completion of the contract.

Eskom requires a commitment from the Contractor on the following issues:

1. Take into consideration the legal rights of the individual Landowner, Communities and Eskom Regional staff.
2. Always behave professionally on and off site.
3. Ensure quality in all work done, technical and environmental.
4. Resolve problems and claims arising from damage immediately to ensure a smooth flow of operations.
5. To underwrite Transmission's Environmental Policy at all times.
6. To preserve the natural environment by limiting any destructive actions on site, avoiding sensitive areas and actively implement the conditions of the EMP and ROD.

3. DESCRIPTION OF THE PROJECT

3.1. SUBSTATION

The substation where the work will be performed is _____.

3.2. PROJECT EXECUTION AREA (All projects)

Construction, refurbishment or upgrading activities are limited to the area as demarcated by Eskom and shown on the site plans. Any area outside Eskom owned property, required to facilitate access, construction camps or material storage areas, shall be negotiated with the Landowner and written agreements shall be obtained.

Should water be required from sources other than Eskom supply, a written agreement shall be reached between the Contractor and the Landowner in the presence of Eskom. Should the Contractor be required to use water from a natural source, **the Contractor shall supply a method statement to that effect.** Strict control shall be maintained and the ECO shall regularly inspect the abstraction point and methods used.

In case of a new substation or an extension to an existing substation, the works area shall be fenced to prevent livestock or local community members from wandering onto site and getting injured. All works shall be limited to the fenced area and the Contractor workforce shall refrain from venturing outside this area onto private property.

No work shall commence until permission is granted from the Environmental Advisor from Transmission. The Project Manager shall ensure that all conditions in the ROD are fulfilled before the Contractor occupies the site.

3.3. SITE ESTABLISHMENT (All projects)

Site establishment shall take place in an orderly manner and all amenities shall be installed before the main workforce move onto site. **A method statement is required from the Contractor at tender stage that includes the layout of the camp, management of ablution facilities and wastewater management.** The Contractor camp shall have the necessary ablution facilities with chemical toilets where such facilities are not available at commencement of construction. The Contractor shall supply a wastewater management system that will comply with legal requirements and be acceptable to Eskom.

Where Eskom facilities are available the Contractor shall make use of such facilities where it is viable and possible. The Contractor shall inform all site staff to the use of supplied ablution facilities and under no circumstances shall indiscriminate excretion and urinating be allowed other than in supplied facilities.

The Contractor shall supply waste collection bins where such is not available and all solid waste collected shall be disposed of at a registered waste dump. A certificate of disposal shall be obtained by the Contractor and kept on file. Where a registered waste site is not available close to the construction site, **the Contractor shall provide a method statement with regard to waste**

management. Under no circumstances may solid waste be burned on site unless a suitable incinerator is available.

3.4. WORKSHOP AND EQUIPMENT STORAGE AREAS (All projects)

Where possible and practical all maintenance of vehicles and equipment shall take place in a workshop area. During servicing of vehicles or equipment, a suitable drip tray shall be used to prevent carbon spills onto the soil, especially where emergency repairs are effected outside the workshop area. Leaking equipment shall be repaired immediately or be removed from site to facilitate repair. All potentially hazardous and non-degradable waste shall be collected and removed to a registered waste site.

Workshop areas shall be monitored for oil and fuel spills and such spills shall be cleaned and re-mediated to the satisfaction of the ECO. **To this end a method statement is required from the Contractors, tendering for the project, to show procedures for dealing with possible emergencies that can occur, such as fire and accidental leaks and spillage's.** The Contractor / Regional staff shall be in possession of an emergency spill kit that must be complete and available at all times on site.

The following shall apply:

- All contaminated soil / yard stone shall be removed and be placed in containers. Contaminated material can be taken to one central point where bio-remediation can be done.
- Smaller spills can be treated on site.
- A specialist Contractor shall be used for the bio-remediation of contaminated soil where the required remediation material is not available on site.
- All spills of hazardous substances must be reported to the appointed Transmission Engineering Environmental Advisor or alternatively to the Regional Environmental Advisor **(Tx Key Performance Indicator requirement).**

3.5. STORAGE AREAS OF HAZARDOUS SUBSTANCES (All projects)

All hazardous substances shall be stored in suitable containers and storage areas shall be bunded. This includes all carbon substances like fuel and oil as well as herbicides and battery acid. A register shall be kept on all substances and be available for inspection at all times. Areas shall be monitored for spills and any spills shall be contained, cleaned and rehabilitated immediately. Any leaking containers shall be repaired or removed from site (See above for actions after spills).

Storage areas shall display the required safety signs depicting “No smoking”, “No naked lights” and “Danger”. Containers shall be clearly marked to indicate contents as well as safety requirements. **The contractor shall supply a method statement for the storage of hazardous materials at tender stage.**

4. PHYSICAL ISSUES AND THEIR CONTROL

4.1. SUBSTATION TERRAIN AREA (New sites and extensions)

Where terracing is required, topsoil shall be collected and retained for the purpose of re-use later to rehabilitate disturbed areas not covered by yard stone. Such areas include terrace embankments and areas outside the high voltage yards. Where required, all sloped areas shall be re-vegetated and stabilised to ensure proper rehabilitation is effected. These areas can be stabilised using design structures or vegetation as specified in the design to prevent erosion of steep embankments. The contract design specifications and Environmental Impact Report (EIR) recommendations shall be adhered to and implemented strictly.

The retained topsoil shall be spread evenly over areas to be rehabilitated and suitably compacted to effect re-vegetation of such areas to prevent erosion. Where required re-vegetation can also be enhanced using a grass seed mixture as described in section 4.10 of this EMP.

(Any special terrain issues identified in the EIR and design to be considered for timing of the project, like turf in rainy season, access problems, etc. to be included here)

4.1.1. Management objectives

- Minimise scarring of the soil surface and land features other than on site
- Minimise disturbance and loss of topsoil from site
- Rehabilitate all disturbed areas in the substation area

4.1.2. Measurable targets

- No visible erosion scars once construction is completed
- All disturbed areas successfully rehabilitated

4.2. NATURAL DRAINAGE'S (New sites and extensions)

Under no circumstances shall the contractor interfere with any watercourses in the vicinity of the site. Should deviation of such watercourses be required as part of the contract design specification, the specifications shall be adhered to strictly. The Environmental Control Officer shall ensure that all watercourses are adequately protected to prevent downstream siltation due to erosion on site. Rubble from the construction process shall be removed from site and may under no circumstances be dumped into any natural drainage channels. The normal flow of runoff water must not be impeded, as this will enhance erosion.

(Any special issues identified in the EIR and design to be included here)

4.2.1. Management objectives

- Avoid damage to natural drainage channels
- Avoid damage to river and stream embankments
- Minimise erosion of embankments and subsequent siltation of rivers and streams

4.2.2. Measurable targets

- No damage to natural drainage channels
- No damage to river and stream banks
- No visible erosion scars on embankments once construction is completed

4.3. ACCESS ROADS TO THE SITE (New sites)

Planning of access routes to the site for construction purposes shall be done in conjunction between the Contractor, Eskom and the Landowner. All agreements reached should be documented and no verbal agreements should be made. The normal Eskom site documentation will be sufficient for this purpose. The Contractor shall properly mark all access roads. Roads not to be used shall be marked with a " **NO ENTRY** " sign.

Where new access roads are constructed, this must be done according to design and contract specifications. Drainage channels shall be suitably designed to ensure erosion does not occur, especially at the outflows. The new access road shall be designed to allow for the natural flow of water where required. Crossing of dongas and eroded areas on access routes to new substation sites shall be thoroughly planned and installed according to design and contract specifications. All areas susceptible to erosion shall be protected with suitable erosion control measures from the onset of the project. Prevention is the total aim as restoration is normally very difficult and costly.

Where necessary suitable measures shall be taken to rehabilitate damaged areas next to the newly constructed road.

(Specifics about the project identified in EIR and design).

4.3.1. Management objectives

- Minimise damage to existing access roads
- Minimise damage to environment due to construction of new access roads
- Minimise loss of topsoil and enhancement of erosion
- Minimise impeding the natural flow of water

4.3.2. Measurable targets

- No claims from Landowners due to damage on existing access roads
- No erosion visible on access roads three months after completion of construction
- No loss of topsoil due to runoff water on access roads
- No interference with the natural flow of water

4.4. CONSTRUCTION RUBBLE DISPOSAL (All projects)

The Contractor shall dispose of all excess material on site in an appropriate manner and at a registered landfill. All packaging material shall be removed from site and disposed of and not burned on site. A negotiated landfill may be

used but when it is closed up, the rubble shall be compacted and there shall be at least 1m of soil covering the waste material. No landfill may be used without the consent from the Landowner. No non-biodegradable materials shall be disposed of in any unregistered waste site. **A method statement regarding management and disposal of construction rubble shall be included in the tender documents by the Contractor.**

No material shall be left on site that may harm man or animals. Broken, damaged and unused spares such as porcelain, glass, nuts, bolts and washers shall be picked up and removed from site. Surplus concrete may not be dumped indiscriminately on site, but shall be disposed of in designated areas as agreed by the Landowner. Concrete trucks shall not be washed on site after depositing concrete into foundations. Any spilled concrete shall be cleaned up immediately.

4.4.1. Management objectives

- To keep the site neat
- Disposal of construction rubble in an appropriate manner
- Minimise litigation
- Minimise Landowner complaints

4.4.2. Measurable targets

- No construction rubble left lying around on site
- No incidents of litigation
- No complaints from Landowners

4.5. SITE CLEARING (New sites and extensions)

Vegetation clearing to allow for site establishment as well as construction purposes will sometimes be required. Vegetation can be cleared mechanically with a bulldozer where terracing is required, but should be cleared by hand on other areas. All alien vegetation shall be eradicated from site during the project. Indigenous vegetation that does not pose any risks to the operation of the substation upon completion of the contract should be retained for

esthetical purposes. **Such vegetation shall be identified during design and clearly indicated on the site plans.**

Protected or endangered species of plants shall be retained where possible. Where such species have to be removed due to interference with structures, the necessary permission and permits shall be obtained by the ECO from **Provincial Nature Conservation** prior to commencement of site works. Search, rescue and replanting of indigenous, valuable and protected species is highly recommended where possible and viable.

The use of herbicides shall only be allowed after a proper investigation into the type to be used, the long-term effects and the effectiveness of the agent. Eskom's guidelines regarding the use of herbicides (TRR/S91/032) shall be adhered to strictly. Application shall be under the direct supervision of a qualified technician. All surplus herbicide shall be disposed of in accordance with the Supplier's specifications.

The Contractor for vegetation clearing shall comply with the following parameters:

- **The contractor must have the necessary knowledge to be able to identify different species.**
- **The contractor must be able to identify declared weeds and alien species that can be totally eradicated.**
- **The contractor must be in possession of a valid herbicide applicators licence.**

The Contractor shall supply a method statement regarding vegetation clearing at the tender stage.

NATURAL FEATURES SHALL BE TAKEN INTO CONSIDERATION DURING DESIGN AND WHERE POSSIBLE THESE SHALL BE PROTECTED UNLESS THEY WILL INTERFERE WITH THE OPERATION OF THE SUBSTATION.

(Specifics about the project identified in EIR and design)

4.5.1. Management objectives

- Minimise unnecessary damage to vegetation
- Keep site as natural looking as possible
- Minimise possibility of erosion due to removal of vegetation
- Minimise removal of plant material on river and stream embankments
- Minimise damage to natural features

4.5.2. Measurable targets

- Only vegetation cleared as required for site construction purposes
- No vegetation interfering with structures and statutory requirements upon completion of the contract
- No de-stumping of vegetation on river and stream embankments
- No visible erosion scars three months after completion of the contract due to vegetation removal
- No visible damage to the vegetation outside the site one year after completion of the contract due to herbicide leaching
- No litigation due to unauthorised removal of vegetation
- No unnecessary damage to natural features

4.6. FENCING REQUIREMENTS (New sites and extensions)

The site shall be fenced to prevent any loss or injury to persons or livestock during the construction phase. All Eskom gates shall be fitted with locks and be kept locked at all times during the construction phase, especially when works are stopped during weekends and holidays. All claims arising from gates left open shall be investigated and if at fault, settled in full by the Contractor. If any fencing interferes with the construction process, such fencing shall be deviated until construction is completed. The deviation of fences shall be negotiated and agreed with the landowner in writing.

(Specifics about the project)

4.6.1. Management objectives

- Properly installed gates to allow access to the site
- Minimise damage to private fences
- Limit access to Eskom and Contractor personnel

4.6.2. Measurable targets

- No transgressions of the fencing act and therefore no litigation
- No damage to fences and subsequent complaints from Landowners
- All gates kept locked at all times to limit access to construction staff

4.7. FIRE PREVENTION (All projects)

No open fires shall be allowed on site under any circumstance (The Forest Act, No 122 of 1984). All cooking shall be done in demarcated areas that are safe and cannot cause runaway fires. The Contractor shall have operational fire-fighting equipment available on site, especially during the winter months.

4.7.1. Management objectives

- Minimise risk of runaway veld fires
- Minimise damage to private property

4.7.2. Measurable targets

- No veld fires started by the Contractor's work force
- No claims from Landowners for damages due to veld fires
- No litigation

4.8. NOISE POLLUTION (All projects)

The Contractor shall ensure that noise levels remain within acceptable limits, especially in built up areas. This applies especially after working hours and during the night.

4.8.1. Management objectives

- Prevention of noise pollution
- Minimise nuisance factor of construction activities

4.8.2. Measurable targets

- No complaints from landowner or community
- No litigation

4.9. CLAIMS FOR DAMAGES (All projects)

The ECO shall keep a photographic record of any damage to areas outside the demarcated site area. The date, time of damage, type of damage and reason for the damage shall be recorded in full to ensure the responsible party is held liable. All claims for compensation emanating from damage should be directed to the ECO for appraisal. The Contractor shall be held liable for all unnecessary damage to the environment. **A register shall be kept of all complaints from the Landowner or community. All claims shall be handled immediately to ensure timeous rectification / payment by the responsible party.**

4.9.1. Management objectives

- Minimise complaints from Landowners and communities
- Prevent litigation due to outstanding claims
- Completion of the contract on time

4.9.2. Measurable targets

- No claims from the Landowner or communities
- All claims investigated and settled within one month
- No litigation due to unsettled claims

4.10. REHABILITATION (New sites and extensions)

All damaged areas shall be rehabilitated upon completion of the contract in accordance with design specifications. In accordance with the Conservation of Agricultural Resources Act, No 43 of 1983, slopes in excess of 2% must be

contoured and slopes in excess of 12% must be terraced. Extra seed shall be sown on disturbed areas as directed by the ECO (see below for specifications). Other methods of rehabilitating disturbed sites may also be used at the discretion of the PM to comply with the conditions of the ROD and EMP, e.g. stone pitching, logging, etc. Contour banks shall be spaced according to the slopes. The type of soil shall also be taken into consideration.

A mixture of grass seed can be used provided the mixture is carefully selected to ensure the following:

- a) Annual and perennial grasses are chosen.**
- b) Pioneer species are included.**
- c) All the grasses shall not be edible.**
- d) Species chosen will grow in the area under natural conditions.**
- e) Root systems must have a binding effect on the soil.**
- f) The final product should not cause an ecological imbalance in the area.**

To get the best results in a specific area, it is a good idea to consult with a specialist or the local Extension Officer of the Dept of Agriculture. Seed distributors can also give valuable advice as to the mixtures and amount of seed necessary to seed a certain area. Re-seeding will always be at the discretion of the PM, unless specifically requested by a Landowner / Regional staff.

(Specifics about the project)

4.10.1. Management objective

- Minimise damage to topsoil and environment
- Successful rehabilitation of all damaged areas
- Prevention of erosion

4.10.2. Measurable targets

- No loss of topsoil due to construction activities
- All disturbed areas successfully rehabilitated within one year of completion of the contract

- No visible erosion scars one year after completion of the contract

4.11. MATERIAL STORAGE AREAS (All projects)

Specifications require the protection of Eskom supplied material on site, especially conductor drums. This normally requires that a firebreak is created around a material storage area. These areas are left to rehabilitate on their own which could be disastrous. Once construction has been completed on site and all excess material has been removed, the storage area shall be rehabilitated. If the area was badly damaged, re-seeding shall be done and fencing in of the area shall be considered if livestock will subsequently have access to such an area. For seeding the same provisions as in 4.10 shall apply.

4.11.1. Management objectives

- Minimise disturbance of topsoil
- Successful rehabilitation of disturbed areas

4.11.2. Measurable targets

- No remaining disturbance to vegetation outside the substation area
- No loss of topsoil
- All disturbed areas successfully rehabilitated one year after completion of the contract

4.12. BATCHING PLANTS (New sites and extensions)

In remote areas where batching plants have to be established, these sites shall be negotiated with the Landowner / Regional staff depending on their location. **The Contractor shall supply a method statement with regard to concrete and batching plant management.** These sites shall be cleared of all excess material upon completion of the contract. Such areas shall be rehabilitated to their natural state. Any spilled concrete shall be removed and soil compacted during construction shall be ripped, levelled and re-vegetated.

4.12.1. Management objectives

- Minimise complaints from Landowners / Regional staff
- Successful rehabilitation of disturbed areas

4.12.2. Measurable targets

- No complaints from Landowners / Regional staff
- All disturbed areas successfully rehabilitated one year after completion of the contract

4.13. OLD EQUIPMENT (Refurbishment and upgrading projects)

All old equipment removed during refurbishment or upgrading projects shall be stored in such a way as to prevent pollution of the environment. Oil containing equipment shall be stored to prevent leaking or be stored on drip trays should such equipment already be leaking. All scrap steel shall be stacked neatly and any disused and broken insulators shall be stored in containers.

Once material has been scrapped and the contract has been placed for removal, the Contractor shall ensure that any equipment containing pollution causing substances is removed in such a way as to prevent spillage and pollution of the environment. **A method statement shall be required during tender stage for such projects.** The Contractor shall also be equipped to contain and clean up any pollution causing spills. Disposal of unusable material shall be at a registered waste disposal site and a certificate of disposal shall be obtained and copied to Eskom.

4.13.1. Management objectives

- To prevent pollution of the environment
- Prevention of litigation due to illegal dumping

4.13.2. Measurable targets

- No complaints from Landowners / Regional staff / Communities
- No pollution of the environment
- No litigation due to illegal dumping

4.14. TRANSPORT OF EQUIPMENT (All projects)

All equipment moved onto site or off site during a project is subject to the legal requirements as well as Eskom specifications for the transport of such equipment. Oil filled equipment such as CT's, VT's and capacitor cans have specific safety requirements regarding their handling, transport and storage. The Contractor shall meet these safety requirements under all circumstances. All equipment transported shall be clearly labelled as to their potential hazards according to specifications. All the required safety labelling on the containers and trucks used shall be in place.

The Contractor shall ensure that all the necessary precautions against damage to the environment and injury to persons are taken in the event of an accident and shall supply a method statement to that effect.

4.14.1. Management objectives

- Safe handling and transport of equipment
- Safe handling and transport of hazardous substances
- Minimise environmental pollution and damage

4.14.2. Measurable targets

- All equipment delivered to site in tact
- No spillage of hazardous substances
- No litigation due to environmental pollution

(Specifics about the project included here)

5. SOCIAL ISSUES AND THEIR CONTROL

5.1. SANITATION (All projects)

The Contractor shall install mobile chemical toilets on site where ablution facilities are not available. Staff shall be sensitised to the fact that they should use these facilities at all times. No indiscriminate excretion or urinating on site shall be allowed. Ablution facilities shall be within 100m from workplaces but not closer than 50m from any natural water bodies. There should be enough toilets available to accommodate the workforce (minimum requirement 1: 20 workers). Toilets shall be serviced regularly and the ECO shall inspect toilets regularly to ensure compliance to health standards.

5.1.1. Management objectives

- Ensure that proper sanitation is achieved
- Prevent spreading of disease

5.1.2. Measurable targets

- No complaints received from Landowners or Regional staff regarding sanitation
- No litigation or compensation claims

5.2. PREVENTION OF DISEASE (All projects)

The Contractor shall take all the necessary precautions against the spreading of disease such as measles, foot and mouth, etc. especially under livestock. A record shall be kept of drugs administered or precautions taken and the time and dates when this was done. This can then be used as evidence in court should any claims be instituted against Eskom or the Contractor. Drugs such as

The workforce shall also be sensitised to the effects of sexually transmitted diseases, especially AIDS. General health issues shall be brought under the attention of the site staff and condoms shall be supplied on site.

5.2.1. Management objectives

- Prevent litigation due to infestation of livestock
- Prevent spreading of sexually transmitted diseases

5.2.2. Measurable targets

- No complaints from Landowners / Communities
- No litigation

5.3. INTERACTION WITH AFFECTED PARTIES (All projects)

The success of any project depends mainly on the good relations with the affected Landowner, Communities and Regional staff. It is therefore required that the ECO and the Contractor establish good relations with all the affected parties at the substation site.

All negotiations for any reason shall be between the ECO, the affected parties and the Contractor. **NO** verbal agreements shall be made. All agreements shall be recorded in writing and all parties shall co-sign the documentation.

The affected parties shall always be kept informed about any changes to the construction programme should they be involved. If the ECO is not on site the Contractor should keep the affected parties informed. The contact numbers of the Contractor and the ECO shall be made available to the affected parties. This will ensure open channels of communication and prompt response to queries and claims.

All contact with the affected parties shall be courteous at all times. The rights of the affected parties shall be respected at all times.

5.3.1. Management objectives

- Maintain good relations with affected parties

5.3.2. Measurable targets

- No delays in the project due to interference from affected parties

5.4. LITTERING CONTROL (All projects)

Littering by the employees of the Contractor shall not be allowed under any circumstances. The ECO shall monitor the neatness of the work sites as well as the Contractor campsite (See also 3.3).

5.4.1. Management objectives

- Neat workplace and site

5.4.2. Measurable targets

- No complaints from affected parties

5.5 DUST POLLUTION (New sites and extensions)

The Contractor shall be responsible for dust control on site to ensure no nuisance is caused to the Landowner, neighbouring Communities or Regional staff at the substation. Watering of access roads is recommended, as this is normally the greatest cause of dust pollution. Speed limits can also be effected, especially on private dirt roads leading to the site. Any complaints or claims emanating from the lack of dust control shall be attended to immediately by the Contractor.

5.5.1. Management objectives

- Site works does not cause a nuisance to other people in the area

5.5.2. Measurable targets

- No formal complaints or claims arising due to dust pollution

5.6. AESTHETICS (All projects)

The site shall be kept visually and aesthetically pleasing, especially in and around the Contractor camp. The ECO shall regularly inspect the site to ensure that it is neat and clean. Where required the campsite shall be screened by the Contractor to ensure that there is no unacceptable visual

intrusion in the area of the site. Screening can be done by use of shade cloth or corrugated fencing.

5.6.1 Management objectives

- Aesthetically pleasing works area, campsite and storage areas

5.6.2. Measurable targets

- No complaints from affected parties on or around the site

6. BIOLOGICAL ISSUES AND THEIR CONTROL

6.1. FAUNA (All projects)

The Contractor shall under no circumstances interfere with livestock without the Landowner or Community members being present. This includes the moving of livestock where they interfere with construction activities. Should the Contractors workforce obtain any livestock for consumption, they must be in possession of a written note from the owner. The transportation of meat for consumption shall take into consideration any legal requirements regarding the spreading of disease. No poaching shall be tolerated under any circumstances.

6.1.1. Management objectives

- Minimise disruption of farming activities
- Minimise disturbance of animals
- Minimise complaints and litigation

6.1.2. Measurable targets

- No stock losses where construction is underway
- No complaints from Landowners and Communities
- No litigation concerning stock losses and animal deaths

6.2. FLORA (New sites and extensions)

Protected or endangered species may occur on the site. Special care should be taken not to damage or remove any such species unless absolutely necessary. Permits for removal must be obtained **from Provincial Nature Conservation** should such species be affected. All plants not interfering with the operation of the substation shall be left undisturbed, clearly marked and indicated on the site plan. **Collection of firewood outside the site area is strictly prohibited** (refer also 4.5 and conditions of the ROD)

(Specifics about the project identified in the EIR and ROD to be included here)

6.2.1. Management objectives

- Minimal disturbance to vegetation where such vegetation does not interfere with construction and operation of the substation
- Prevention of litigation concerning removal of vegetation

6.2.2. Measurable targets

- No litigation due to removal of vegetation without the necessary permits

6.3. HERBICIDE USE (All projects)

Herbicide use shall only be allowed with the approval of Eskom and according to contract specifications. The application shall be according to set specifications and under supervision of a qualified technician. The possibility of leaching into the surrounding environment shall be properly investigated and only environmentally friendly herbicides shall be used (See also 4.5).

6.3.1. Management objectives

- Control over the use of herbicides

6.3.2. Measurable targets

- No signs of vegetation dying due to leaching of herbicides one year after completion of the contract
- No Landowner complaints and litigation

7. CULTURAL ISSUES AND THEIR CONTROL

7.1. ARCHAEOLOGY (New sites and extensions)

The position of any known sites shall be shown on the final design plans. Such areas shall be marked as no go areas. Artefacts shall not be removed under any circumstances. No dolomite, breccia or stromatolites may be removed or disturbed without the required permits from SAHRA. Any destruction of a site can only be allowed once a permit is obtained and the site has been mapped and noted. Permits shall be obtained from the South African Heritage Resources Association (SAHRA) should the proposed site affect any world heritage sites or if any heritage sites are to be destroyed or altered.

Should any archaeological sites be uncovered during construction, their existence shall be reported to Eskom immediately, John Geeringh to be informed at 011 800 2465 or the Regional Environmental Advisor.

(Specifics about the project)

7.1.1. Management objectives

- Protection of archaeological sites and land considered to be of cultural value
- Protection of known sites against vandalism, destruction and theft
- The preservation and appropriate management of new archaeological finds should these be discovered during construction

7.1.2. Measurable targets

- No destruction of or damage to known archaeological sites
- Management of existing sites and new discoveries in accordance with the recommendations of the Archaeologist

7.2. MONUMENTS / HISTORICAL SITES (New sites and extensions)

All monuments and historical sites shall be treated with the utmost respect. Any graves shall be clearly marked and treated as no go areas. No destruction of any site shall be allowed. Should it be necessary to remove any graves, the necessary procedures shall be followed and permits obtained.

(Specifics about the project)

7.1.1. Management objectives

- Protection of sites and land considered to be of cultural value
- Protection of known sites against vandalism, destruction and theft
- The preservation and appropriate management of new finds should these be discovered during construction

7.1.2. Measurable targets

- No destruction of or damage to known sites
- Management of existing sites and new discoveries in accordance with legislation
- No litigation due to destruction of sites

7.3. FARMHOUSES / BUILDINGS (All projects)

If and where the substation is close to any inhabited area, the necessary precautions shall be taken by the Contractor to safeguard the lives and property of the inhabitants. The Contractor shall under no circumstances interfere with the property of Landowners, Regional staff or nearby Communities.

(Specifics about the project)

7.3.1. Management objectives

- Control over actions and activities in close proximity to inhabited areas

7.3.2. Measurable targets

- No complaints from Landowners, Regional staff or Communities
- No damage to private property

7.4. INFRASTRUCTURE (New sites and extensions)

No interruptions other than those negotiated shall be allowed to any essential services. Damage to infrastructure shall not be tolerated and any damage shall be rectified immediately by the Contractor. A record of any damage and remedial actions shall be kept on site.

All existing private access roads used for construction purposes, shall be maintained at all times to ensure that the local people have free access to and from their properties. Speed limits shall be enforced in such areas and all drivers shall be sensitised to this effect.

Any possible disruptions to essential services must be kept to a minimum and should be well advertised and communicated to the Landowners and surrounding Communities. Care must be taken not to damage irrigation equipment, lines, channels and crops, as this could lead to major claims being instituted against Eskom and the Contractor. The position of all pipelines and irrigation lines in the vicinity of a site must be obtained from the Landowners or local Community and clearly marked. Where required such lines shall be deviated.

(Specifics about the project)

7.4.1. Management objectives

- The control of temporary or permanent damage to plant and installations
- Control of interference with the normal operation of plant and installations
- Securing of the safe use of infrastructure, plant and installations

7.4.2. Measurable targets

- No unplanned disruptions of services
- No damage to any plant or installations
- No complaints from Authorities, Landowners and Communities regarding disruption of services
- No litigation due to losses of plant, installations and income

8. PROBLEMS FORESEEN (New sites and extensions)

8.1. PRE-CONSTRUCTION

Most Landowners will see the construction period as interference with their daily activities. There will be a negative attitude towards the whole construction process. Landowners are always apprehensive toward changes they do not control and strangers on their properties

8.2. DURING CONSTRUCTION

Due to the current security situation Landowners are not comfortable when strangers come on to their properties. They will look for reasons to interfere with the construction process and may therefore cause delays in the process that can be very costly to Eskom and the Contractor.

Illegal collection of firewood or use of private amenities can cause problems with Landowners and communities that may lead to disruptions of the construction process.

Damage to fences, gates and other infrastructure may occur at any time. This will create problems with the Landowners and communities and should be avoided as far as possible.

The use of private roads for construction purposes always leads to damage due to heavy equipment and frequent use. It is foreseen that the Contractor will receive many complaints in this regard, especially during the rainy season.

8.3. AFTER CONSTRUCTION

If damaged infrastructure is not repaired to the expectations of the affected parties, they may engage in litigation. Outstanding claims for damages may also result in litigation.

9. POSSIBLE SOLUTIONS TO THE FORESEEN PROBLEMS (New sites and extensions)

1. Proper liaison between Eskom, the Contractor and affected parties regarding do's and don'ts.
2. The Landowners shall be informed of the starting date of construction as well as the phases in which the construction shall take place.
3. The Contractor must adhere to all conditions of contract including the Environmental Management Programme.
4. Environmental awareness training shall be given to all site staff regarding the conditions of this EMP and the ROD from DEAT, and shall include relevant posters placed strategically for information purposes.
5. Proper planning of the construction process to allow for disruptions due to rain and very wet conditions.
6. Where existing private roads are in a bad state of repair, such roads' condition shall be documented before they are used for construction purposes. If necessary some repairs should be done to prevent damage to equipment and plant.
7. All manmade structures shall be protected against damage at all times and any damage shall be rectified immediately.
8. The Contractor shall ensure that all damaged areas are rehabilitated to the satisfaction of Eskom and each and every affected party and that outstanding claims are settled.
9. Proper site management and regular monitoring of site works.
10. Proper documentation and record keeping of all complaints and actions taken.
11. Regular site inspections and good control over the construction process throughout the construction period.
12. A positive attitude towards implementing Environmental Management by all site personnel.
13. Environmental Audits to be carried out during and upon completion of construction (at least two for a new substation or extension project and one for any refurbishment or upgrade project).

10. SITE SPECIFIC PROBLEM AREAS (New sites and extensions)

Site specific problems, if any, are shown on the layout plans (**Design**) and accompanying photographs (Appendix 13.1). No-go areas, if any, are also identified on the plans.

10.1. ESTIMATED QUANTITIES FOR SPECIAL WORKS ON THE SITE

(As per specific contract identified in the EIR, ROD conditions and design)

11. METHOD STATEMENTS FOR THE CONTRACT

The Contractor shall supply method statements for all works required as stated throughout this document **as per specific contract requirement**. All agreements regarding **extra works for environmental compliance** shall be in writing and well documented. Work shall only commence upon approval by Eskom.

The ECO shall ensure that all works are in accordance with method statements and contract specifications.

12. SITE DOCUMENTATION / MONITORING / REPORTING

The standard Eskom site documentation shall be used to keep records on site. All documents shall be kept on site and be available for monitoring purposes. Site inspections by an Environmental Audit Team may require access to this documentation for auditing purposes. The documentation shall be signed by all parties to ensure that such documents are legal. Regular monitoring of site works by the ECO is imperative to ensure that all problems encountered are solved punctually and amicably. When the ECO is not available, the Contract Manager / Site Supervisor shall keep abreast of all works to ensure no problems arise.

Two-weekly environmental compliance reports shall be forwarded to the Transmission Engineering Environmental Advisor (appointed per project) with all information relating to environmental matters. The following **Key Performance Indicators** must be reported on a two-weekly basis by the ECO:

1. Complaints received from affected parties and actions taken.
2. Environmental incidents, such as oil spills, etc. and actions taken.
3. Incidents possibly leading to litigation and legal contravention's.
4. Environmental damage that needs specialised rehabilitation measures to be taken.

The following documentation shall be kept on site by the ECO:

- 12.1. Site daily dairy.
- 12.2. Complaints register.
- 12.3. Records of all remediation / rehabilitation activities.
- 12.4. Copies of two-weekly reports to the Transmission Engineering Environmental Advisor for auditing purposes.
- 12.5. Copy of the Environmental Management Programme.
- 12.6. Minutes of site meetings including discussions on environmental issues.

REFERENCES

Conservation of Agricultural Resources Act, Act 43 of 1983 and amendments.
Corporate directive for the management of PCB, ESKADAAO3 REV 1.
Environmental Impact Assessment of the Project.
Eskom Guidelines for Herbicide Use, TRR/S91/032.
Environment Conservation Act, Act 73 of 1989 and amendments.
Fencing Act, Act 31 of 1963 and amendments.
Hazardous Substances Act, 15 of 1973 and amendments.
Health Act, Act 63 of 1977.
Herbicide Management, ESKPBAAD4 REV 0.
Minerals Act, Act 50 of 1991.
National Environmental Management Act, Act 107 of 1998.
National Forest Act, Act 84 of 1998.
National Heritage Resources Act, Act 25 of 1999.
National Water Act, Act 36 of 1998.
Occupational Health and Safety Act, Act 85 of 1993
Record of Decision and conditions– DEAT.
Standard passive fire protection for oil-filled equipment in High Voltage yards,
TRMASAAQ8 REV 4
Standard for management of PCB, ESKASAAC2 REV1.

**PRO FORMA TO BE SIGNED BY THE CONTRACTOR AND ESKOM
PROJECT MANAGER AT CONTRACT AWARD.**

CONTRACT NAME: _____

CONTRACT NUMBER: _____

ENVIRONMENTAL COMPLIANCE

I _____ ON BEHALF OF _____(C)

I _____ ON BEHALF OF ESKOM

DECLARE AS FOLLOWS:

1. I AM AWARE THAT CONSTRUCTION, REFURBISHMENT OR UPGRADING ACTIVITIES CAN HAVE A MAJOR IMPACT ON THE ENVIRONMENT.
2. I UNDERTAKE TO ADHERE TO THE REQUIREMENTS AS SET OUT IN THE ENVIRONMENTAL MANAGEMENT PROGRAMME AND THE RECORD OF DECISION FROM DEAT.
3. I PLEDGE TO INFORM ALL SITE STAFF OF THEIR INVOLVEMENT IN MANAGING ENVIRONMENTAL IMPACTS ON SITE.
4. I COMMIT TO IMPLEMENTING ENVIRONMENTAL BEST PRACTISE ON SITE AT ALL TIMES DURING THE CONTRACT.

SIGNED: _____ DATE: _____

CONTRACTOR

SIGNED: _____ DATE: _____

ESKOM

Questionnaire to be completed during tender stage by the contractor for evaluation purposes of the tender for substation construction:

PLEASE TICK APPROPRIATE BOX (All yes answers to be accompanied by proof)	YES	NO
ENVIRONMENTAL MANAGEMENT SYSTEM - GENERAL		
1-Is your company ISO 14001 certified?		
2-Is your company ISO 14001 compliant?		
3-Does your company have an Environmental Management System in place?		
4-Does your company have an Environmental Policy?		
5-Does your company have an Environmental Statement?		
6-Is your company in the process of implementing any of the above?		
7-Will you be using sub-contractors during the project?		
8-Does any of your proposed sub-contractors comply with 1-6 above?		
ENVIRONMENTAL MANAGEMENT PROGRAMME - GENERAL		
1-Do you understand the contents and context of this EMP attached to the tender document?		
2-Do you agree to implement the requirements of the EMP on site?		
3-Did you allow for the appointment of a specific person to act as the dedicated Contractor Environmental Liaison Officer (CELO) on site for the duration of the contract? (As per responsibility matrix on page 5 of the EMP)		
4-Is your CELO qualified to implement the EMP conditions? Please attach CV.		
5-Have you allowed sufficient funds for implementing the requirements of the EMP? (Environmental management requirements)		
6-State total amount allowed for EMP implementation = R	R	
METHOD STATEMENTS		
1-Did you supply a method statement for campsite establishment?		
2-Did you supply a typical drawing of your camp layout?		
3-Did you supply a method statement for camp wastewater management?		
4-Did you supply a method statement for camp and site ablution management?		
5-Did you supply a method statement for solid waste management?		
6-Did you supply a method statement for hazardous (oil, fuel, herbicides, etc) substance management?		
7-Did you supply a method statement for fire management on site and in the camp?		
8-Did you supply a method statement for concrete management?		
ENVIRONMENTAL MANAGEMENT PROGRAMME - SPECIFIC		
1-Did your tender allow for the installation of sealed and bunded fuel storage areas?		
2-Did you allow for a contained workshop area for servicing of vehicles?		
3-Did you allow for signage to mark access roads to the site?		
4-Did you allow for emergency spill kits to address possible spills of fuel and oil to prevent pollution?		
5-Does the vegetation-clearing contractor comply with section 4.7 of the EMP?		
6-Did you allow for suitable means and materials to safeguard excavations?		

APPENDIX J

ESKOM GENERIC EMP FOR CONSTRUCTION ACTIVITIES

TRANSMISSION SERVICES



ENVIRONMENTAL MANAGEMENT PROGRAMME

EMP **Line Construction**

J Geeringh
Senior Environmental Advisor
Tx Services, Land & Rights focus area

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1. SCOPE

The scope of this document is to give guidelines for environmental best practice, to the Contractor commissioned to construct the proposed transmission line. This document shall be seen as part of the contract and supplementary to Eskom's TRMSCAAC1 REV 3. **The management programme must thus be part of the enquiry document to make the recommendations and constraints, as set out in this document, enforceable under the general conditions of contract.**

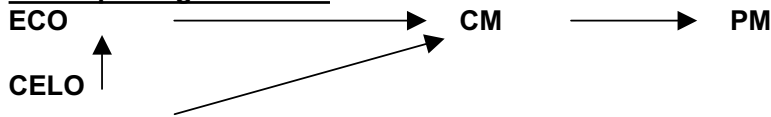
The management programme has a long-term objective to ensure that:

- 1) Environmental Management considerations are implemented from the start of the project,
- 2) Precautions against damage and claims arising from damage are taken timeously, and
- 3) The completion date of the contract is not delayed due to problems with Landowners arising during the course of construction.

Eskom would like a commitment from the Eskom Project Manager and Contractor on the following issues:

1. Take into consideration the Landowners as the line traverses private property.
2. Always behave professionally on and off site.
3. Ensure quality in all work done, technical and environmental.
 4. Resolve problems and claims arising from damage immediately to ensure a smooth flow of operations.
5. To underwrite Eskom's Environmental Policy at all times.
6. To use this Environmental Management Programme for the benefit of all involved.
7. To preserve the natural environment by limiting destructive actions on site.

1.1. Reporting Structure.



- ECO: Environmental Control Officer (Can be the Eskom Site Supervisor)
- C: Contractor
- CM: Contract Manager (Eskom)
- CELO: Contractor Environmental Liaison Officer (Dedicated person)
- PM: Project Manager (Eskom)

1.2. Responsibility Matrix.

Function	Name / Cell Nu	Responsibility
Project Manager (PM) Eskom		Overall management of project and EMP implementation
Site Supervisor/ Contract Manager (CM) Eskom		Oversees site works, liaison with Contractor, PM and ECO
Environmental Control Officer (ECO) Eskom		Implementation of EMP and liaison between Eskom, Contractor and Landowners
Contractor (C)		Implementation and compliance with recommendations and conditions of the EMP, Appoints dedicated person (CELO) to work with ECO
Contractor Environmental Liaison Officer (CELO)		Implementation of EMP, landowner interaction, environmental control of site actions, re-mediation and rehabilitation work.
Tx Services Environmental Advisor (Eskom)		Environmental advice and auditing

(Table to be completed upon Contract award)

2. INTRODUCTION

The construction of Transmission lines can have a major impact on the environment. It is thus imperative that better precautions be taken to ensure that environmental damage is minimised. This will take a concerted effort from the Contractor and proper planning is of the utmost importance. The Environmental Control Officer shall make contact with the local Extension Officer of the Dept. of Agriculture, as this person has valuable information about the area and the local farming community.

(Information regarding the line and special conditions in general).

The Environmental Control Officer shall convey the contents of this document to the Contractor site staff and discuss the contents in detail with the Project Manager and Contractor.

The Contractor (TRMSCAAC1 REV 3 section 4.1.2) shall take all the necessary precautions against damage.

Good relations with Landowners need to be established and sustained. This will help in the solving of problems and the prevention thereof. Lines of communication should always be open to ensure proper and timeous reaction to complaints. The contact numbers of the ECO and Contractor shall be made available to Landowners. The reputation of both the Contractor and Eskom is at stake and should be the drive for everybody involved to perform in excellence.

All Environmentally sensitive areas are indicated on the profiles and the Project Manager and Contractor shall take note of these.

During the construction period at least two (2) Environmental Audits shall be conducted to determine compliance with the recommendations of the EIA, EMP and conditions of the Record of Decision (ROD). These can be internal or external by DEAT or combined audits.

3. TECHNICAL SPECIFICATIONS OF THE LINE

3.1. LENGTH:

The length of the line will be approximately _____ km.

3.2. SERVITUDE WIDTH:

The building restriction is __55__m. Construction is limited to the __55__m servitude in which the line will be constructed. A 6m strip shall be cleared flush with the ground to facilitate access and construction, except where tower erection and stringing requires more space. 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.

3.3. TOWER PARAMETERS:

- 3.3.1. Tower spacing : _____m. (Average)
- 3.3.2. Tower height : _____m. (Average)
- 3.3.3. Conductor attachment height : _____m. (Average)
- 3.3.4. Conductor type : _____.
- 3.3.4. Minimum ground clearance : _____m.

3.4. TOWER DESIGN:

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

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

3.5. MAJOR ACTIVITIES OF THE PROJECT

The project involves 18 major activities of which 4 are completed. These are:

1. Environmental Impact Study – Copy of ROD appended to this document.
2. Negotiations for the servitude –Landowners list and details appended.
3. Land survey to determine exact placement of the line towers.
4. Drawing work to produce the profiles for construction – profiles included.

The following activities are still to be performed and will take approximately 6 months to complete:

1. Erection of camp sites for the Contractors' workforce.
2. Negotiations for access roads to the servitude.
3. Servitude gate installation to facilitate access to the servitude.
4. Bush clearing to facilitate access, construction and the safe operation of the line.
5. Establishing of access roads on the servitude.
6. Transportation of equipment, materials and personnel.
7. Installation of foundations for the towers.
8. Tower assembly and erection.
9. Conductor stringing and regulation.
10. Final inspection of the line and hand over to region for operation.
11. Rehabilitation of disturbed areas.
12. Signing off Landowners.
13. Handing and taking over of the servitude.
14. Operation and maintenance of the line.

The final inspection for the release of the Contractors' guarantee takes place 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 plant. Subsequent maintenance and refurbishment can extend the operational lifetime of the plant substantially.

3.6. PROJECT EXECUTION AREA

Construction activities are limited to the area as demarcated by Eskom and shown on the site plans. Any area outside Eskom owned property, required to facilitate access, construction camps or material storage areas, shall be negotiated with the Landowner and written agreements shall be obtained.

Should water be required from sources other than Eskom supply, a written agreement shall be reached between the Contractor and the Landowner in the presence of Eskom. Should the Contractor be required to use water from a natural source, **the Contractor shall supply a method statement to that effect.** Strict control shall be maintained and the ECO shall regularly inspect the abstraction point and methods used.

No work shall commence until permission is granted from the Environmental Advisor from Transmission Engineering and the ROD from DEAT has been obtained. The

Project Manager shall ensure that all conditions in the ROD are fulfilled before the Contractor occupies the site.

3.7. SITE ESTABLISHMENT

Site establishment shall take place in an orderly manner and all amenities shall be installed at Camp sites before the main workforce move onto site. **A method statement is required from the Contractor at tender stage that includes the layout of the camp, management of ablution facilities and wastewater management.** The Contractor camp shall have the necessary ablution facilities with chemical toilets where such facilities are not available at commencement of construction. The Contractor shall supply a wastewater management system that will comply with legal requirements and be acceptable to Eskom.

Where Eskom facilities are available the Contractor shall make use of such facilities where it is viable and possible. The Contractor shall inform all site staff to the use of supplied ablution facilities and under no circumstances shall indiscriminate excretion and urinating be allowed other than in supplied facilities.

The Contractor shall supply waste collection bins where such is not available and all solid waste collected shall be disposed of at a registered waste dump. A certificate of disposal shall be obtained by the Contractor and kept on file. Where a registered waste site is not available close to the construction site, **the Contractor shall provide a method statement with regard to waste management. Under no circumstances may solid waste be burned on site unless a suitable incinerator is available.**

3.8. WORKSHOP AND EQUIPMENT STORAGE AREAS

Where possible and practical all maintenance of vehicles and equipment shall take place in the workshop area. During servicing of vehicles or equipment, a suitable drip tray shall be used to prevent spills onto the soil, especially where emergency repairs are effected outside the workshop area. Leaking equipment shall be repaired immediately or be removed from site to facilitate repair. All potentially hazardous and non-degradable waste shall be collected and removed to a registered waste site.

Workshop areas shall be monitored for oil and fuel spills and such spills shall be cleaned and re-mediated to the satisfaction of the ECO. **To this end a method statement is required from the Contractor, tendering for the project, to show procedures for dealing with possible emergencies that can occur, such as fire and accidental leaks and spillage.** The Contractor shall be in possession of an emergency spill kit that must be complete and available at all times on site.

The following shall apply:

- All contaminated soil / yard stone shall be removed and be placed in containers. Contaminated material can be taken to one central point where bio-remediation can be done.
- Smaller spills can be treated on site.
- A specialist Contractor shall be used for the bio-remediation of contaminated soil where the required remediation material and expertise is not available on site.
- All spills of hazardous substances must be reported to the ECO and appointed Transmission Engineering Environmental Advisor (**Tx Key Performance Indicator requirement**).

3.9. STORAGE AREAS OF HAZARDOUS SUBSTANCES

All hazardous substances shall be stored in suitable containers and storage areas shall be banded. This includes all carbon substances like fuel and oil as well as herbicides and battery acid. A register shall be kept on all substances and be available for inspection at all times. Areas shall be monitored for spills and any spills shall be contained, cleaned and rehabilitated immediately. Any leaking containers shall be repaired or removed from site (See above for actions after spills).

Storage areas shall display the required safety signs depicting “No smoking”, “No naked lights” and “Danger”. Containers shall be clearly marked to indicate contents as well as safety requirements. **The contractor shall supply a method statement for the storage of hazardous materials at tender stage.**

4. PHYSICAL ISSUES AND THEIR CONTROL

4.1. TERRAIN

(Description of terrain, major land-use activities, soil types, etc.)

(Any special terrain issues to be considered for timing of the project like turf in the rainy season and access problems, etc.)

4.1.1. Management objectives

- Minimise scarring of the soil surface and land features
- Minimise disturbance and loss of topsoil
- Rehabilitate all disturbed areas along the servitude

4.1.2. Measurable targets

- No visible erosion scars once construction is completed
- Minimum loss of topsoil at any one site
- No barren areas visible three months after construction is completed
- All damaged areas successfully rehabilitated

4.2. WET AREAS

Permanently wet areas are shown on the profiles. No vehicular traffic shall be allowed in such areas. Only existing roads through such areas may be used with the approval of Eskom and the Landowner. No equipment shall be used which may cause irreparable damage to wet areas. The contractor shall use alternative methods of construction in such areas. **Refer to TRMSCAAC1 REV 3 section 4.4.1 regarding access through seasonally wet areas.**

(Specifics about the project)

4.2.1. Management objectives

- Avoid wet areas to prevent damage

4.2.2. Measurable targets

- No damage to wet areas

4.3. RIVER CROSSINGS

No roads shall be cut through river- and stream banks as this may lead to erosion causing siltation of streams and downstream dams. Existing drifts and bridges may be used if the Landowner gives his consent. Such structures shall then be thoroughly examined

for strength and durability before they are used. New drifts and bridges shall only be constructed with the approval of Eskom and the Landowner and at the discretion of the Environmental Control Officer. Refer to TRMSCAAC1 REV 3 section 4.4.1 regarding access across running water.

(Special description of any specific problems or areas along the route).

4.3.1. Management objectives

- Minimise damage to river and stream embankments
- Minimise erosion of embankments and subsequent siltation of rivers and streams

4.3.2. Measurable targets

- No access roads through river and stream banks
- No visible erosion scars on embankments once construction is completed

4.4. EROSION AND DONGA CROSSINGS

Crossing of dongas and eroded areas shall be thoroughly planned and accordance with TRMSCAAC1 REV 3 section 4.4.1. Water diversion berms shall be installed at donga crossings to ensure runoff water on the servitude does not run into dongas and cause an erosion hazard.

(Specifics about the project)

4.4.1. Management objectives

- Minimise erosion damage on donga crossings
- Minimise impeding the natural flow of water
- Minimise initiation of erosion through donga embankments

4.4.2. Measurable targets

- No disturbance to donga embankments
- No erosion visible on donga embankments due to construction activities
- No interference with the natural flow of water

4.5. ACCESS ROADS

Planning of access routes must be done in conjunction between the Contractor, Eskom and the Landowner. All agreements reached should be documented and no verbal agreements should be made. The normal Eskom site documentation will be sufficient for this purpose. The Contractor shall properly mark all access roads. Markers shall show the direction of travel as well as tower numbers to which the road leads. Roads not to be used shall be marked with a " **NO ENTRY** " sign (refer also TRMSCAAC1 REV 3).

Where new access roads are constructed, this must be done in accordance with TRMSCAAC1 REV 3 section 4.4. Water diversion berms shall be installed from the start of the contract in accordance with TRMSCAAC1 REV 3 section 4.6. These berms shall be maintained at all times and be repaired at the end of the contract. Where berms are installed on severe slopes the outflow shall be suitably stone pitched to prevent erosion from starting at the berms.

No roads shall be constructed on slopes of more than 20% unless such roads follow contours. In such areas the Contractor shall only use existing roads or alternative methods of construction. The Contractor shall take such areas into consideration during the tender.

The installation of concrete pipes and drifts, to facilitate access, shall be at the discretion of the Environmental Control Officer on site. Any dangerous crossings shall be marked as such and where necessary, speed limits shall be enforced.

Where necessary a suitable mixture of grass seed shall be used to re-seed damaged areas. Badly damaged areas shall be fenced in to enhance rehabilitation. The seed mixture should comply with the parameters as set out in section 4.12 of this document.

(Any specifics about the project).

4.5.1. Management objectives

- Minimise damage to existing access roads
- Minimise damage to environment due to construction of new access roads
- Minimise loss of topsoil and enhancement of erosion

4.5.2. Measurable targets

- No claims from Landowners due to damage on existing access roads
- No erosion visible on access roads three months after completion of construction
- No loss of topsoil due to runoff water on access roads

4.6. RUBBLE AND REFUSE DISPOSAL

The Contractor shall dispose of all excess material on site in an appropriate manner and at a designated place. All packaging material shall be removed from site and disposed of and not burned on site. A landfill may be used for biodegradable materials only but when it is closed up, the rubble shall be compacted and there shall be at least 1m of soil covering the waste material. No landfill may be used without the consent from the Landowner. No hazardous material, e.g. oil or diesel fuel shall be disposed of in any unregistered waste site. **(Refer also 3.7)**

No material shall be left on site that may harm man or animals. Any broken insulators shall be removed and all shards picked up. Broken, damaged and unused nuts, bolts and washers shall be picked up and removed from site. Surplus concrete may not be dumped indiscriminately on site, but shall be disposed of in designated areas as agreed by the Landowner. Concrete trucks shall not be washed on site after depositing concrete into foundations. Any spilled concrete shall be cleaned up immediately.

4.6.1. Management objectives

- To keep the servitude neat and clean
- Disposal of rubble and refuse in an appropriate manner
- Minimise litigation
- Minimise Landowner complaints

4.6.2. Measurable targets

- No rubble or refuse lying around on site
- No incidents of litigation
- No complaints from Landowners
- No visible concrete spillage on the servitude

4.7. VEGETATION CLEARING

The object of vegetation clearing is to trim, cut or clear the minimum number of trees and vegetation necessary for the safe mechanical construction and electrical operation of the transmission line. Vegetation clearing shall be done in accordance with ESKASABG3 REV 0 (Standard for bush clearance and maintenance within overhead power line servitudes –

Appendix 5). **Only a 8m strip may be cleared flush with the ground to allow vehicular passage.**

No scalping shall be allowed on any part of the servitude road unless absolutely necessary. The removal of all economically valuable trees or vegetation shall be negotiated with the Landowner before such vegetation is removed. All trees and vegetation cleared from the site shall be cut into manageable lengths and neatly stacked at regular intervals along the line. No vegetation shall be pushed into heaps or left lying all over the veld.

Vegetation clearing on tower sites must be kept to a minimum. Big trees with large root systems shall be cut manually and removed, as the use of a bulldozer will cause major damage to the soil when the root systems are removed. Stumps shall be treated with herbicide. Smaller vegetation can be flattened with a machine, but the blade should be kept above ground level to prevent scalping. Any vegetation cleared on a tower site shall be removed or flattened and not be pushed to form an embankment around the tower.

No vegetation clearing in the form of de-stumping, scalping or uprooting shall be allowed on river- and stream banks. Vegetation shall only be cut to allow for the passage of the pilot-cables and headboard. No vegetation clearing shall be allowed across ravines and gullies, as this vegetation will very rarely interfere with the clearance to the strung conductor. Trees and vegetation not interfering with the statutory clearance to the conductors can be left under the line. Dense vegetation under the line which could cause a fire hazard, particularly in the middle third of the span in the vicinity of the lowest point of the conductors, will be considered as a separate case.

Protected or endangered species of plants shall not be removed unless they are interfering with a structure. Where such species have to be removed due to interference with a structure, the necessary permission and permits shall be obtained **from Provincial Nature Conservation.** All protected species not to be removed must be clearly marked and such areas fenced off if required.

The use of herbicides shall only be allowed after a proper investigation into the necessity, the type to be used, the long-term effects and the effectiveness of the agent. Eskom's approval for the use of herbicides is mandatory (Contact Dr. Eugene van Rensburg—TRI, 082 451 1994). Application shall be under the direct supervision of a qualified technician. All surplus herbicide shall be disposed of in accordance with the supplier's specifications.

IT IS RECOMMENDED THAT A CONTRACTOR FOR VEGETATION CLEARING SHOULD COMPLY WITH THE FOLLOWING PARAMETERS:

- **THE CONTRACTOR MUST HAVE THE NECESSARY KNOWLEDGE TO BE ABLE TO IDENTIFY PROTECTED SPECIES AS WELL AS SPECIES NOT INTERFERING WITH THE OPERATION OF THE LINE DUE TO THEIR HEIGHT AND GROWTH RATE.**
- **THE CONTRACTOR MUST ALSO BE ABLE TO IDENTIFY DECLARED WEEDS AND ALIEN SPECIES THAT CAN BE TOTALLY ERADICATED.**
- **THE CONTRACTOR MUST BE IN POSSESSION OF A VALID HERBICIDE APPLICATORS LICENCE.**

(Specifics about the project)

4.7.1. Management objective

- Minimise damage to vegetation
- Keep servitude as natural looking as possible

- Minimise interference by vegetation to flow of electricity
- Minimise possibility of erosion due to removal of vegetation
- Minimise removal of plant material on river and stream embankments
- Eradication of alien invader species

4.7.2. Measurable targets

- Only 6m vegetation cleared along the centre of the servitude
- No trees and vegetation removed unnecessarily
- No vegetation interfering with structures and statutory distances upon completion of the contract
- No de-stumping of vegetation on river and stream embankments
- No visible erosion scars three months after completion of the contract due to vegetation removal
- No visible damage to the vegetation along the servitude one year after completion of the contract due to herbicide use
- No litigation due to unauthorised removal of vegetation
- All alien invaders eradicated from the servitude

4.8. GATE INSTALLATION AND GATE CONTROL

The contractor is referred to the Fencing Act, Act no 31 of 1963. Gate installation shall be according to TRMSCAAC1 REV 3 section 4.5 and the drawing 0.00/10261 Rev 2 as stated in the specifications. Game gates, drawing 0.00/10280 Rev 0, shall be installed where necessary. **All gates installed in electrified fencing shall be electrified as well.** The Environmental Control Officer shall approve gate positions. All gate positions shall be three (3) metres off centre to allow for continued access when stringing takes place.

All gates shall be fitted with locks and be kept locked at all times during the construction phase. Gates shall only be left open on request of the Landowner if he accepts partial responsibility for such gates in writing, once the Contractor have left site and the gates are fitted with Eskom locks. Such gates shall be clearly marked by painting the posts green. All claims arising from gates left open shall be investigated and settled in full by the Contractor. If any fencing interferes with the construction process, such fencing shall be deviated until construction is completed.

(Specifics about the project)

4.8.1. Management objective

- Properly installed gates to allow access to the servitude
- Minimise damage to fences
- Limit access to Eskom and Contractor personnel with gate keys

4.8.2. Measurable targets

- No transgressions of the fencing act and therefore no litigation
- No damage to fences and subsequent complaints from Landowners
- All gates equipped with locks and kept locked at all times to limit access to key holders
- All fences properly tied off to the gate posts
- All gates properly and neatly installed according to specifications
- No complaints about open gates

4.9. FIRE PREVENTION

No open fires shall be allowed on site under any circumstance (The Forest Act, No 122 of 1984, TRMSCAAC1 REV 3 section 4.1.2). The Contractor shall have fire-fighting equipment available on all vehicles working on site, especially during the winter months.

4.9.1. Management objective

- Minimise risk of veld fires
- Minimise damage to grazing

4.9.2. Measurable targets

- No veld fires started by the Contractor's work force
- No claims from Landowners for damages due to veld fires
- No litigation

4.10. SERVICING OF VEHICLES

Servicing of vehicles in the veld is strictly prohibited. Only emergency repairs shall be allowed on site and a drip tray shall be used to prevent oil spills. All vehicles shall be serviced in the designated area inside the Contractors camp. In the event of a breakdown in the veld, any oil spills shall be cleaned up immediately. (Refer also 3.8) The following shall apply:

- All contaminated soil shall be removed and be placed in containers. Contaminated soil can be taken to one central point at the Contractors campsite where bio-remediation can be done.
- Smaller spills can be treated on site.
- A specialist Contractor shall be used for the bio-remediation of contaminated soil.
- The area around the fuel storage drum at the Contractor's campsite shall also be remediated upon completion of the contract
- For further details contact John Geeringh at 011 800 2465. All oil spills must be reported to John Geeringh.

All old parts, packaging, old oil, etc. shall be disposed of in the correct manner and in a proper area designated for such waste materials. Under no circumstances shall such waste be buried on site indiscriminately.

4.10.1. Management objective

- Prevention of pollution of the environment
- Minimise chances of transgression of the acts controlling pollution

4.10.2. Measurable targets

- No pollution of the environment
- No litigation due to transgression of pollution control acts
- No complaints from Landowners

4.11. CLAIMS FOR DAMAGES

All anticipated crop damage shall be noted while access negotiations are underway. All damage to commercial crops shall be recorded immediately. The Environmental Control Officer should also keep a photographic record of such damage. The date, time of damage, type of damage and reason for the damage shall be recorded in full to ensure the responsible party is held liable. All claims for compensation emanating from crop damage should be directed to the Environmental Control Officer for appraisal. The Contractor shall be held liable for all unnecessary damage to the environment and crops. **A register shall be kept of all complaints from Landowners. All claims shall be handled immediately to ensure timeous rectification / payment.**

4.11.1. Management objective

- Minimise complaints from Landowners
- Prevent litigation due to outstanding claims
- Successful completion of the contract and all Landowners signing release forms

4.11.2. Measurable targets

- All claims investigated and settled within one month
- No litigation due to unsettled claims
- All Landowners signing release forms within six months after completion of the contract

4.12. TOWER POSITIONS

Refer to TRMSCAAC1 REV 3 SECTION 4.4.5 for specifications concerning tower sites on slopes. Disturbance of topsoil on tower sites with severe slopes shall be minimised at all costs. At any tower sites where conventional foundations are installed, the Contractor shall remove the topsoil separately and store it for later use during rehabilitation of such tower sites. During backfilling operations, the Contractor shall take care not to dump the topsoil in the bottom of the foundation and then put spoil on top of that.

Re-seeding shall be done on disturbed areas as directed by the Environmental Control Officer. In accordance with the Conservation of Agricultural Resources Act, No 43 of 1983, slopes in excess of 2% must be contoured and slopes in excess of 12% must be terraced. Other methods of rehabilitation of tower sites may also be used at the discretion of the Environmental Control Officer, e.g. stone pitching, logging, etc. Contour banks shall be spaced according to the slope on tower sites. The type of soil shall also be taken into consideration.

A mixture of grass seed can be used provided the mixture is carefully selected to ensure the following:

- a) Annual and perennial grasses are chosen.**
- b) Pioneer species are included.**
- c) All the grasses shall not be edible.**
- d) Species chosen will grow in the area without many problems.**
- e) Root systems must have a binding effect on the soil.**
- f) The final product should not cause an ecological imbalance in the area.**

To get the best results in a specific area, it is a good idea to consult with a specialist or the local extension officer of the Dept of Agriculture. Seed distributors can also give valuable advice as to the mixtures and amount of seed necessary to seed a certain area. Re-seeding, as well as fencing in of badly damaged areas, will always be at the discretion of the Environmental Control Officer, unless specifically requested by a Landowner.

(Specifics about the project, special tower positions, helicopter construction, etc.)

4.12.1. Management objective

- Minimise damage to topsoil and environment at tower positions
- Successful rehabilitation of all damaged areas
- Prevention of erosion

4.12.2. Measurable targets

- No loss of topsoil due to construction activities
- All disturbed areas successfully rehabilitated within three months of completion of the contract

- No visible erosion scars three months after completion of the contract

4.13. WINCH- AND TENSIONER STATIONS

The siting of winch and tensioner stations shall be done in conjunction with the ecologist/botanist and archaeologist that participated in the compilation of the EMP.

Specifications require the protection of Eskom supplied material on site, especially conductor drums. This normally means that a firebreak is bladed around a drum station in the veld. These areas are left to rehabilitate on their own which could be disastrous. Once the stringing of conductor has been completed in a certain area, the winch- and tensioner stations shall be rehabilitated where necessary. If the area was badly damaged, re-seeding shall be done and fencing in of the area shall be considered and carried out. For seeding the same provisions as in 4.12 shall apply. (See also 4.12 about slopes).

Fencing in of the storage areas for drums on site is also proposed, as this will keep out animals and prevent injury. Should the Contractor want to leave guards on site, this should be discussed and negotiated with the Landowner. Proper facilities must be provided to ensure sanitation standards are met. Mobile chemical toilets shall be installed at such sites where a large number of the workforce is concentrated.

4.13.1. Management objective

- Minimise damage to vegetation
- Minimise damage to topsoil
- Successful rehabilitation of barren areas

4.13.2. Measurable targets

- No damage to vegetation outside the servitude
- No loss of topsoil
- No visible erosion three months after completion of the contract
- All disturbed areas successfully rehabilitated three months after completion of the contract

4.14. BATCHING PLANTS

The siting of batching plants shall be done in conjunction with the ecologist/botanist and archaeologist that participated in the compilation of the EMP.

Refer to TRMSCAAC1 REV 3 section 4.8 for specifications regarding batching plants. The batching plant area shall be operated in such a way as to prevent contaminated water to run off the site and polluting nearby streams or water bodies. To this effect diversion berms can be installed to direct all wastewater to a catchment area.

Eskom shall ensure that all agreements reached with the Landowner are fulfilled, and that such areas be rehabilitated once construction is completed. Should any claim be instituted against Eskom, due to the actions of the Contractor at a batching plant site, Eskom shall hold the Contractor fully responsible for the claim until such time that the Contractor can prove otherwise with the necessary documentation. (Refer to section 3.6 regarding use of water from a natural source at a bathing plant)

4.14.1. Management objective

- To ensure all agreements with Landowners are adhered to
- Prevention of complaints from Landowners
- Successful rehabilitation of disturbed areas

4.14.2. Measurable targets

- No complaints from Landowners
- All disturbed areas successfully rehabilitated three months after completion of the contract

4.15. STRINGING OPERATIONS

The necessary scaffolding must be installed to prevent damage to structures supporting certain perennial crops, such as grapes, as well as the crops itself (Refer TRMSCAAC1 REV 3 section 8.2.1.). All structures supplying services such as telephone and smaller power lines, as well as farm roads, shall be safeguarded by measures to prevent disruption of services (see Section 7.4).

(Specifics about the project, known problems, etc.)

4.15.1. Management objective

- Prevent damage to expensive structures and crops
- Prevent disruption of services

4.15.2. Measurable targets

- No claims emanating from damage to supporting structures and crops
- No complaints or claims arising from disruption of services

5. SOCIAL ISSUES AND THEIR CONTROL

5.1. SANITATION

The Contractor shall install mobile chemical toilets on site (TRMSCAAC1 REV 3). Staff shall be sensitised to the fact that they should use these toilets at all times. Should the workers make use of the veld, all stools shall be buried.

5.1.1. Management objective

- Ensure that proper sanitation is achieved

5.1.2. Measurable target

- No complaints received from Landowners regarding sanitation

5.2. PREVENTION OF DISEASE

Applicable where the transmission line traverses land where stock (cattle and sheep) and game farming is practised. The Contractor shall take all the necessary precautions against the spreading of disease, especially under livestock. Refer to Section 5.2 and TRMSCAAC1 REV 3 regarding prevention measures. A record shall be kept of drugs administered and the dates when this was done. This can then be used as evidence in court should any claims be instituted against Eskom or the Contractor. **The workforce shall also be sensitised to the effects of sexually transmitted diseases, especially AIDS.**

5.2.1. Management objective

- Prevent litigation due to infestation of livestock

5.2.2. Measurable targets

- No complaints from Landowners
- No litigation

5.3. INTERACTION WITH LANDOWNERS

The success of the project depends a lot on the good relations with the Landowners. It is therefore required that the Contractor will supply one person to be the liaison officer (CLLO) for the entire contract, and that this person shall be available to investigate all problems arising on the work sites concerning the Landowners (TRMSCAAC1 REV 3)

All negotiations for any reason shall be between Eskom, the Landowner and the Contractor. **NO** verbal agreements shall be made. All agreements shall be recorded properly and all parties shall co-sign the documentation. It is proposed that the Contractor keep a photographic record of access roads. This will then be available should any claims be instituted by any Landowners. Any claims instituted by the Landowners shall be investigated and treated promptly. Unnecessary delays should be avoided at all costs.

The Landowners shall always be kept informed about any changes to the construction programme should they be involved. If the Environmental Control Officer is not on site the Contractor's liaison officer should keep the Landowners informed. The contact numbers of the Contractor's liaison officer and the Eskom ECO shall be made available to the Landowners. This will ensure open channels of communication and prompt response to queries and claims.

All contact with the Landowners shall be courteous at all times. The rights of the Landowners shall be respected at all times and all staff shall be sensitised to the effect that we are working on private property.

5.3.1. Management objective

- Maintain good relations with Landowners

5.3.2. Measurable targets

- No delays in the project due to Landowner interference

5.4. LITTERING CONTROL

Littering by the employees of the Contractor shall not be allowed (TRMSCAAC1 REV 3 section 4.1.2 and Environment Conservation Act, No 73 of 1989). The Environmental Control Officer shall monitor the neatness of the work sites as well as the campsite.(Refer section 3.7 regarding rubble and refuse disposal).

5.4.1. Management objective

- Neat workplace and site

5.4.2. Measurable targets

- No complaints from Landowners

6. BIOLOGICAL ISSUES AND THEIR CONTROL

6.1. FAUNA

Construction activities must be planned carefully so as not to interfere with the calving and lambing season for most animal species. The Contractor's workforce will have to be very careful not to disturb the animals as this may lead to fatalities which will give rise to claims from the Landowners.

The Contractor shall under no circumstances interfere with livestock without the Landowner being present. This includes the moving of livestock where they interfere with construction activities. Should the Contractor's workforce obtain any livestock for eating purposes, they must be in possession of a written note from the Landowner.

The breeding sites of raptors and other wild bird species shall be taken into consideration during the planning of the construction programme. There are many instances where protected and endangered species of birds are nesting on our transmission towers without causing any problems to the flow of electricity or network stability. These birds are highly territorial and some have been using the same nests for many years, i.e. Black Eagle (Witkruisarend). They are guarded jealously by the landowners and are monitored by many groups involved with ensuring their continued existence, including Nature Conservation officials at National and Provincial level.

It is therefore imperative that the breeding sites of these birds are kept intact and that the breeding pairs are not disturbed especially where there are young nestlings. The Contractor shall take all the necessary precautions and it is recommended that sites on parallel existing lines be noted, i.e. tower numbers. This information must then be given to the avian specialist via the Environmental Advisor so that the necessary action can be taken timeously.

Should any new sites or nests be found, during the construction process, that was not known or have been noted before, each site shall be assessed for merit and the necessary precautions be taken to ensure the least disturbance.

The recommendations of the avian specialist shall be adhered to at all time to prevent unnecessary disruption of such species. Bird guards and diverters shall be installed, as per the recommendations of the avian specialist, on the new line.

(Specifics about the project)

6.1.1. Management objective

- Minimise disruption of farming activities
- Minimise disturbance of animals
- Minimise interruption of breeding patterns of birds

6.1.2. Measurable targets

- No stock losses where construction is underway
- No complaints from Landowners or Nature Conservation
- No litigation concerning stock losses and animal deaths

6.2. FLORA

Protected or endangered species may occur along the line route. Special care should be taken not to damage or remove any such species unless absolutely necessary. Permits for removal must be obtained **from Provincial Nature Conservation** should such species be affected. All plants not interfering with the operation of the line shall be left undisturbed. **Collection of firewood is strictly prohibited.**

(Specifics about the project)

6.2.1. Management objective

- Minimal disturbance to vegetation where such vegetation does not interfere with construction and operation of the line
- Prevention of litigation concerning removal of vegetation

6.2.2. Measurable targets

- No litigation due to removal of vegetation without the necessary permits

6.3. HERBICIDE USE

Herbicide use shall only be allowed with the approval of Eskom. The application shall be according to set specifications and under supervision of a qualified technician. The possibility of leaching into the surrounding environment shall be properly investigated and only environmentally friendly herbicides shall be used (Refer section 4.7. regarding VEGETATION CLEARING and section 3.9 regarding storage of hazardous substances).

6.3.1. Management objective

- Control over the use of herbicides

6.3.2. Measurable targets

- No signs of vegetation dying due to leaching of herbicides one year after completion of the bush clearing
- No Landowner complaints and litigation

7. CULTURAL ISSUES AND THEIR CONTROL

7.1. ARCHAEOLOGY

The position of known sites will be shown on the final profiles. Such areas shall be marked as no go areas. Artefacts shall not be removed under any circumstances. No dolomite, breccia or stomatolites may be removed or disturbed without the required permits from SAHRA. Any destruction of a site can only be allowed once a permit is obtained and the site has been mapped and noted. Permits shall be obtained from the South African Heritage Resources Association (SAHRA) should the proposed line affect any world heritage sites or if any sites are to be destroyed or altered.

Should any archaeological sites be uncovered during construction, their existence shall be reported to Eskom immediately, John Geeringh to be informed at 011 800 2465. An archaeologist will then take the necessary action so that construction can continue.

(Specifics about the project)

7.1.1. Management objective

- Protection of archaeological sites and land considered to be of cultural value
- Protection of known sites against vandalism, destruction and theft
- The preservation and appropriate management of new archaeological finds should these be discovered during construction

7.1.2. Measurable targets

- No destruction of or damage to known archaeological sites
- Management of existing sites and new discoveries in accordance with the recommendations of the Archaeologist

7.2. MONUMENTS/HISTORICAL SITES

All monuments, heritage sites and historical sites shall be treated with the utmost respect. Any graves shall be clearly marked and treated as no go areas. No destruction of any site shall be allowed. Should it be necessary to remove any graves, the necessary procedures shall be followed and permits obtained.

(Specifics about the project)

7.1.1. Management objective

- Protection of sites and land considered to be of cultural value
- Protection of known sites against vandalism, destruction and theft

- The preservation and appropriate management of new finds should these be discovered during construction

7.1.2. Measurable targets

- No destruction of or damage to known sites
- Management of existing sites and new discoveries in accordance with legislation
- No litigation due to destruction of sites

7.3. FARMHOUSES / BUILDINGS

If and where the lines cross any inhabited area, the necessary precautions shall be taken by the Contractor to safeguard the lives and property of the inhabitants. The Contractor shall under no circumstances interfere with the property of Landowners.

If water is required, the Contractor shall negotiate with the relevant Landowner and a written agreement shall be drawn up (TRMSCAAC1 REV 3 section 4.8).

(Specifics about the project)

7.3.1. Management objective

- Control over actions and activities in close proximity to inhabited areas

7.3.2. Measurable targets

- No complaints from Landowners
- No damage to private property

7.4. INFRASTRUCTURE

No telephone lines shall be dropped during the stringing operations. All crossings shall be with at least rugby posts to protect the lines. Where pipe lines are found along the route, the depth of the pipes under the surface shall be determined to ensure that proper protection is afforded to such structures. Any damage to pipe lines shall be repaired immediately.

All existing private access roads used for construction purposes, shall be maintained at all times to ensure that the local people have free access to and from their properties. Speed limits shall be enforced in such areas and all drivers shall be sensitised to this effect. Upon completion of the project all roads shall be repaired to their original state.

Many Landowners use electrically driven farming activities such as irrigation or dairies. Power cuts to facilitate construction and especially stringing must be carefully planned. If possible disruptions must be kept to a minimum and should be well advertised and communicated to the Landowners. Care must be taken not to damage irrigation equipment, lines, channels and crops, as this could lead to major claims being instituted against Eskom and the Contractor. The position of all pipelines and irrigation lines must be obtained from the Landowners and be shown on the physical access plan.

(Specifics about the project)

7.4.1. Management objective

- The control of temporary or permanent damage to plant and installations
- Control of interference with the normal operation of plant and installations
- Securing of the safe use of infrastructure, plant and installations

7.4.2. Measurable targets

- No unplanned disruptions of services

- No damage to any plant or installations
- No complaints from authorities or Landowners regarding disruption of services
- No litigation due to losses of plant, installations and crops

8. PROBLEMS FORESEEN ON THE PROJECT

8.1. PRE-CONSTRUCTION

Most Landowners will see the construction period as interference with their daily activities. There will be a negative attitude towards the whole construction process. Landowners are always apprehensive toward changes they do not control. Landowners shall therefore be informed timeously of the construction programme, duration and all interference with their daily activities.

8.2. DURING CONSTRUCTION

Due to the current security situation Landowners are not comfortable when strangers come on to their properties. They will look for reasons to interfere with the construction process and may therefore cause delays in the process that can be very costly to Eskom and the Contractor.

(Specifics about the project)

The Contractor is reminded that access shall not be continuous along the servitude and allowance must be made for the translocation of equipment around obstacles such as rivers and irrigation channels.

No camping shall be allowed on any private property. If the Contractor wants to leave guards on site, it shall only be done with the written consent of the Landowners involved.

Damage to fences, gates and other infrastructure may occur at any time. This will create problems with the Landowners and should be avoided as far as possible. All damage to be repaired immediately and to the satisfaction of the landowner.

The use of private roads for construction purposes always leads to damage due to heavy equipment and frequent use. It is foreseen that the Contractor will receive many complaints in this regard, especially during the rainy season.

8.3. AFTER CONSTRUCTION

If damaged infrastructure is not repaired to the expectations of the Landowners, they may refuse to sign the release forms and even engage in litigation. Outstanding claims may also result in release forms not being signed by the Landowners.

9. POSSIBLE SOLUTIONS TO THE PROBLEMS

9.1. Proper liaison between Eskom, the Contractor and Landowners.

9.2. A physical access plan along the servitude shall be compiled and the Contractor shall adhere to this plan at all times. Proper planning when the physical access plan is drawn up by the Environmental Control Officer in conjunction with the Contractor shall be necessary to ensure access to all tower sites.

9.3. The Landowners shall be informed of the starting date of construction as well as the phases in which the construction shall take place.

9.4. The Contractor must adhere to all conditions of contract including the Environmental Management Programme.

9.5. Proper planning of the construction process to allow for disruptions due to rain and very wet conditions.

9.6. All servitude gates on a section of the line route shall be completely installed before any construction activities are undertaken.

- 9.7. Where existing private roads are in a bad state of repair, such roads' condition shall be documented before they are used for construction purposes. If necessary some repairs should be done to prevent damage to equipment and plant.
- 9.8. All manmade structures shall be protected against damage at all times and any damage shall be rectified immediately.
- 9.9. Rehabilitation of the servitude roads shall be done properly to ensure all Landowners sign the release forms. The Contractor shall ensure that all damaged areas are rehabilitated to the satisfaction of Eskom and each and every property owner and that outstanding claims are settled.
- 9.10. Proper site management and regular monitoring of site works.
- 9.11. Proper documentation and record keeping of all complaints and actions taken.
- 9.12. Regular site inspections and good control over the construction process throughout the construction period.
- 9.13. A positive attitude towards Environmental Management by all site personnel.
- 9.14. Appointment of a Landowner Liaison Officer on behalf of the Contractor to implement this EMP as well as deal with all Landowner related matters.
- 9.15. Environmental Audits to be carried out during and upon completion of construction (**at least two for the project**).
- 9.16. **The Contractor shall not be released from site until all Landowners have signed off the release documentation to the satisfaction of the Environmental Control Officer.**

10. TOWER SPECIFIC PROBLEM AREAS

Tower specific problems are shown on the profiles and accompanying photographs (Appendix 13.2). No-go areas are also identified on the profiles.

10.1. ESTIMATED QUANTITIES FOR SPECIAL WORKS ALONG THE SERVITUDE

10.1.1. Water diversion berms

The contractor shall allow for the installation of water diversion berms as per the contract schedule. Berms shall be installed according to TRMSCAAC1 REV 3. It is foreseen that approximately ____km of servitude through natural veld will require water diversion berms on the servitude road. **IN THE SECTION OF THE LINE THAT RUNS THROUGH CROP FARMING AREAS, BERMS ARE NOT REQUIRED.** Contour berms in crop farming areas shall be protected and rehabilitated upon completion of the contract. Berms will only be installed on private roads following special requests from Landowners. Existing berms on private roads shall however be maintained and repaired where required. Approximate quantities required:

- In situ : ____ water diversion berms
- Imported material : ____ water diversion berms

10.1.2. Concrete pipes : ____ crossings

10.1.3. Protection of irrigation lines : ____ crossings

10.1.4.a. Bush clearing (km) : ____km 6m wide strip

10.1.4.b. Bush clearing (km)(Selective) : ____km ____ m wide strip

10.1.5. Special stringing arrangements

- The Contractor will not be able to cross a river with conventional tractors pulling the pilot cable. Some other solution needs to be found for river crossings at _____ (sections of the line).
- The sections of the line crossing the _____ where special measures are required to protect the _____ (approximately _____m).
- The sections of line where special measures will be used to cross ravines or bush filled valleys and gullies.

11. PHYSICAL ACCESS PLAN

The Contractor (CLLO), in conjunction with the Environmental Control Officer (ECO) and Landowners, shall draft a physical access plan. No decisions shall be made without the consent of the Landowner. The standard Eskom site documentation shall be used. All agreements should be in writing and well documented.

The physical access plan shall allow for the installation of concrete pipes and drifts where such structures may be needed to facilitate access. The Environmental Control Officer in conjunction with the Contract Manager shall use discretion as to what special measures will be required to ensure access (Refer also Section 10.1). The necessary agreements reached shall be implemented to the satisfaction of the landowner.

12. SITE DOCUMENTATION / MONITORING / REPORTING

The standard Eskom site documentation shall be used to keep records on site. All documents shall be kept on site and be available for monitoring and auditing purposes. Site inspections by an Environmental Audit Team may require access to this documentation for

auditing purposes. The documentation shall be signed by all parties to ensure that such documents are legal. Regular monitoring of site works by the Environmental Control Officer is imperative to ensure that all problems encountered are solved punctually and amicably. When the Environmental Control Officer is not available, the Contract Manager/Site Supervisor shall keep abreast of all works to ensure no problems arise.

Two-weekly reports shall be forwarded to the appointed Transmission Engineering Environmental Advisor with all information relating to environmental matters. The following **Key Performance Indicators** must be reported on a two-weekly basis:

1. Complaints received from Landowners and actions taken.
2. Environmental incidents, such as oil spills, concrete spills, etc. and actions taken (litigation excluded).
3. Incidents possibly leading to litigation and legal contravention's.
4. Environmental damage that needs rehabilitation measures to be taken.

The following documentation shall be kept on site:

- 12.1. Access negotiations and physical access plan.
- 12.2. Complaints register.
- 12.3. Site daily dairy.
- 12.4. Records of all remediation / rehabilitation activities.
- 12.5. Copies of two-weekly reports to the Tx Engineering Environmental Advisor at MWP.
- 12.6. Copy of the Environmental Management Programme.

13. REFERENCES

Conservation of Agricultural Resources Act, Act 43 of 1983 and amendments.
Corporate directive for the management of PCB, ESKADAAO3 REV 1.
Environmental Impact Assessment of the Project.
Eskom Guidelines for Herbicide Use, TRR/S91/032.
Environment Conservation Act, Act 73 of 1989 and amendments.
Fencing Act, Act 31 of 1963 and amendments.
Hazardous Substances Act, 15 of 1973 and amendments.
Health Act, Act 63 of 1977.
Herbicide Management, ESKPBAAD4 REV 0.
Minerals Act, Act 50 of 1991.
National Environmental Management Act, Act 107 of 1998.
National Forest Act, Act 84 of 1998.
National Heritage Resources Act, Act 25 of 1999.
National Water Act, Act 36 of 1998.
Occupational Health and Safety Act, Act 85 of 1993
Record of Decision and conditions– DEAT.
Standard passive fire protection for oil-filled equipment in High Voltage yards, TRMASAAQ8 REV 4
Standard for management of PCB, ESKASAAC2 REV1.

14. APPENDICES

1. LANDOWNER SPECIAL CONDITIONS.
2. PROFILE SHEETS AND PHOTOGRAPHS.
3. TRANSMISSION ENVIRONMENTAL POLICY.
4. ESKOM BUSHCLEARING STANDARD – ESKASABG3 rev 0.
5. RECORD OF DECISION FROM DEAT.

**PRO FORMA TO BE SIGNED BY THE CONTRACTOR AND ESKOM PROJECT
MANAGER AT CONTRACT AWARD.**

CONTRACT NAME: _____
CONTRACT NUMBER: _____

ENVIRONMENTAL COMPLIANCE

I _____ ON BEHALF OF _____(C)
I _____ ON BEHALF OF ESKOM

DECLARE AS FOLLOWS:

1. I AM AWARE THAT CONSTRUCTION, REFURBISHMENT OR UPGRADING ACTIVITIES CAN HAVE A MAJOR IMPACT ON THE ENVIRONMENT.
2. I UNDERTAKE TO ADHERE TO THE REQUIREMENTS AS SET OUT IN THE ENVIRONMENTAL MANAGEMENT PROGRAMME AND THE RECORD OF DECISION FROM DEAT.
3. I PLEDGE TO INFORM ALL SITE STAFF OF THEIR INVOLVEMENT IN MANAGING ENVIRONMENTAL IMPACTS ON SITE.
4. I COMMIT TO IMPLEMENTING ENVIRONMENTAL BEST PRACTISE ON SITE AT ALL TIMES DURING THE CONTRACT.

SIGNED: _____ DATE: _____
CONTRACTOR

SIGNED: _____ DATE: _____
ESKOM

Contractor to supply at tender stage:

1. LIST OF METHOD STATEMENTS REQUIRED AT TENDER STAGE

1. The Contractor shall supply a method statement that outlines the approximate number of people on site, the layout of the camp, management of ablution facilities and wastewater management.
2. The Contractor shall provide a method statement with regard to waste management.
3. The Contractor shall provide a method statement to show procedures for dealing with possible emergencies that can occur, such as fire and accidental leaks and spillage of carbon fuels and oils.
4. The Contractor shall supply a method statement for the storage of hazardous substances.
5. The Contractor shall supply a method statement for dealing with veld fires caused on site during construction.
6. The Contractor shall supply a method statement for management of concrete and batching plants.

2. LIST OF METHOD STATEMENTS THAT MAY BE REQUIRED DURING THE CONSTRUCTION PROCESS

- Method statement for extraction of water from a natural source.
- Method statement for rehabilitation of a specific site.
- Method statement for waste disposal other than in a registered waste site.

NB! METHOD STATEMENTS 1-5 REQUIRED FOR TENDER EVALUATION PURPOSES.

Questionnaire to be completed during tender stage by the contractor for evaluation purposes of the tender for line construction:

PLEASE TICK APPROPRIATE BOX (All yes answers to be accompanied by proof)	YES	NO
ENVIRONMENTAL MANAGEMENT SYSTEM - GENERAL		
1-Is your company ISO 14001 certified?		
2-Is your company ISO 14001 compliant?		
3-Does your company have an Environmental Management System in place?		
4-Does your company have an Environmental Policy?		
5-Does your company have an Environmental Statement?		
6-Is your company in the process of implementing any of the above?		
7-Will you be using sub-contractors during the project?		
8-Does any of your proposed sub-contractors comply with 1-6 above?		
ENVIRONMENTAL MANAGEMENT PROGRAMME - GENERAL		
1-Do you understand the contents and context of this EMP attached to the tender document?		
2-Do you agree to implement the requirements of the EMP on site?		
3-Did you allow for the appointment of a specific person to act as the dedicated Contractor Environmental Liaison Officer (CELO) on site for the duration of the contract? (As per responsibility matrix on page 5 of the EMP)		
4-Is your CELO qualified to implement the EMP conditions? Please attach CV.		
5-Have you allowed sufficient funds for implementing the requirements of the EMP? (Environmental management requirements)		
6-State total amount allowed for EMP implementation = R	R	
METHOD STATEMENTS		
1-Did you supply a method statement for campsite establishment?		
2-Did you supply a typical drawing of your camp layout?		
3-Did you supply a method statement for camp wastewater management?		
4-Did you supply a method statement for camp and site ablution management?		
5-Did you supply a method statement for solid waste management?		
6-Did you supply a method statement for hazardous (oil, fuel, herbicides, etc) substance management?		
7-Did you supply a method statement for fire management on site and in the camp?		
8-Did you supply a method statement for concrete management?		
ENVIRONMENTAL MANAGEMENT PROGRAMME - SPECIFIC		
1-Did your tender allow for the installation of sealed and banded fuel storage areas?		
2-Did you allow for a contained workshop area for servicing of vehicles?		
3-Did you allow for signage to mark access roads the line?		
4-Did you allow for emergency spill kits to address possible spills of fuel and oil to prevent pollution?		
5-Does the vegetation-clearing contractor comply with section 4.7 of the EMP?		
6-Did you allow for suitable means and materials to safeguard excavations?		