PROJECT DETAILS

DEAT Reference No.	:	12/12/20/1014 (power station conversion) 12/12/20/1037 (transmission power line)
Title	:	Environmental Impact Assessment Process Final Environmental Impact Assessment (EIA) Report: Proposed Ankerlig Power Station Conversion and Transmission Integration Project, Western Cape Province
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Client	:	Eskom Holdings Limited (Eskom Generation Division)
Report Status	:	Final EIA Report for authority review
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PURPOSE OF THE ENVIRONMENTAL IMPACT ASSESSMENT REPORT

Eskom Holdings Limited (Eskom) is investigating the conversion of the nine Open Cycle Gas Turbine (OCGT) units to be installed at the existing Ankerlig Power Station (located in Atlantis Industria) plant to a Combined Cycle Gas Turbine (CCGT). This would increase the generating capacity of this existing power station by approximately 720 MW. The proposed conversion involves the addition of steam turbines to the existing gas turbine plant, and will be established on the same site as the existing Ankerlig Power Station.

Eskom is also proposing the construction of a 400kV transmission power line between the Ankerlig Power Station and the already authorised Omega Substation (to be located on the Farm Groot Oliphantskop 81) to integrate the additional power generated at Ankerlig Power Station into the national electricity grid.

Eskom has appointed Savannah Environmental, as independent environmental consultants, to undertake the Environmental Impact Assessment (EIA). The EIA process is being undertaken in accordance with the requirements of the National Environmental Management Act (NEMA; Act No. 107 of 1998).

This EIA Report represents the outcome of the EIA Phase of the EIA process and contains the following sections:

Chapter 1 provides background to the proposed power station conversion and transmission integration project and the EIA process.
Chapter 2 provides the strategic context for energy planning in South Africa.
Chapter 3 describes the components of the proposed project (project scope).
Chapter 4 outlines the process which was followed during the EIA Phase of the EIA process, including the consultation programme that was undertaken and input received from interested parties.
Chapter 5 describes the existing biophysical and socio-economic environment.
Chapter 6 presents the assessment of environmental impacts associated with the power station conversion and details recommended mitigation measures.
Chapter 7 presents the evaluation of environmental impacts associated with the proposed transmission power line and details recommended mitigation measures.
Chapter 8 presents the conclusions and recommendations of the EIA, as well as an Impact Statement.

The Scoping Phase of the EIA process identified potential issues associated with the proposed project, and defined the extent of the studies required within the EIA Phase. The EIA Phase addresses those identified potential environmental impacts and benefits (direct, indirect and cumulative impacts) associated with all phases of the project including design, construction and operation, and

recommends appropriate mitigation measures for potentially significant environmental impacts. The EIA report aims to provide the environmental authorities with sufficient information to make an informed decision regarding the proposed project.

The release of a draft EIA Report provided stakeholders with an opportunity to verify that the issues they raised through the EIA process were captured and adequately considered. This final EIA Report incorporates all issues and responses raised during the public review of the draft EIA Report prior to submission to the National Department of Environmental Affairs and Tourism (DEAT), the decision-making authority for the project.

PUBLIC REVIEW OF THE DRAFT EIA REPORT

The Draft EIA Report was made available for public review at the following public places in the project area from **10 October – 9 November 2008**:

» Wesfleur Library
» Atlantis Residents and Ratepayers Association office
» Red Door Local LED Office
» Atlantis Development Forum Office
» Avondale Library
» Melkbosstrand Residents and Ratepayers Association
» Melkbostrand Library

The report is also available on:
» www.eskom.co.za/eia
» www.savannahSA.com

Comments were requested as written submission via fax, post or e-mail.

STAKEHOLDER MEETING

In order to facilitate comments on the draft EIA Report, a stakeholder meeting was held during the review period. All interested and affected parties were invited to attend:

STAKEHOLDER WORKSHOP
DATE: Tuesday, 21 October 2008
TIME: 11h00
VENUE: Koeberg Visitor's Centre

The aim of this meeting was to provide feedback of the findings of the EIA process undertaken, and to invite comment on the proposed project.

SUMMARY

Background and Project Overview

As part of its plans for increased electricity supply options, Eskom is proposing the **conversion of the nine OCGT units** installed and being installed at the existing Ankerlig Power Station to Combined Cycle Gas Turbine (CCGT) units. This conversion will increase the generating capacity of the Ankerlig Power Station by approximately 720 MW by increasing the efficiency of the gas turbine plant (i.e. more power generated and sent out, for the same amount of fuel used). Overall thermal efficiency is therefore increased from approximately 34% for the current OCGTs to approximately 50% to 55% for the proposed CCGT plant, depending on the operating regime of the plant.

Electricity cannot be readily or inexpensively stored and must be used as it is generated. It is, therefore, required that electricity must be efficiently transmitted from the point of generation to the end user. It is vital that transmission capacity keeps up with both electricity generation capacity and electricity demand.

Therefore, in order to integrate the additional power generated at the Ankerlig Power Station into the national electricity grid, the **construction of a new 400kV transmission power line** between the Ankerlig Power Station and the Omega Substation will be required.

The Ankerlig Power Station conversion & associated transmission integration project can be seen as a third phase of the original Atlantis OCGT power station project. The construction of the initial OCGT units (i.e. the four units now in operation) was the first phase of the project. The second phase of the project (currently under construction) involves the expansion (capacity increase) of the power station by adding another five OCGT units, four fuel tanks and a switchyard to the power station.

The primary components of the conversion project include the following:

» A **heat recovery steam generator** (HRSG) will be added to the gas turbine to recover waste heat, to drive the steam turbine cycle.
» A **condenser** which converts exhaust steam from the steam turbine back into water through a cooling process.
» Depending on the configuration, a **bypass stack** for the CCGT, anticipated to be approximately 60 m in height will be associated with each HRSG.
» **Water treatment plant** (for treatment of potable water and production of demineralised water (for steam generation)).
» **Dry-cooled technology** consisting of a system of air-

cooled condenser fans situated in fan banks approximately between 25-30 m above ground.

» **Additional fuel storage facilities** and associated off-loading and other related infrastructure to cater for the increased fuel requirements associated with the higher load factor (i.e. longer operating hours or a mid-merit operating regime).

» An **elevated water tank**, approximately 20 m high, with a holding volume of approximately 2.5 million litres (i.e. water storage for approximately 5 days of operation).

The nature and extent of the power station conversion and transmission integration project, as well as potential environmental impacts associated with the construction of a facility of this nature is assessed in this Environmental Impact Assessment (EIA) Report.

Environmental Impact Assessment

The proposed power station conversion & associated transmission integration project is subject to the requirements of the Environmental Impact Assessment Regulations (EIA Regulations) published in Government Notice (GN) 28753 of 21 April 2006, in terms of Section 24(5) of the National Environmental Management Act (NEMA, No 107 of 1998). In terms of sections 24 and 24D of NEMA, as read with GNs R385 (Regulations 27–36) and R387, a Scoping and EIA are required to be undertaken for this proposed project.

The National Department of Environmental Affairs and Tourism (DEAT) is the competent authority for this project as Eskom is a statutory body. An application for authorisation has been accepted by DEAT (under Application Reference numbers **12/12/20/1014 (power station conversion)** and **12/12/20/1037 (transmission power line)**). Through the decision-making process, DEAT will be supported by the Western Cape Department of Environmental Affairs and Development Planning (DEA&DP).

The Scoping Study, which commenced in August 2007, provided I&APs with the opportunity to receive information regarding the proposed project, participate in the process and raise issues of concern.

The Scoping Report aimed at detailing the nature and extent of the proposed project, identifying potential issues associated with the proposed project, and defining the extent of studies required within the EIA. This was achieved through an evaluation of the proposed project, involving the project proponent, specialist consultants, and a consultation process with key stakeholders that included both relevant government authorities and interested and affected parties (I&APs). In accordance with the requirements of the EIA Regulations, feasible project-specific alternatives

(including the "do nothing" option) were identified for consideration within the EIA process.

The draft Scoping Report compiled was made available at public places for I&AP review and comment for a 30-day period. All the comments, concerns and suggestions received during the Scoping Phase and the draft report review period were included in the final Scoping Report and Plan of Study for EIA. The Scoping Report was submitted DEAT and DEA&DP in March 2008. The Final Scoping Report was accepted by DEAT, as the competent Authority. In terms of this acceptance, DEAT requested that an EIA be undertaken for the proposed project.

The EIA addresses potential environmental impacts and benefits (direct, indirect and cumulative impacts) associated with all phases of the project including design, construction, operation and decommissioning, and aims to provide the environmental authorities with sufficient information to make an informed decision regarding the proposed project.

A comprehensive public participation process was undertaken in accordance with Regulation 56 of Government Notice No R385 of 2006 during the Scoping phase of this EIA process. This public participation process comprised the following:

» **Notification of the EIA Process** in local, regional and national newspapers and on site, as well as through written notification to identified stakeholders and affected landowners.
» **Identification and registration** of I&APs and key stakeholders.
» Compilation and distribution of a **Background Information Document** (BID) to all identified I&APs and key stakeholders.
» **On-going consultation** with identified I&APs and stakeholders.
» Compilation and maintenance of a **register** containing the names and addresses of all identified I&APs and key stakeholders.
» Preparation of an **Issues and Response Report** detailing key issues raised by I&APs as part of the EIA Process.

Conclusions and Recommendations from the Assessment of the Proposed Power Station Conversion

All components of the proposed power station conversion project will be on the site of the existing Ankerlig Power Station, and will not require any additional land take outside of the existing power station boundaries. Potential impacts associated with the proposed power station conversion project are expected to occur during both the construction and operational phases. In general, impacts are expected to be similar to those associated with the initial phases of the power station project (i.e. the initial 4 OCGT units currently in operation, and the additional 5 OCGT units currently

under construction). New impact sources associated with the power station conversion project would include:

» **Air quality impacts** associated with the construction phase (dust) and the operational phase (emissions from the power station). Impacts on air quality associated with the construction phase are expected to be restricted to the power station site and of low significance. For the operational phase, the introduction of the combined cycle units will not change the emission quantities of the air pollutants. However, the temperature of the exit gases will be reduced with the introduction of the CCGT units. During operation, the introduction of the combined cycle units will potentially increase the ground-level concentrations if the stack heights are not increased from the existing 30m. However, increasing the stack heights to 60m in height (as is proposed) will result in the ground level concentrations being at levels similar to those associated with the open cycle units. With the introduction of 60m high stacks, nitrogen dioxide was the only pollutant predicted to exceed its hourly guideline limit of 200 $\mu g/m^3$. The number of incidents per year, however, was below 10. The annual guideline for this pollutant was not exceeded at any of the sensitive receptor locations. The other pollutants examined, i.e. sulphur dioxide, PM10 and volatile organic compounds (VOCs), were well within their respective guidelines for all sensitive receptor locations. The utilisation of natural gas as fuel for the Ankerlig power Station units (should this become available) will significantly reduce the ground level concentrations of all pollutants, including nitrogen oxides to well below their respective guidelines. The overall impact significance for the combined cycle Ankerlig units was found to be High. The introduction of natural gas (should this become available) will reduce this impact to Low.

» **Noise impacts** associated with the existing OCGT units as well as the additional CCGT components to be added onto the existing power station (i.e. air filters, the gas compressor, the gas turbine, the generator, the electricity transformers, the fans associated with the stacks, the heat recovery equipment, the steam generator, the steam turbine and the air-cooled condenser system associated with the dry-cooling system). Noise impacts on the boundary of the power station are expected to be of **moderate significance**. However, **noise impacts on sensitive receptors** in the residential areas surrounding the Atlantis Industria area as a result of the proposed Ankerlig Power Station conversion project is

expected to be **negligible**. The additional proposed mitigation measures will reduce this noise level increase even further.

» **Visual impacts** as a result of the additional infrastructure associated with the conversion project to be added onto the existing power station (i.e. the heat recovery steam generator (HRSG), the 60 m high stacks, the 25 m - 30 m high air-cooled condensers, the additional fuel storage tanks and the water reservoir). The visual impacts associated with the conversion of the power station will be additional to existing visual impacts and are expected to be of **high** significance without mitigation. The operation of the Ankerlig OCGT power station and the number of transmission power lines already present within the study area mitigates the visual impacts that would be associated with "green fields" projects. Mitigation measures are recommended for consideration during the detailed design phase in order to minimise visual impacts associated with the proposed project.

» **Impacts on the biodiversity** as a result of the proposed additional fuel storage area. The ecology of the power station site has been largely transformed through the construction of the existing Ankerlig Power Station. Small portions of vegetation do, however, still exist in areas not directly impacted by construction, such as the area proposed for the establishment of additional fuel storage tanks. This area comprises approximately 17.5ha to the east of the existing power station. The primary negative impact is a direct, permanent loss of natural vegetation. This impact cannot be avoided, and can only be mitigated by a biodiversity offset, which is regarded as essential. Potential impacts are expected to be of **moderate to low** significance without mitigation.

» **Traffic and transportation impacts associated with the transportation of additional fuel to the power station site** as a result of the construction and operation of the power station (due to the need to operate the power station at a higher load factor (i.e. for longer hours) than is currently the case). Impacts are expected to be of **moderate to low** significance without mitigation. This is largely due to the fact that the major roads within the study area are designed to accommodate a certain number of heavy loads within their design life, thereby minimising the potential impacts associated with the proposed project.

» **Impacts on the social environment** expected during both the construction and operation phases of the proposed

project. The positive impact of electricity provision associated with the proposed power station conversion outweighs potential negative impacts that may be associated with the development. Such negative impacts can be mitigated, while potential positive impacts such as social investment and employment creation during construction can be optimised through appropriate management measures. Impacts on the social environment are expected to be of **moderate to low** significance.

» No environmental fatal flaws have been identified to be associated with the proposed power station conversion project at this stage of the project.

Conclusions and Recommendations from the Assessment of the Proposed Transmission Power Line Alternatives

Two technically feasible alternative transmission power line alignment corridors (approximately 500 m in width) were assessed within the EIA phase of the process. Potential impacts associated with the proposed transmission power line are expected to occur during the construction and operational phases, and have been identified and assessed through the EIA process include:

» **Impacts on flora and fauna** as a result of the disturbance of habitats within the power line servitude and at tower footprints. Impacts are expected to be of moderate to low significance prior to mitigation and of **low significance** with mitigation.

» **Impacts on avifauna** as a result of collisions with the earthwire, electrocution and disturbance of habitats within the power line servitude. Impacts are expected to be of **low significance** before and after mitigation.

» **Impacts on heritage sites** as a result of disturbance or destruction during the construction phase, as well as due to visual impacts on heritage sites. Impacts are expected to be of **low significance**. No mitigation is required other than monitoring during the construction phase.

» **Visual impacts** on the surrounding area. Impact are expected to be of **high to moderate significance** depending on the alternative selected. Visual impacts associated with a power line of this nature are not easily mitigated.

» **Impacts on the social environment** as a result of the creation of employment opportunities, influx of workers to the area, impacts on land use, and impacts on sense of place. Impacts are anticipated to be both positive and negative and are expected to be of High to Moderate significance prior to mitigation and **moderate to low** significance after mitigation.

In general, the nature and extent of impacts identified is dependent on the alignment which is selected. From the specialist studies undertaken, various conclusions have been drawn regarding the preferred alternative for establishment of the power line.

» There is **no preference** between the power line alternatives from a vegetation and heritage perspective.
» From a terrestrial fauna perspective, **Alternative A** is slightly preferred.
» From a visual perspective, **Alternative A** is preferred.
» From a social perspective (considering, inter alia, number of properties affected), the **Sub-alternative** is preferred.

Visual impacts and social impacts are considered to be of equal importance in determining a preferred alternative. Social impacts can be mitigated through acquisition of all the properties of affected households, whereas it would not be possible to mitigate the visual impacts associated with the transmission power line. Therefore, **Alternative A** is nominated as the preferred alternative from an environmental perspective.

This conclusion is supported from a technical perspective, as this would allow for future power lines exiting the Koeberg Nuclear Power Station site.

Overall Conclusion (Impact Statement)

The findings of the specialist studies undertaken within this EIA to assess both the benefits and potential negative impacts anticipated as a result of the proposed project conclude that:

» There are no environmental fatal flaws that should prevent the proposed project from proceeding on the identified site.
» From the assessment of the alternative power line alternatives, **Alternative A** is considered to be the alternative which would result in the lower impact on the environment as potential impacts associated with this alternative can be mitigated to some extent. This conclusion is supported from a technical perspective, as this would allow for future power lines exiting the Koeberg Nuclear Power Station site.
» The significance levels of the majority of identified negative impacts can be minimised by implementing the recommended mitigation measures.

Overall Recommendations

Based on the nature and extent of the proposed project, the local level of disturbance predicted, the findings of the EIA, and the understanding of the significance level of potential environmental impacts, it is the opinion of the EIA project team that the application for the proposed

Ankerlig Power Station Conversion and Transmission Integration Project be authorised by DEAT.

The following conditions of this recommendation must be included within the authorisation issued:

» All mitigation measures detailed within this EIA Report and the specialist reports must be implemented.
» The draft Environmental Management Plan (EMP) as contained within this report, as well as the approved EMP for the Ankerlig OCGT Power Station should form part of the contract with the Contractors appointed to undertake the decommissioning, relocation and re-commissioning activities associated with the project, and must be used to ensure compliance with environmental specifications and management measures. The implementation of this EMP for all life cycle phases of the proposed project is considered to be key in achieving the appropriate environmental management standards as detailed for this project.
» Applications for all other relevant and required permits required to be obtained by Eskom must be submitted to the relevant regulating authorities. This includes permits for the transporting of all components (abnormal loads) to site, disturbance to heritage sites, disturbance of protected vegetation, and disturbance to any riparian vegetation or wetlands.
» During construction, unnecessary disturbance to habitats should be strictly controlled and the footprint of the impact should be kept to a minimum.
» The need for on-site offsets or enhanced ecological management should be discussed with the authorities, should this be deemed necessary
» Mitigation and compensation and/or relocation must be negotiated with landowners directly affected by the Ankerlig-Omega transmission power line.
» The process of communication and consultation with the community representatives must be maintained after the closure of this EIA process, and, in particular, during the construction phase associated with the proposed project.

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DEFINITIONS AND TERMINOLOGY

Alternatives: Alternatives are different means of meeting the general purpose and need of a proposed activity. Alternatives may include location or site alternatives, activity alternatives, process or technology alternatives, temporal alternatives or the 'do nothing' alternative.

Ambient sound level: The reading on an integrating impulse sound level meter taken at a measuring point in the absence of any alleged disturbing noise at the end of a total period of at least 10 minutes after such meter was put into operation.

Condenser: Converts exhaust steam from the steam turbine back into water through a cooling process.

Cumulative impacts: Impacts that result from the incremental impact of the proposed activity on a common resource when added to the impacts of other past, present or reasonably foreseeable future activities (e.g. discharges of nutrients and heated water to a river that combine to cause algal bloom and subsequent loss of dissolved oxygen that is greater than the additive impacts of each pollutant). Cumulative impacts can occur from the collective impacts of individual minor actions over a period of time and can include both direct and indirect impacts.

Direct impacts: Impacts that are caused directly by the activity and generally occur at the same time and at the place of the activity (e.g. noise generated by blasting operations on the site of the activity). These impacts are usually associated with the construction, operation or maintenance of an activity and are generally obvious and quantifiable

Disturbing noise: A noise level that exceeds the ambient sound level measured continuously at the same measuring point by 7 dB or more.

'Do nothing' alternative: The 'do nothing' alternative is the option of not undertaking the proposed activity or any of its alternatives. The 'do nothing' alternative also provides the baseline against which the impacts of other alternatives should be compared.

Dry-cooled technology: A system of air-cooled condenser fans situated in fan banks approximately between 25-30 m above ground.

Endangered species: Taxa in danger of extinction and whose survival is unlikely if the causal factors continue operating. Included here are taxa whose numbers of

individuals have been reduced to a critical level or whose habitats have been so drastically reduced that they are deemed to be in immediate danger of extinction.

Endemic: An "endemic" is a species that grows in a particular area (is endemic to that region) and has a restricted distribution. It is only found in a particular place. Whether something is endemic or not depends on the geographical boundaries of the area in question and the area can be defined at different scales.

Environment: the surroundings within which humans exist and that are made up of:

i. the land, water and atmosphere of the earth;
ii. micro-organisms, plant and animal life;
iii. any part or combination of (i) and (ii) and the interrelationships among and between them; and
iv. the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being.

Environmental Impact: An action or series of actions that have an effect on the environment.

Environmental impact assessment: Environmental Impact Assessment (EIA), as defined in the NEMA EIA Regulations and in relation to an application to which scoping must be applied, means the process of collecting, organising, analysing, interpreting and communicating information that is relevant to the consideration of that application.

Environmental management: Ensuring that environmental concerns are included in all stages of development, so that development is sustainable and does not exceed the carrying capacity of the environment.

Environmental management plan: A plan that organises and co-ordinates mitigation, rehabilitation and monitoring measures in order to guide the design, construction and implementation of a proposal and its ongoing maintenance after implementation.

Heat recovery steam generator (HRSG): Component to be added to the gas turbine to recover waste heat, to drive the steam turbine cycle. In principle, a HRSG is associated with a gas turbine. One HRSG can be linked to 2 or 3 OCGT units.

Indirect impacts: Indirect or induced changes that may occur as a result of the activity (e.g. the reduction of water in a stream that supply water to a reservoir that supply water to the activity). These types of impacts include all the potential

impacts that do not manifest immediately when the activity is undertaken or which occur at a different place as a result of the activity.

Interested and Affected Party: Individuals or groups concerned with or affected by an activity and its consequences. These include the authorities, local communities, investors, work force, consumers, environmental interest groups and the general public.

Mid-merit capacity: Electricity capacity during the daytime from about 6 am to about 10 pm on weekdays

Peaking generation capacity: Peaking power refers to power generation technology designed to generate electricity during periods of high electricity demand, generally in the weekday mornings from 07:00 to 09:00 and weekday evenings from 18:00 to 20:00.

Rare species: Taxa with small world populations that are not at present Endangered or Vulnerable, but are at risk as some unexpected threat could easily cause a critical decline. These taxa are usually localised within restricted geographical areas or habitats or are thinly scattered over a more extensive range. This category was termed Critically Rare by Hall and Veldhuis (1985) to distinguish it from the more generally used word "rare".

Red data species: Species listed in terms of the International Union for Conservation of Nature and Natural Resources (IUCN) Red List of Threatened Species, and/or in terms of the South African Red Data list. In terms of the South African Red Data list, species are classified as being extinct, endangered, vulnerable, rare, indeterminate, insufficiently known or not threatened (see other definitions within this glossary).

Significant impact: An impact that by its magnitude, duration, intensity or probability of occurrence may have a notable effect on one or more aspects of the environment.

ABBREVIATIONS AND ACRONYMS

BID	Background Information Document
CBOs	Community Based Organisations
CCGT	Combined Cycle Gas Turbine
CO_2	Carbon dioxide
CPP	Condensate Polishing Plant
DEA&DP	Western Cape Department of Environmental Affairs and Development Planning
DEAT	National Department of Environmental Affairs and Tourism
DME	Department of Minerals and Energy
DOT	Department of Transport
DWAF	Department of Water Affairs and Forestry
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
GIS	Geographical Information Systems
GG	Government Gazette
GN	Government Notice
I&AP	Interested and Affected Party
IEP	Integrated Energy Planning
km^2	Square kilometres
kV	Kilovolt
LUPO	Land Use Planning Ordinance, Ordinance 15 of 1985
m^2	Square meters
MW	Mega Watt
NEMA	National Environmental Management Act (Act No 107 of 1998)
NERSA	National Energy Regulator of South Africa
NHRA	National Heritage Resources Act (Act No 25 of 1999)
NGOs	Non-Governmental Organisations
NIRP	National Integrated Resource Planning
NWA	National Water Act (Act No 36 of 1998)
OCGT	Open Cycle Gas Turbine
PGWC	Provincial Government of the Western Cape
SAHRA	South African Heritage Resources Agency
SIA	Social Impact Assessment
VOCs	Volitile Organic Compounds

INTRODUCTION CHAPTER 1

Eskom Holdings Limited (Eskom) is investigating the conversion of the nine Open Cycle Gas Turbine (OCGT) units at the existing Ankerlig Power Station (located in Atlantis Industria) plant to a Combined Cycle Gas Turbine (CCGT). This would increase the generating capacity of this existing power station by a maximum capacity of 720 MW. The proposed conversion would involve the addition of Heat Recovery Steam Generators (HRSG) to generate steam, and steam turbines and generators to the existing gas turbine plant (essentially adding a steam cycle to the existing gas cycle), and would be established on the same site as the existing Ankerlig Power Station.

Eskom is also proposing the construction of a 400kV transmission power line between the Ankerlig Power Station and the already authorised Omega Substation (to be located on the Farm Groot Oliphantskop 81) to integrate the additional power generated at Ankerlig Power Station into the national electricity grid.

The Ankerlig Power Station conversion and associated transmission integration project can be seen as a third phase of the original Atlantis OCGT power station project. The construction of the initial OCGT units (i.e. the four units now in operation) was the first phase of the project. The second phase of the project (currently under construction) involves the expansion (capacity increase) of the power station by adding another five OCGT units, four fuel tanks and a switchyard to the power station.

The nature and extent of the power station conversion and transmission integration project, as well as potential environmental impacts associated with the construction of a facility of this nature is assessed in this Environmental Impact Assessment (EIA) Report.

1.1. The Need for the Proposed Project

Eskom contributes to its vision of “Together building the powerbase for sustainable growth and development” through its core business focus on electricity generation, transportation, trading and retail. It entrenches the values of excellence, innovation, customer satisfaction and integrity across all business operations.

Achieving the vision requires in-depth planning and energetic implementation in a complex environment characterised by higher economic growth, greater demand for electricity and the heightened need for significant infrastructure expansion

with attendant competition for scarce materials, funding, skills and supplier inputs. Challenges are compounded by the rising cost of primary energy and new components, regulatory pressure, restructuring of the electricity distribution industry, expectations of better environmental performance and the growing involvement of stakeholder groups.

Considering the Government's Accelerated and Shared Growth Initiative for South Africa (ASGI-SA) targets and load growth currently being experienced, South Africa will require additional power in the next five years. To supply this additional demand in the medium term, a variety of options such as demand side management, cogeneration non-Eskom generation and gas-fired plants (open cycle and combined cycle), continue to be investigated by Eskom in addition to conventional long term supply options such as electricity generation with coal, nuclear fuels.

As part of its plans for increased electricity supply options, Eskom is proposing the conversion of the existing OCGT units installed and being installed at the existing Ankerlig Power Station (near Atlantis) and the Gourikwa Power Station (near Mossel Bay) in the Western Cape to **Combined Cycle Gas Turbine** (CCGT) units. Due to the medium-term forecast in the demand for electricity (until approximately 2014) and constraints associated with meeting this projected demand, the conversion of these OCGT units to CCGT units is one of the few options available to Eskom to manage the projected demand in the medium-term.

The conversion of the nine units at the Ankerlig Power Station and the five units at the Gourikwa Power Station would increase the generating capacity of the OCGT units within the Western Cape by a maximum of approximately 1120 MW (i.e. ~720 MW at Ankerlig and ~400 MW at Gourikwa). This would be achieved by increasing the efficiency of the gas turbine plant (i.e. more power generated and sent out, for the same amount of fuel used at the same operating regime). Overall thermal efficiency is therefore increased from approximately 34% for the current OCGTs to approximately 50% to 55% for the proposed CCGT plant, depending on the operating regime of the plant.

This EIA Report considers the conversion of the OCGT units at the Ankerlig Power Station to CCGT units, and considers a **maximum capacity increase of 720 MW** which would be associated with the conversion of all nine (9) units at the power station. Environmental studies for the conversion of the OCGT units at the Gourikwa Power Station are the subject of a separate EIA process[1]. Eskom has submitted a separate application for the maximum capacity increase at this

[1] The EIA process for the Gourikwa conversion and transmission integration project is currently underway and has been registered with the National Department of Environmental Affairs and Tourism under Application Reference Numbers 12/12/20/1141 (power station conversion) and 12/12/20/1142 (proposed power line)

power station. However, the decision around the total number of OCGT units to be converted to CCGT units, and the final split of generation capacity between these two power stations is still to be determined through feasibility studies being undertaken by Eskom.

As electricity cannot be readily or inexpensively stored, it is required that electricity must be efficiently transmitted from the point of generation to the end user. Transmission capacity is required to keep up with both electricity generation capacity and electricity demand. Therefore, in order to integrate the additional power generated at the Ankerlig Power Station into the national electricity grid, the construction of a new **400kV transmission power line** between the Ankerlig Power Station and the Omega Substation will be required.

1.2. Background to the Project

Environmental Impact Assessment (EIA) processes have previously been undertaken by Eskom for the existing OCGT units at Atlantis (with the existing four units (with a nominal capacity of 600 MW) approved in December 2005 and an additional five units (with a nominal capacity of 750 MW) approved in July 2007). The construction and commissioning of the initial four OCGT units is complete, and these units have been operational since mid-2007. Construction of the additional five OCGT units is currently underway and is expected to be complete end-2008/beginning 2009. The electricity generation capacity of the Ankerlig Power Station will assist Eskom in meeting the peaking electricity generation demands[2] in the medium-term (i.e. up to 2014).

Subsequently, considering the strategic electricity planning in place (refer to Chapter 2) and taking into account the continued growth in electricity demand, Eskom has determined that there is a need for **additional** power generation capacity in the **medium-term**[3]. In considering the most suitable options to meet the increased electricity demand in the medium-term, Eskom has concluded that it would be feasible to convert the existing Ankerlig OCGT units to CCGT units, thereby generating additional capacity for the same amount of fuel (under a similar operating regime) considering the load factors at which the units may have to operate.

[2] OCGT units are best suited for peaking generation capacity (i.e. for peak periods in the morning and evenings).

[3] The period up to 2014

1.3. Project Overview

The existing Ankerlig OCGT Power Station is located on the Remainder of Farm No 1395 in the Atlantis Industrial Township (refer to Figure 1.1), which is located ~40 km from the Cape Town city centre.

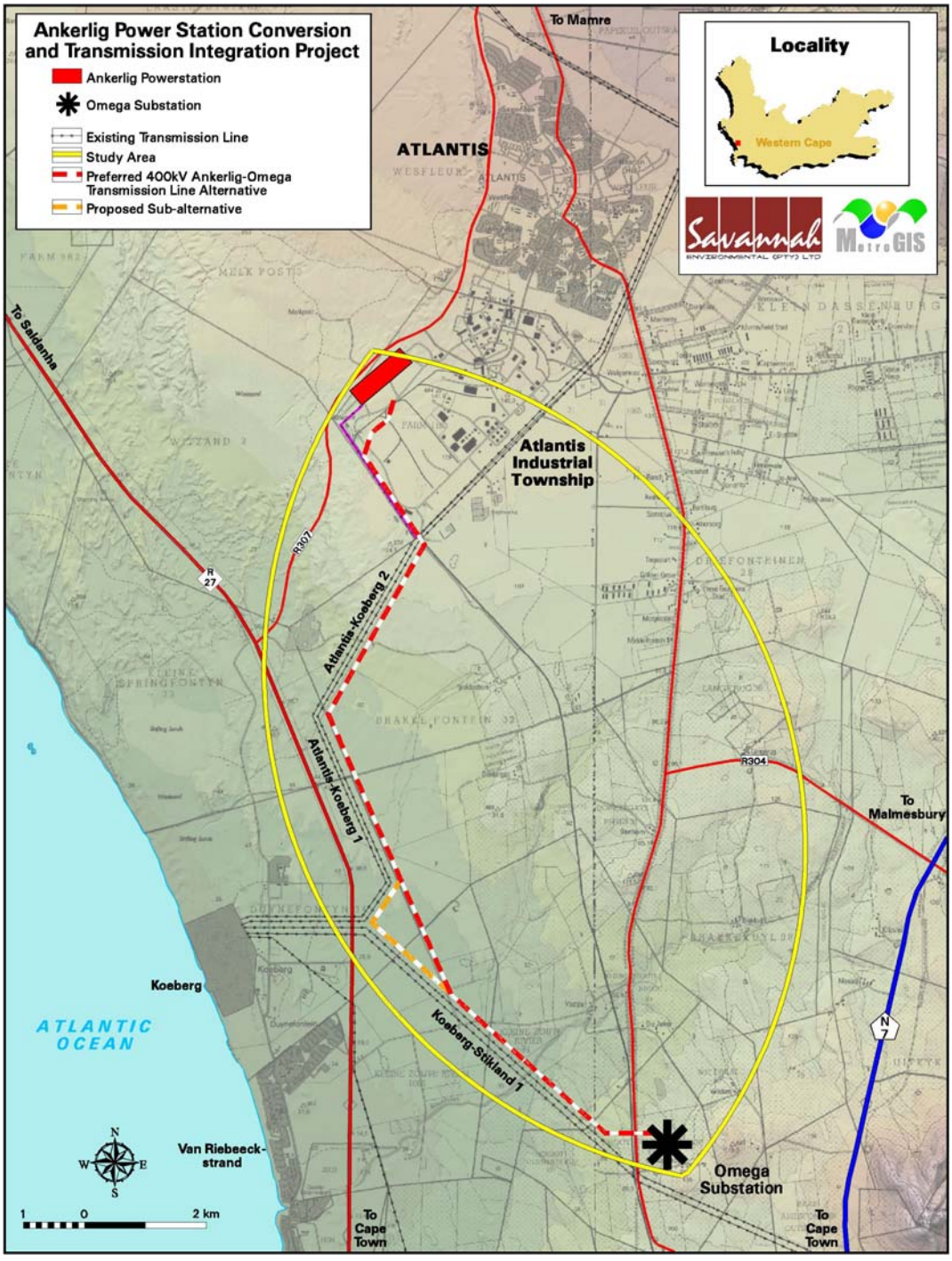


Figure 1.1: Locality map showing the location of the existing Ankerlig Power Station, the study area and the transmission power line corridor alternatives between Ankerlig and Omega Substation nominated for detailed consideration in the EIA phase of the EIA process

1.3.1. Power Station Conversion

The Ankerlig OCGT Power Station consists of nine OCGT units (i.e. four existing OCGT units, plus an additional five OCGT units currently under construction) each with a nominal capacity of approximately 150 MW, resulting in a total nominal capacity of approximately 1 350 MW for the power station.

Each OCGT unit consists of one gas turbine driving an electric generator. The concept of converting the OCGT units to CCGT units is to utilise the **heat energy** from the exhaust of the gas turbine to create steam in the Heat Recovery Steam Generator (HRSG), to drive a steam turbine, instead of this heat energy being exhausted and lost to the atmosphere (as is the current scenario). Conversion of the units to CCGT is therefore based on increased cycle efficiency.

Simply stated, this can be achieved through the following (and is illustrated in Figure 1.2):

» When the hot gas exits the gas turbine as exhaust gas, it has a temperature of up to 600°C. This heat energy is transferred to water in the heat recovery steam generator, instead of being exhausted to the atmosphere.
» The heat is used to generate steam (water vapour), which powers the steam turbine to produce mechanical energy.
» The resulting mechanical energy is transferred to a generator, where it is converted into electricity.

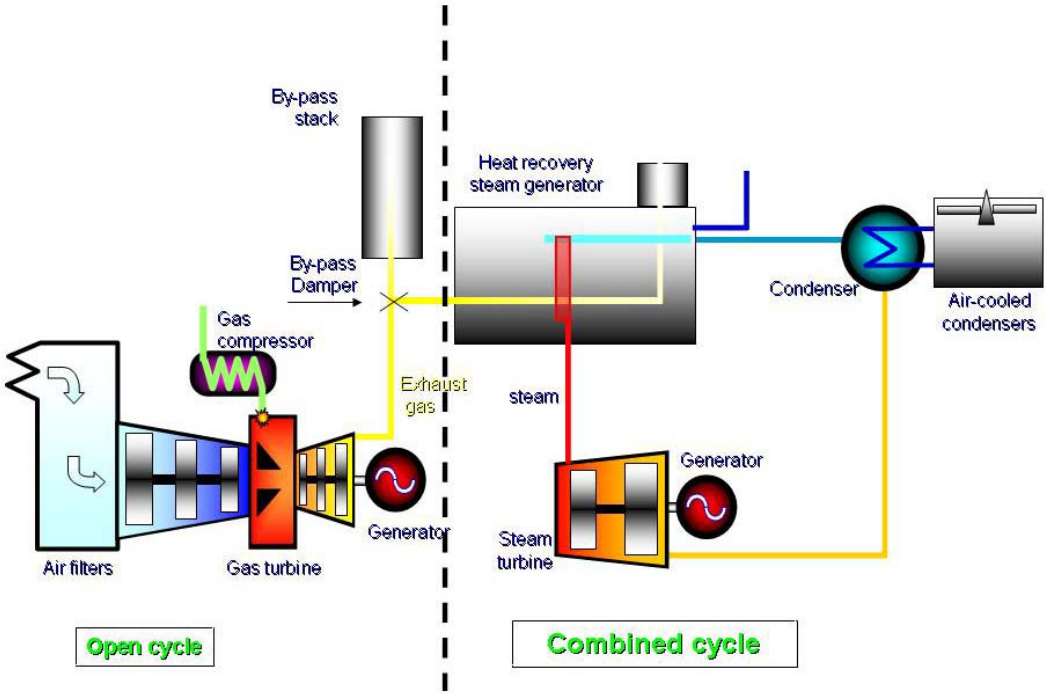


Figure 1.2: Simplified schematic illustrating the CCGT conversion process and components

Conversion of the units to CCGT is undertaken to increase cycle thermal efficiency. It is estimated that each converted unit will produce approximately 80 MW additional capacity, i.e. approximately 50% more than a standard OCGT unit. Therefore, an additional 9 x 80 MW increase in capacity (approximately 720 MW total) is foreseen from the OCGT to CCGT conversion. The total nominal capacity of the Ankerlig Power Station will therefore increase to approximately 2 070 MW.

The proposed conversion will be on the site of the existing Ankerlig Power Station, and will not require any additional land take outside of the existing power station boundaries (refer to Figure 1.3).

The primary components of the conversion project include the following (refer to Chapter 3 for more details):

» A **heat recovery steam generator** (HRSG) will be added to the gas turbine to recover waste heat, to drive the steam turbine cycle. In principle, a HRSG is associated with a gas turbine. One HRSG can be linked to 2 or 3 OCGT units.
» A **condenser** which converts exhaust steam from the steam turbine back into water through a cooling process.
» Depending on the configuration, a **bypass stack** for the CCGT, anticipated to be approximately 60 m in height will be associated with each HRSG.
» **Water treatment plant** (for treatment of potable water and production of demineralised water (for steam generation). A **waste disposal system** for the effluent from this water treatment system will be required.
» **Dry-cooled technology** consisting of a system of air-cooled condenser fans situated in fan banks approximately between 25-30 m above ground.
» **Additional fuel storage facilities** and associated off-loading and other related infrastructure to cater for the increased fuel requirements associated with the higher load factor (i.e. longer operating hours or a mid-merit operating regime[4]).
» An **elevated water tank**, approximately 20m high, with a holding volume of approximately 2.5 million litres (i.e. water storage for approximately 5 days of operation).

It is important to note that the plant can use liquid fuel or natural gas as fuel. It is envisaged that the CCGT units would initially be diesel-fired, until such time that natural gas becomes available, if and when it becomes available.

[4] Mid-merit capacity is during the daytime from about 6 am to about 10 pm on weekdays.

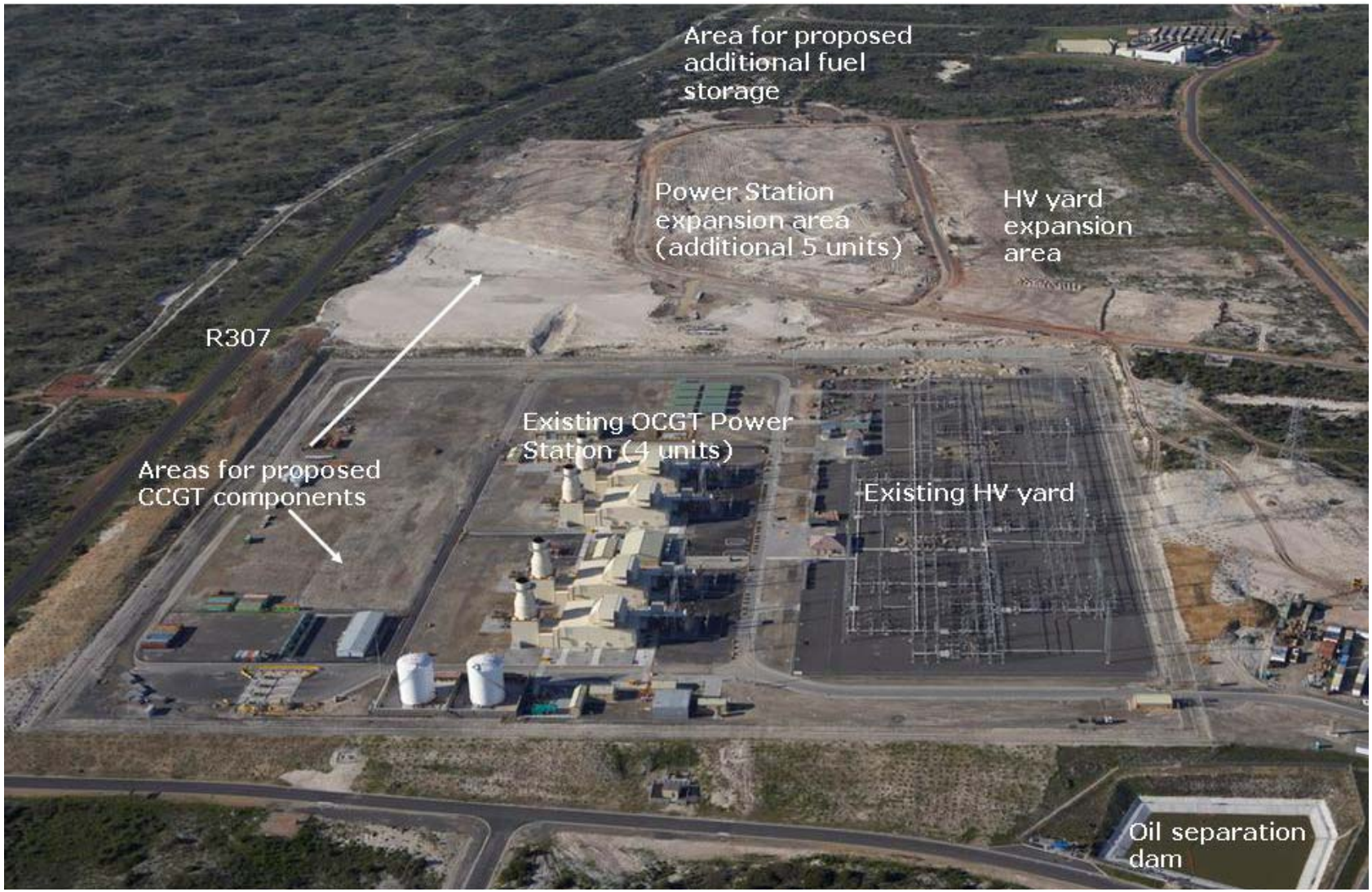


Figure 1.3: Aerial photograph of the Ankerlig Power Station site showing the existing power station infrastructure the power station expansion site, as well as the areas for the placement of infrastructure associated with the proposed power station conversion

1.3.2. Integration of the CCGT Power Station into the National Grid

A 400kV transmission power line is required to be constructed between the Ankerlig Power Station and the Omega Substation (authorised but not yet constructed, and to be located on the Farm Groot Oliphantskop 81) to integrate the additional power generated at this power station to the national electricity grid. The existing substation (high voltage (HV) yard) at the Ankerlig Power Station will be utilised, and no additional infrastructure or expansion of this HV yard is required to accommodate the new transmission power line.

Technically feasible alternative transmission power line alignment corridors (approximately 1 km in width) were investigated in the Scoping Study (Savannah Environmental, March 2008), and preferred alternatives nominated for further investigation within the EIA phase of the process (refer to Figure 1.1), i.e. Alternative A and an associated sub-alternative.

Transmission power lines are constructed and operated within a servitude that is established along the entire length of the line (55 m wide for a 400 kV line). Within this servitude, Eskom would have certain rights and controls that support the safe, effective operation and maintenance of the line. The process of achieving options to acquire servitudes is referred to as the Servitude Negotiation Process with each affected landowner. The negotiation process is undertaken directly by Eskom and is independent of and follows on from the EIA process.

1.4. Requirement for an Environmental Impact Assessment Process

The proposed power station and transmission power line integration project is subject to the requirements of the Environmental Impact Assessment Regulations (EIA Regulations) published in terms of Section 24(5) of the National Environmental Management Act (NEMA, No 107 of 1998). This section provides a brief overview of EIA Regulations and their application to this project.

NEMA is national legislation that provides for the authorisation of certain controlled activities known as “listed activities”. In terms of Section 24(1) of NEMA, the potential impact on the environment associated with these listed activities must be considered, investigated, assessed and reported on to the competent authority (the decision-maker) charged by NEMA with granting of the relevant environmental authorisation. The National Department of Environmental Affairs and Tourism (DEAT) is the competent authority for this project as Eskom is a statutory body. An application for authorisation has been accepted by DEAT (under Application Reference numbers **12/12/20/1014** (**power station conversion**) and **12/12/20/1037** (**transmission power line**)). Through the decision-making process, DEAT will be supported by the Western Cape Department of Environmental Affairs and Development Planning (DEA&DP).

The need to comply with the requirements of the EIA Regulations ensures that decision-makers are provided the opportunity to consider the potential environmental impacts of a project early in the project development process, and assess if environmental impacts can be avoided, minimised or mitigated to acceptable levels. Comprehensive, independent environmental studies are required to be undertaken in accordance with the EIA Regulations to provide the competent authority with sufficient information in order for an informed decision to be taken regarding the project. Eskom appointed Savannah Environmental (Pty) Ltd to conduct the independent EIA process for the proposed project.

An EIA is also an effective planning and decision-making tool for the project proponent. It allows the environmental consequences resulting from a technical facility during its establishment and its operation to be identified and appropriately managed. It provides the opportunity for the developer to be forewarned of potential environmental issues, and allows for resolution of the issue(s) reported on in the Scoping and EIA reports as well as dialogue with affected parties.

In terms of sections 24 and 24D of NEMA, as read with Government Notices (GN) R385 (Regulations 27–36) and R387, a Scoping and EIA are required to be undertaken for this proposed project as it includes the following activities listed in terms of GN R386 and R387 (GG No 28753 of 21 April 2006) relevant to the **power station conversion**:

No & date of relevant notice	Activity No (in terms of relevant Regulation / notice)	Description of listed activity
Government Notice R387 (21 April 2006)	1(a)	The construction of facilities or infrastructure, including associated structures or infrastructure, for the generation of electricity where (i) the electricity output is 20 megawatts or more; or (ii) the elements of the facility cover a combined area in excess of 1 hectare
Government Notice R387 (21 April 2006)	1(c)	The above-ground storage of a dangerous good, including petrol, diesel, liquid petroleum gas or paraffin, in containers with a combined capacity of 1000 cubic meters or more at any one location or site including the storage of one or more dangerous goods, in a tank farm
Government Notice R387 (21 April 2006)	1(e)	Any process or activity which requires a permit or licence in terms of legislation governing the generation or release of emissions, pollution, effluent or waste and which is not identified in Government

No & date of relevant notice	Activity No (in terms of relevant Regulation / notice)	Description of listed activity
		Notice No. R 386 of 2006
Government Notice R387 (21 April 2006)	1(j)	The bulk transportation of dangerous goods using pipelines, funiculars or conveyors with a throughput capacity of 50 tons or 50 cubic metres or more per day
Government Notice R387 (21 April 2006)	2	Any development activity, including associated structures and infrastructure, where the total area of the developed area is, or is intended to be, 20 hectares or more
Government Notice R386 (21 April 2006)	1(k)	The construction of facilities or infrastructure, including associated structures or infrastructure, for the bulk transportation of sewage and water, including storm water, in pipelines with - » an internal diameter of 0,36 metres or more; or » a peak throughput of 120 litres per second or more
Government Notice R386 (21 April 2006)	1(n)	The construction of facilities or infrastructure, including associated structures or infrastructure, for the off-stream storage of water, including dams and reservoirs, with a capacity of 50 000 cubic metres or more, unless such storage falls within the ambit of the activity listed in item 6 of Government Notice No. R. 387 of 2006
Government Notice R386 (21 April 2006)	1(s)	The treatment of effluent, wastewater or sewage with an annual throughput capacity of more than 2000 cubic meters but less than 15 000 cubic meters.
Government Notice R386 (21 April 2006)	7	The above ground storage of a dangerous good, including petrol, diesel, liquid petroleum gas or paraffin, in containers with a combined capacity of more than 30 cubic metres but less than 1 000 cubic metres at any one location or site.
Government Notice R386 (21 April 2006)	14	The construction of masts of any material of type and of any height, including those used for telecommunications broadcasting and radio transmission, but excluding (a) masts of 15m and lower exclusively used by (i) radio amateurs; or (ii) for lightening purposes (b) flagpoles; and (c) lightening conductor poles
Government Notice R386 (21 April 2006)	15	The construction of a road that is wider than 4 m or that has a reserve wider than 6 m, excluding roads that fall within the ambit of another listed activity or which are access roads of less than 30 m long.

The following activities listed in terms of GN R386 and R387 (GG No 28753 of 21 April 2006) relevant to the **transmission power line integration**:

No & date of relevant notice	Activity No (in terms of relevant Regulation / notice)	Description of listed activity
Government Notice R387 (21 April 2006)	1(l)	The construction of facilities or infrastructure, including associated structures or infrastructure, for the transmission and distribution of above ground electricity with a capacity of 120 kilovolts or more
Government Notice R386 (21 April 2006)	1(m)	The construction of facilities or infrastructure, including associated structures or infrastructure, for any purpose in the one in ten year flood line of a river or stream, or within 32 m from the bank of a river or stream where the flood line is unknown, excluding purposes associated with existing residential use, but including: (i) canals; (ii) channels; (iii) bridges; (iv) dams; and (v) weirs
Government Notice R386 (21 April 2006)	14	The construction of masts of any material of type and of any height, including those used for telecommunications broadcasting and radio transmission, but excluding (a) masts of 15m and lower exclusively used by (i) radio amateurs; or (ii) for lightening purposes (b) flagpoles; and (c) lightening conductor poles
Government Notice R386 (21 April 2006)	15	The construction of a road that is wider than 4 m or that has a reserve wider than 6 m, excluding roads that fall within the ambit of another listed activity or which are access roads of less than 30 m long.

This report documents the assessment of the potential environmental impacts of the proposed construction, operation and decommissioning of the proposed power station conversion and transmission integration project. This EIA Phase followed the Scoping Phase, and was conducted in accordance with the requirements of the EIA Regulations in terms of Section 24(5) of the National Environmental Management Act (NEMA; Act No 107 of 1998).

1.5. Objectives of the Environmental Impact Assessment Process

The Scoping Phase of the EIA process identified potential issues associated with the proposed project, and defined the extent of the studies required within the

EIA Phase. This was achieved through an evaluation of the proposed project, involving the project proponent, specialists with experience in undertaking EIAs for similar projects, and a public consultation process with key stakeholders that included both government authorities and interested and affected parties (I&APs).

The EIA addresses those identified potential environmental impacts and benefits (direct, indirect and cumulative impacts) associated with all phases of the project including design, construction, operation and decommissioning, and recommends appropriate mitigation measures for potentially significant environmental impacts. The EIA report aims to provide the environmental authorities with sufficient information to make an informed decision regarding the proposed project.

The release of a draft EIA Report provides stakeholders with an opportunity to verify that the issues they have raised through the EIA process have been captured and adequately considered. The final EIA Report will incorporate all issues and responses raised during the public review of the draft EIA Report prior to submission to DEAT.

The EIA Report consists of the following sections:

» **Chapter 1** provides background to the proposed power station conversion and transmission integration project and the EIA process.
» **Chapter 2** provides the strategic context for energy planning in South Africa.
» **Chapter 3** describes the components of the proposed project (project scope).
» **Chapter 4** outlines the process which was followed during the EIA Phase of the EIA process, including the consultation programme that was undertaken and input received from interested parties.
» **Chapter 5** describes the existing biophysical and socio-economic environment.
» **Chapter 6** presents the assessment of environmental impacts associated with the power station conversion and details of recommended mitigation measures.
» **Chapter 7** presents the assessment of environmental impacts associated with the proposed transmission power line and details of recommended mitigation measures.
» **Chapter 8** presents the conclusions and recommendations of the EIA and an Impact Statement.

1.6. Details of Environmental Assessment Practitioner and Expertise to conduct the Scoping and EIA

Savannah Environmental was contracted by Eskom Holdings Limited as an independent environmental assessment practitioner to undertake an EIA for the proposed project, as required by the NEMA EIA Regulations. Neither Savannah

Environmental, nor any its specialist sub-consultants on this project are subsidiaries of or affiliated to Eskom Holdings Limited. Furthermore, Savannah Environmental does not have any interests in secondary developments that may arise out of the authorisation of the proposed project.

The Savannah Environmental project team have more than ten (10) years experience in environmental assessment and environmental management, and have been actively involved in undertaking environmental studies for a wide variety of projects throughout South Africa. Strong competencies have been developed in project management of environmental EIA processes, as well as strategic environmental assessment and compliance advice, and the identification of environmental management solutions and mitigation/risk minimising measures.

Jo-Anne Thomas and Karen Jodas, the principal authors of this EIA Report, are both registered Professional Natural Scientists (in the practice of environmental science) with the South African Council for Natural Scientific Professions. They have gained extensive knowledge and experience on potential environmental impacts associated with electricity generation projects through their involvement in related EIA processes over the past ten (10) years. They have successfully managed and undertaken EIA processes for other power generation projects for Eskom Holdings Limited throughout South Africa. Curricula vitae for the Savannah Environmental project team consultants are included in Appendix A.

In order to adequately identify and assess potential environmental impacts, Savannah Environmental has appointed several specialist consultants to conduct specialist studies, as required. Details of these specialist studies are included in Chapter 4. The curricula vitae for the EIA specialist consultants are also included in Appendix A.

STRATEGIC CONTEXT FOR ENERGY PLANNING CHAPTER 2

Eskom contributes to its vision of "Together building the powerbase for sustainable growth and development" through its core business focus on electricity generation, transportation, trading and retail. It entrenches the values of excellence, innovation, customer satisfaction and integrity across all business operations.

Achieving the vision requires in-depth planning and energetic implementation in a complex environment characterised by higher economic growth, greater demand for electricity and the heightened need for significant infrastructure expansion with attendant competition for scarce materials, funding, skills and supplier inputs. Challenges are compounded by the rising cost of primary energy and new components, regulatory pressure, restructuring of the electricity distribution industry, expectations of better environmental performance and the growing involvement of stakeholder groups.

The following four strategic objectives are key to achieving this vision:

» ***Sustaining quality and continuity of supply:***
This requires effective management of total system capacity and reliability planning, focusing on primary energy availability, maintenance, refurbishment and energy efficiency. Stretch targets need to be set while maintaining rigorous occupational health and safety standards.

» ***Capacity expansion:***
Successful delivery on the capacity expansion programme is central to Eskom's vision and entails thorough environmental impact assessments, site selection and optimisation, procurement efficiency, project management and commitment to health and safety in the construction environment while rigorously applying Eskom's climate change and air quality strategies. The challenge is to build new plant, on time and on budget, while running existing plant at optimal levels.

» ***Funding and resourcing:***
The build programme imposes significant funding and resourcing requirements. Appropriate skills and information management systems are also vital to ensure a sustainable business and delivery on the build programme. Other key factors include multi-year pricing determination, revenue management, efficiency initiatives and Eskom's skills acquisition and retention strategies.

» ***Leveraging business operations for developmental benefits:***
Sustainability shapes the way Eskom conducts business and provides the context for its developmental initiatives.

The magnitude of Eskom's current business procurement spend and the planned capacity expansion programme create opportunities for maximising the organisation's contribution to government's Accelerated and Shared Growth Initiative for South Africa (ASGI-SA). The mechanisms include the fostering of small and medium enterprises, black women-owned businesses and skills development, accelerated electrification and Eskom's corporate social investment spend. Local content will be a core requirement when major contracts are awarded.

Over the last decade, South Africa has experienced a steady growth in the demand for electricity on the back of healthy economic growth. The continued growth in the economy has exhausted Eskom's surplus electricity generation capacity and reduced our electricity reserves progressively. It is expected that the reserve margin will continue on a downward trend for the next seven years until new base-load power plant is built (2014). In spite of new capacity coming on line, which includes bringing back moth-balled power stations and building Open Cycle Gas Turbines, the electricity demand within the country is still higher than available capacity. Eskom is stepping up the implementation of this capacity expansion programme and will invest about R150 billion over the next five years in the upgrading of South Africa's power supply infrastructure. The biggest percentage of the expenditure will go towards improving generation capacity through, among others, the construction of new power stations.

The decision to expand Eskom's electricity generation capacity is based on **national policy** and informed by on-going strategic planning undertaken by the national Department of Minerals and Energy (DME), the National Energy Regulator of South Africa (NERSA) and Eskom. Strategic decisions regarding the electricity generation options to meet energy requirements within the country are made through this strategic planning process. The acceptability of options investigated at a project-specific level from a technical, economic and environmental perspective.

The hierarchy of policy and planning documentation is illustrated in Figure 2.1.

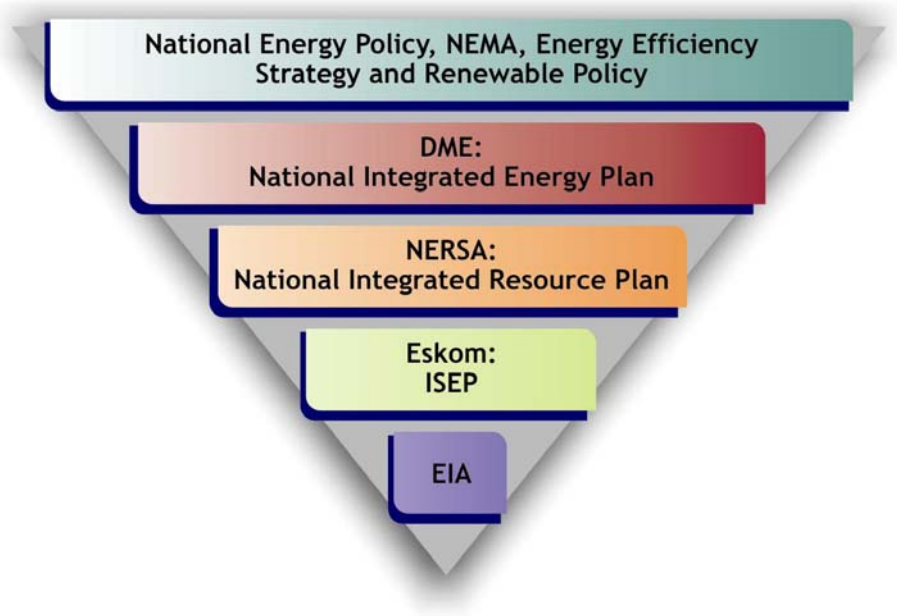


Figure 2.1: Hierarchy of electricity policy and planning documents

2.1. White Paper on the Energy Policy of the Republic of South Africa, 1998

Development within the energy sector in South Africa is governed by the White Paper on a National Energy Policy (the National Energy Policy), published by DME in 1998. This White Paper identifies five key objectives for energy supply within South Africa, that is:

» Increasing access to affordable energy services
» Improving energy sector governance
» Stimulating economic development
» Managing energy-related environmental impacts
» Securing supply through diversity.

Furthermore, the National Energy Policy identifies the need to undertake an Integrated Energy Planning (IEP) process and the adoption of a National Integrated Resource Planning (NIRP) approach. Through these processes, the most likely future electricity demand based on long-term southern African economic scenarios can be forecasted, and provide the framework for South Africa (and Eskom) to investigate a whole range of supply and demand side options.

2.2. Integrated Energy Plan (IEP) – 2003

In response to the requirements of the National Energy Policy, the DME commissioned the Integrated Energy Plan (IEP) to provide a framework in which specific energy policies, development decisions and energy supply trade-offs can be made on a project-by-project basis. The framework is intended to create a

balance between the energy demand and resource availability to provide low-cost electricity for social and economic development, while taking into account health, safety and environmental parameters.

The IEP projected that the additional demand in electricity would necessitate an increase in electricity generation capacity in South Africa by 2007. Furthermore, the IEP recognises:

- That South Africa is likely to be reliant on coal for at least the next 20 years as the predominant source of energy.
- That new electricity generation will remain predominantly coal-based, but with the potential for hydro, natural gas, and nuclear capacity.
- The need to diversify energy supply through increased use of natural gas and new and renewable energies.
- Continuing investigations into nuclear options as a future new energy source.
- The promotion of the use of energy efficiency management and technologies.
- The need to ensure environmental considerations in energy supply, transformation and end use.
- The promotion of universal access to clean and affordable energy, with the emphasis on household energy supply being co-ordinated with provincial and local integrated development programmes.
- The promotion of the use of energy efficiency management and technologies.
- The need to maximise load factors on electricity generation plants to lower levelised lifecycle costs.
- The need to lessen reliance on imported liquid fuels by exploring and developing oil and gas deposits.
- The need to increase existing oil refineries capacity where appropriate rather than greenfields development.
- The continuation of existing synfuel plants and supplement with natural gas as feedstock.
- The need to introduce policy, legislation and regulation for the promotion of renewable energy and energy efficiency measures and mandatory provision of energy data.
- The need to undertake integrated energy planning on an on-going basis

2.3. National Integrated Resource Plan (NIRP), 2003/2004

In response to the National Energy Policy's objective relating to affordable energy services, NERSA commissioned a National Integrated Resource Plan (NIRP) in order to provide a long-term, cost-effective resource plan for meeting electricity demand, which is consistent with reliable electricity supply and environmental, social and economic policies. The planning horizon for the study was from 2003 to 2022.

The objective of the NIRP is to determine the least-cost supply options for the country, provide information on the opportunities for investment into new power generating projects, and evaluate the security of supply. The NIRP also provides an assessment of the system reliability and serves as a benchmarking tool for market performance. It also examines specific public policies, including those on security of electricity supply and risks associated with the current system.

The national electricity demand forecast took a number of factors into account. These include:

» A 2,8% average annual economic growth.
» The development and expansion of a number of large energy-intensive industrial projects.
» Electrification needs.
» A reduction in electricity-intensive industries over the 20-year planning horizon.
» A reduction in the number of electricity consumers – NIRP anticipates people switching to the direct use of natural gas.
» The supply of electricity to large mining and industrial projects in Namibia and Mozambique.
» Typical demand profiles.

Various demand side management and supply-side options are considered in the NIRP process, prior to identifying the least cost supply options for South Africa. The outcome of the process confirmed that coal-fired options are still required over the next 20 years, and that additional base load plants will be required from 2010.

The first NIRP (NIRP1) was carried out during 2001. The second NIRP was carried out under the auspices of the NER in the period 2003-2004. NIRP2 has been drastically improved, compared to its predecessor, NIRP1. It provides moderate and high electricity and demand forecasts, a complete database of the cost and performance of the generation plant considered in the optimisation, detailed output results, methodology applied in the planning process and risk and sensitivity analyses. To a large extent the NIRP report content resembles IRPs recently developed by international utilities and planning panels.

Other important changes from NIRP1 is the inclusion of risk and sensitivity analyses and scenarios to address risk factors and uncertainties that are associated with the long-term demand forecast; performance of existing generation plants; sustainability and delivery of demand-side management (DSM) options, including Interruptible load supplies; and changes in the electricity demand load shape. Further, NIRP2 takes into account transmission integration

costs and credits for regional location of new capacity that were not considered in the previous national resource plan.

2.4. Integrated Strategic Electricity Planning (ISEP) in Eskom

Eskom uses a modelling tool called Integrated Strategic Electricity Planning (ISEP) to plan its future capacity strategy. By analysing usage patterns and growth trends in the economy, and matching these with the performance features of various generation technologies and demand side management options, ISEP identifies the timing, quantity and type (base load or peaking) of new capacity options required in the long-term. These options include the Return-to-Service of the three mothballed coal-fired Simunye Power Stations (i.e. Camden, Komati and Grootvlei), conventional pulverised fuel power plants (i.e. coal-based power), pumped storage schemes, gas-fired power plants, nuclear plants, greenfield fluidised bed combustion technologies, renewable energy technologies (mainly wind and solar projects), and import options within the Southern African Power Pool. As the older Eskom power plants reach the end of their design life from approximately 2025 onwards, the use of all available technologies will need to be exploited to replace these in order to supply the country's growing electricity demand.

The ISEP process identifies the timing, quantity and type (e.g. base load or peaking) of new electricity generating capacity required over the next 20 years. The planning scenarios are based on an average 4% growth in demand for electricity over the 20 year period. This translates into a 6% growth in GDP. The most recently approved ISEP plan (ISEP11) identified the need for increased *peaking* electricity generating by *2007* and additional *baseload* capacity by approximately *2010*. An increase in peaking supply has since been achieved through the commissioning of new plant, such as the OCGT facilities at Atlantis and Mossel Bay in the Western Cape. Figure 2.2 illustrates Eskom's "project funnel", which shows the range of supply options being considered by Eskom to meet the increasing demand for electricity in the country. There are many projects at various stages in the project funnel including research projects, transmission lines and generating options in South Africa and Southern Africa.

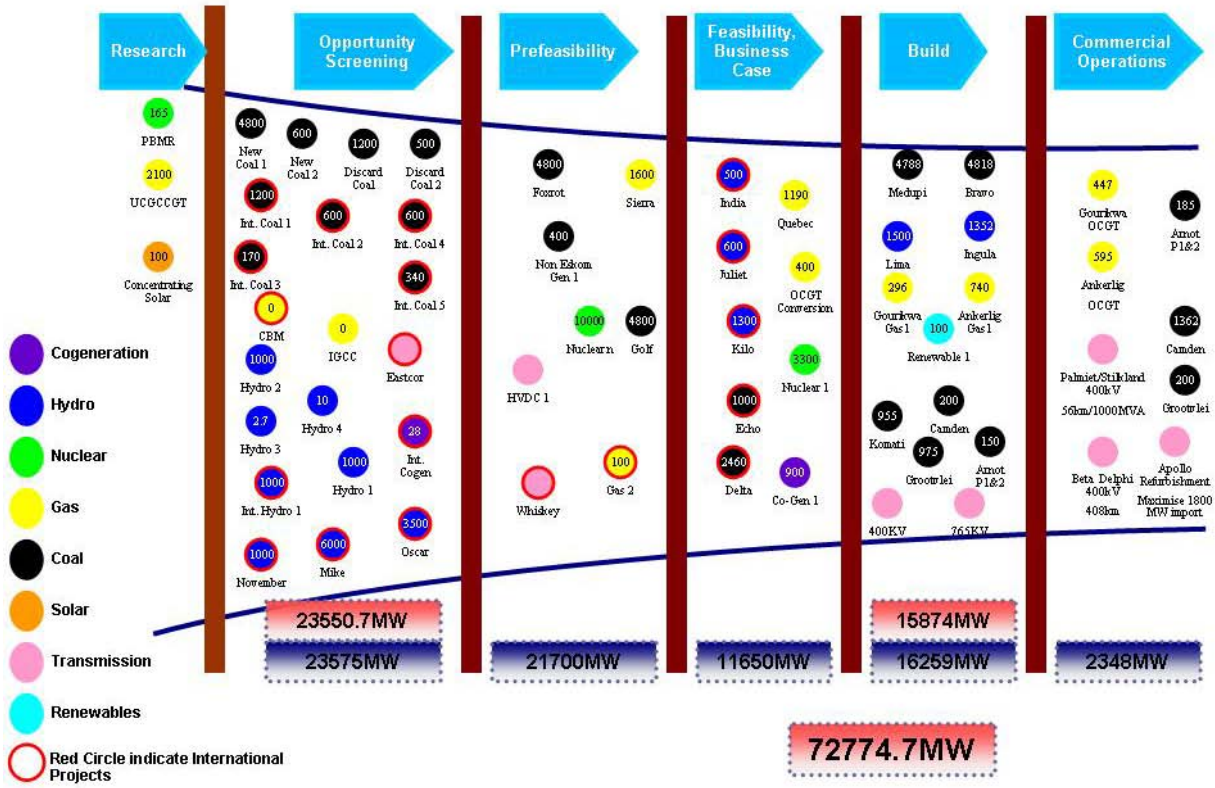


Figure 2.2: Eskom Project Funnel illustrating the range of supply options being considered by Eskom to meet the increasing demand for electricity in the country

As is evident in Figure 2.2, the proposed Ankerlig Power Station conversion and transmission integration project is currently within the pre-feasibility phase, i.e. this project is currently being investigated in terms of its economic, technical and environmental feasibility.

Eskom is currently conducting various energy-related projects in the Western Cape. These are mostly power generation or transmission projects, in various stages of project development. The following list contains some of the projects currently underway in the Western Cape:

» Ankerlig Expansion (Gas 1) – under construction, to be completed end-2008/beginning 2009.
» Gourikwa Expansion (Gas 1) – under construction, to be completed end-2008.
» Omega Substation – already-authorised on the Farm Groot Olifantskop, construction to commence in September 2009.
» Gourikwa Power Station conversion project – EIA process underway.
» Fuel transportation study between Milnerton and Ankerlig Power Station via a liquid fuel pipeline, as well as transport of fuel by rail – EIA process now underway.
» Relocation of the Acacia gas turbines from the existing site in Goodwood to the Ankerlig Power Station site in Atlantis – EIA process underway.

» Palmiet-Stikland 400 kV transmission line – Commissioned in August 2007.
» Nuclear 1 – Environmental Impact Assessment process has commenced. Final Scoping Report is currently being reviewed by a DEAT-appointed review panel. DEAT response is expected end September 2008.
» Nuclear 1 transmission power lines – EIA process recently commenced.
» Wind Energy Facility in the Vredendal area - Environmental Authorisation issued by DEAT.
» Pebble-bed Modular Reactor - Final Scoping Report and Plan of Study for EIA approved by DEAT; EIA process underway.

2.5. Draft Western Cape Integrated Energy Strategy

The recent energy crisis in the Western Cape has highlighted the need to develop a plan for sustainable, secure energy provision in the Western Cape. Although various national efforts are underway to increase energy provision to the Western Cape, the Provincial Government believes that additional efforts need to be made to address the other energy challenges facing the Province, including the challenges of reducing the Province's carbon footprint and eradicating energy poverty.

The Western Cape currently relies heavily on coal-produced electricity and on petrochemicals for its energy supply. The strategy recognises that, in order to ensure that energy can be accessed from various sources in emergency situations, it is necessary to explore alternative sources of energy. The strategy lists the potential opportunities for increasing power supply to the Province. In this regard, the strategy states that the potential for gas-fired power generation is high, provided that sufficient resources of natural gas are discovered. However, supplies are currently not confirmed. Natural gas is a cleaner fossil fuel-based option than coal and can provide base load capacity.

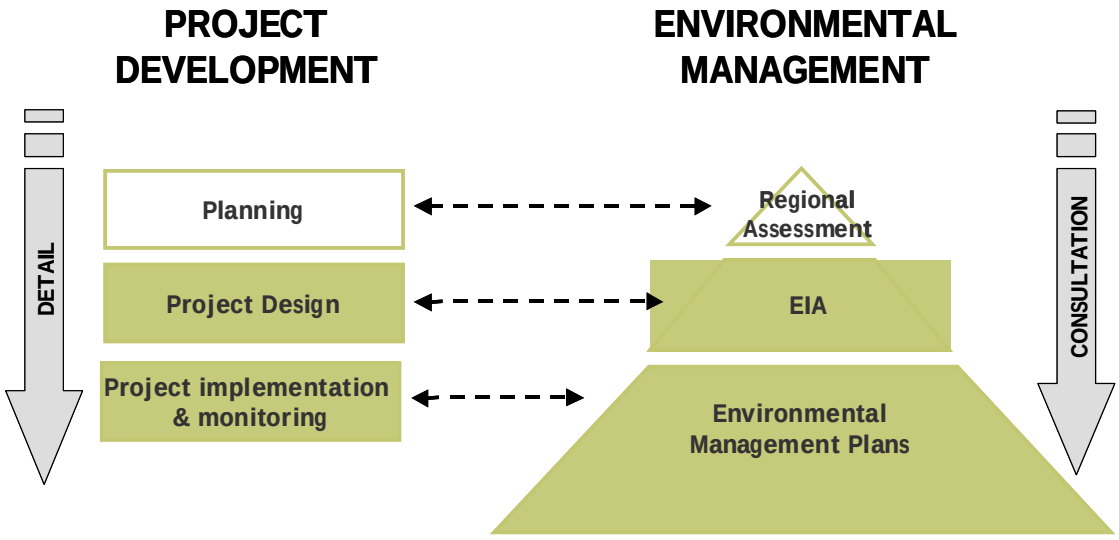
The Strategy details various goals to which the Provincial Government of the Western Cape (PGWC) is committed and outlines a programme of action for implementation of the strategy framework (a copy of this Strategy can be obtained at http://www.capegateway.gov.za/eng/pubs/public_info/D/152704).

2.6. Project Planning and the site-specific Environmental Impact Assessment

Eskom Generation's planning process is based on anticipated electricity demand, rather than immediate load requirements in order to timeously supply the anticipated increased demand in the country. This is due to the long lead-time process of acquiring the necessary permissions to construct such infrastructure from DEAT and the National Energy Regulator of South Africa (NERSA), and negotiations with landowners, and power generation infrastructure purchase, delivery and ultimately construction.

In terms of the EIA Regulations under NEMA, a Scoping and EIA report (including a draft Environmental Management Plan (EMP)) are required to be compiled for this proposed project. The EIA is considered as an effective planning and decision-making tool in the planning process of a new power generation facility. It allows the environmental consequences resulting from a technical facility during its establishment and its operation to be identified and appropriately managed through project design and implementation. The level of detail at a site-specific level is refined through the process, and allows for resolution of potential issue(s) through dialogue with affected parties.

The relationship between project development and the environmental assessment and management process is depicted in the figure below.



DESCRIPTION OF THE PROPOSED ANKERLIG POWER STATION & TRANSMISSION INTEGRATION PROJECT CHAPTER 3

This chapter provides details regarding the scope of the proposed Ankerlig Power Station and Transmission Integration Project, including all required elements of the project and necessary steps for the project to proceed. The scope of project includes construction and operation activities. The expected lifespan of the project is approximately 25 years, with the option to extend this lifespan at the end of this period through the replacement of components, should this be required. Decommissioning of the infrastructure is therefore considered as an activity which is unlikely to occur in the short- to medium-term.

3.1. Power Station Conversion

The existing Ankerlig OCGT Power Station consists of nine OCGT units (i.e. four existing OCGT units, plus an additional five OCGT units, currently under construction) each with a nominal capacity of ~150 MW, resulting in a total nominal capacity of 1 350 MW for the power station. Each OCGT unit consists of one gas turbine driving an electric generator. The concept of converting the OCGT units to CCGT units is to utilise the **heat energy** from the exhaust of the gas turbine to drive a steam turbine, instead of this heat energy being exhausted and lost to the to the atmosphere (as is the current scenario).

Simply stated, this can be achieved through the following:

» When the hot gas exits the gas turbine as exhaust gas, it has a temperature of up to 600°C. This heat energy is transferred to water in the heat recovery steam generator, instead of being exhausted to the atmosphere.
» The heat is used to generate steam (water vapour), which powers the steam turbine to produce mechanical energy.
» The resulting mechanical energy is transferred to a generator, where it is converted into electricity (i.e. electrical energy).
» A condenser converts exhaust steam from the steam turbine back into saturated water through a cooling process.

Conversion of the units to CCGT would be undertaken to increase cycle thermal efficiency. It is estimated that each converted unit would produce approximately 80 MW additional capacity, i.e. approximately 50% more than a standard OCGT unit. Therefore, an additional 9 x 80 MW (720 MW in total) increase in capacity is foreseen from the OCGT to CCGT conversion. The **total nominal capacity** of the Ankerlig Power Station would, therefore, be **2 070 MW**. The proposed conversion is dependent on the existence of the OCGT units and would be on the

site of the existing Ankerlig Power Station, and would not require any additional land take outside of the existing power station boundaries. Therefore, no location alternatives have been considered within this EIA process.

The primary components of the conversion project include the following:

» A **heat recovery steam generator** (HRSG) would be added to the gas turbine to recover waste heat, to drive the steam turbine cycle. In principle, a HRSG is associated with a gas turbine. One HRSG can be linked to 2 or 3 OCGT units. The following configurations are currently being investigated from a technical perspective:
  * A configuration of 3 x 3:1 (i.e. 3 OCGT units: 1 HRSG unit),
  * A configuration of 2 x 3:1 and 1 x 1:2 (i.e. 1 OCGT unit: 2 HRSG units) and one stand-alone OCGT unit, possibly to be used as "black-start" facility for the power station, and
  * A configuration of 4 x 2:1 (2 OCGT units: 1 HRSG unit) and one stand-alone OCGT unit, possibly to be used as "self-start"[5] facility for the power station. This would allow for HRSG technology standardisation.
» A **condenser** for each HRSG unit which would convert exhaust steam from the steam turbine back into water through a cooling process.
» Depending on the configuration, a **bypass stack** for the CCGT, anticipated to be approximately 60 m in height would be associated with each HRSG. Therefore, between two and four stacks would be required.
» **Water treatment plant** for treatment of potable water and production of demineralised water (for steam generation). High quality water would be required for use within the CCGT power generation process. Membranes/ion exchange systems would be required for water treatment on site. A **waste disposal system** for the effluent[6] from the water treatment system would be required. All solid waste generated from this process would be disposed of off-site at a suitably licensed waste disposal facility.
» **Dry-cooled technology** consisting of a system of air-cooled condenser fans situated in fan banks approximately between 25-30 meters above ground.
» **Additional fuel storage facilities** and associated off-loading and other related infrastructure to cater for the increased fuel requirements associated with the higher load factor (i.e. longer operating hours or a mid-merit operating regime[7]) (see below for details).
» An **elevated water tank**, approximately 20 m high, with a holding volume of approximately 2.5 million litres (i.e. water storage for approximately 5 days of operation).

[5] A power station must be able to kick-start itself in the event of no external power supply being available. Hence this one dedicated unit.

[6] Estimated to be approximately 1,5 m^3/day.

[7] Mid-merit capacity is during the daytime from about 6 am to about 10 pm on weekdays.

The power station is to be operated as a zero liquid effluent discharge (ZLED) system, i.e. water within the power station would be recycled for re-use in the power station process. No liquid waste from the power station would therefore be discharged.

3.1.1. Water Supply

Water will be required for the CCGT power generation process and for cooling. It is estimated that approximately 500 m^3/day will be required for this purpose. This translates into an annual water requirement of ~1.825 Mm^3/annum. From studies undertaken in the Scoping Study (Savannah Environmental, March 2008), it was established that there is currently spare capacity at the water treatment works (~15 Ml/d) which is abstracted and stored by the Witzand Water Treatment Works for industrial purposes. The use of potable water from the Witzand Water Treatment Works was determined to be the preferred option in the short-term based on technical, environmental and economic constraints. The purchase of water from this water treatment works would minimise the impact on the aquifer system as water is already being abstracted and treated by the City of Cape Town. A water reticulation pipeline passes the Ankerlig Power Station on Neil Hare Road. Eskom have an existing permanent water tap-off point from this pipeline to the Ankerlig Power Station (existing 4 units), and a temporary tap-off point to the power station expansion site (i.e. additional 5 units) where construction is currently being undertaken. The option of using the existing tap-off points, as well as the need for a new tap-off point is currently being investigated from a technical perspective[8].

The capacity of the Witzand Water Treatment Works to supply the additional anticipated water demand at the Ankerlig Power Station has been confirmed by the City of Cape Town (refer to Appendix B). The City has, however, encouraged Eskom to investigate alternative supplies of water for operation in the long-term in order to ensure that water resources are used as responsibly as possible. The potential to utilise industrial wastewater in the medium- to long-term will continue to be investigated by Eskom from a technical perspective in parallel to the EIA process.

3.1.2. Cooling Technology

A number of cooling technology options for the CCGT have been investigated by Eskom, including dry-cooled technology and wet-cooled technology. Due to financial and technical constraints, **dry-cooling technology (air-cooled condensers)** has been nominated as a preferred option for implementation.

[8] Should it be determined that a new tap off point is required, a separate EIA process would be required to be undertaken (depending on the capacity of this pipeline)

Dry-cooling technology is less water-intensive (i.e. uses significantly less water) than wet-cooled technology, and consists of a system of air-cooled condenser fans situated in fan banks approximately 25 – 30 m above ground. In a direct dry-cooled system, the steam is condensed directly by air in a heat exchanger (air cooled condenser) and the condensate is returned to the steam cycle in a closed loop. The air flow is induced solely by mechanical draft (i.e. caused by fans) in the air cooled condensers.

A condenser converts exhaust steam from the steam turbine back into saturated water through a cooling process. This water (condensate) is then fed into a Condensate Polishing Plant (CPP), to treat/polish it to desired qualities, before it is fed back into the HRSG as part of the steam cycle. Regeneration wastes, a highly saline effluent from the CPP, is fed back into the water treatment system from where it will be disposed off as part of regeneration wastes from the demineralisation plant. This waste is typically small in volume and non-hazardous, and as such, could be disposed of either in the sewer system, or off-site. Eskom is currently investigating various disposal options, which will be assessed as necessary through a separate process.

3.1.3. Additional Fuel Storage Facilities

Conversion of the units to CCGT is based on **increased cycle thermal efficiency**. The CCGT units would utilise the **same amount of liquid fuel** (i.e. diesel) as is currently the case for the OCGT units (i.e. approximately 40 tons of diesel/unit/hour) for the same operating regime. However, in order to meet the electricity supply demand in the medium-term, the plant will have to operate for more hours per day than was anticipated for the OCGT plant (i.e. higher than anticipated load factors). Therefore, the power station will not only operate as a peaking power plant[9] as is currently the case, but will contribute to the mid-merit electricity generation supply[10].

This **higher load factor** would require **higher fuel consumption**. **Additional fuel storage facilities** will be required at the Ankerlig Power Station to cater for the increased fuel requirements associated with the higher load factor. Fuel is currently transported by road to the Ankerlig Power Station site from the fuel supply point in Milnerton. The installation of a liquid fuel pipeline to the Ankerlig Power Station, as well as transport of fuel by rail is currently being investigated as part of a separate EIA application (DEAT reference number 12/12/20/955) by Bohlweki Environmental. The EIA Process for this project is now underway.

[9] Peaking power refers to power generation technology designed to generate electricity during periods of high electricity demand, generally in the weekday mornings from 07:00 to 09:00 and weekday evenings from 18:00 to 20:00.

[10] Mid-merit capacity is during the daytime from about 6 am to about 10 pm on weekdays.

Eskom currently has authorisation to store 16,2 million litres of fuel on the Ankerlig Power Station site. In order to form a fuel storage buffer between actual fuel usage and fuel delivery to the CCGT units at the higher load factor, Eskom proposes the storage of an additional 43,2 million litres of fuel on the power station site, resulting in a total storage capacity of 59,4 million litres on site. An area to the east of the power station expansion has been earmarked for this additional fuel storage (refer to Figure 3.1). Provision would be required to be made for 8 x 5 400 m^3 fuel storage tanks, as well as associated off-loading and other related infrastructure. Security of liquid fuel supply nationally is regulated by the DME[11].

3.1.4. Project Construction Phase

It is expected that the construction of the power station conversion would commence in early 2009, and would take a maximum of 32 months to complete. In order to meet the urgent need for additional electricity generation capacity, Eskom would aim to fast-track this construction timeframe as far as possible.

The number of construction workers required for a project of this nature is still being determined. Construction crews will constitute mainly skilled and semi-skilled workers. No employees will reside on the construction site at any time during the construction phase, and the intention is for appropriate accommodation to be sought and provided within the neighbouring residential area.

3.1.5. Project Operation Phase

As is typical of gas turbine power stations, the expected lifespan of the power station is approximately 25 years, with the option to extend this lifespan at the end of this period through the replacement of components, should this be required. The creation of additional employment opportunities during the operational phase of the power station will be limited. It is estimated that the project will support only about 20 direct employment opportunities (operators/maintainers).

[11] Refer to Energy Security Master Plan – Liquid Fuels, published by the DME.

Figure 3.1: Aerial photograph showing Ankerlig Power Station layout and land use

3.2. Integration of the CCGT Power Station into the National Grid

Eskom proposes the construction of a 400kV transmission power line between the Ankerlig Power Station and the Omega Substation (to be constructed on the Farm Groot Oliphantskop 81) to transmit the additional power generated at this power station to the national electricity grid.

One 400kV power line will be sufficient to evacuate the additional power, and would be connect to the now-to-be extended substation (high voltage (HV) yard) at the power station. No expansion of this HV yard is required to accommodate the new transmission power line.

Three technically feasible alternative transmission power line alignment corridors (approximately 1 km in width) were investigated within the Scoping Process (refer to Figure 3.2).

From the specialist studies undertaken within the Scoping Phase, **Option B** was nominated as the least preferred alternative in terms of all aspects considered, as this option would result in the most significant impacts on both the social and biophysical environments. Therefore, this option is **excluded as an alternative for further investigation**.

In terms of **Option A**, the following conclusions have been drawn:

» Option A follows existing power lines for the majority of the route.
» The consolidation of power line infrastructure results in a reduction in visual impacts.
» The alignment is considered preferable from an avifauna perspective as this option minimises the length of a new, isolated power line, and effectively reduces the collision risk for both the new line and the existing ones by grouping the entire assemblage together, hugely improving the conspicuousness of all the overhead lines traversing this area.
» Impacts on the social environment are reduced as the alignment minimises impacts on existing and planned land uses in the area.
» Option A does not lie close to any significant historical sites or places of tourism potential. No archaeological sites were recorded along the alignment during the preliminary assessment, and the use of an existing area of disturbance and prior landscape impact will decrease the likelihood of new impacts occurring to the surrounding properties.
» Although not the preferred alternative from a botanical perspective, this option is considered feasible. It is expected that benefits could actually outweigh the negatives if comprehensive alien clearing of the servitudes is undertaken, and the more sensitive areas are not bushcut.

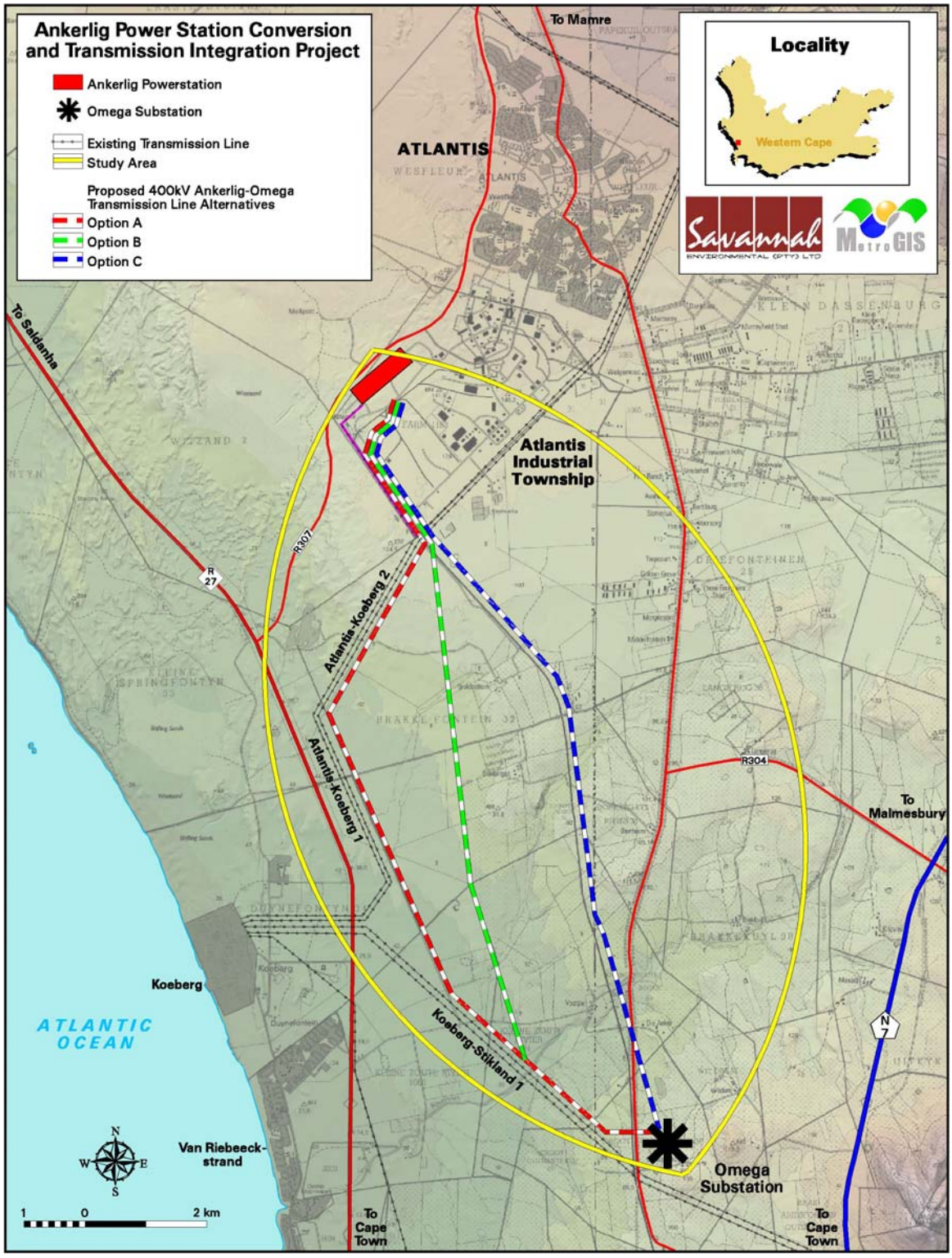


Figure 3.2: Transmission power line alternatives investigated in the Scoping Phase of the EIA process

In terms of **Option C**, the following conclusions have been drawn:

» Option C follows the Atlantis railway line for the majority of the route.
» This option presents fewer botanical constraints in that it is both shorter and of lower sensitivity, due to there being larger areas of minimal natural vegetation.
» As the most inland route of the options considered, Option C was considered to be least sensitive in terms of potential impacts on terrestrial faunal species and associated habitats.
» No archaeological sites were recorded along the alignment during the preliminary assessment. The use of an existing area of disturbance and prior landscape impact will decrease the likelihood of new impacts occurring to the surrounding properties.
» Option C may be considered acceptable from a visual and social impact perspective, but would potentially have an impact of higher significance on current and planned land-uses and sense-of-place.
» Expansion plans currently under investigation by Apollo Bricks (located to the east of the railway line) and the recently authorised Regional Landfill site (located to the west of the railway line) are likely to pose technical constraints (in terms of space requirements) to the construction and operation of the proposed power line (refer to Figure 3.3).

From the above, it was concluded that the adoption of Option A would potentially have the lower impact on the overall environment as a result of consolidation of infrastructure of a similar nature and the minimisation of impacts on current and planned land use. Therefore, **Option A** was nominated as a preferred alternative for further investigation in the EIA phase. Options B and C have therefore not been considered further within the EIA process.

During the public review period of the draft Scoping Report, a power line sub-alternative in the vicinity of the Koeberg Nuclear Power Station was recommended by the stakeholders. This sub-alternative is proposed to follow the alignment of the existing power lines for the section of the route past Koeberg (refer to Figure 3.4). This sub-alternative is considered to be a technically feasible alternative and has been investigated within the EIA phase.

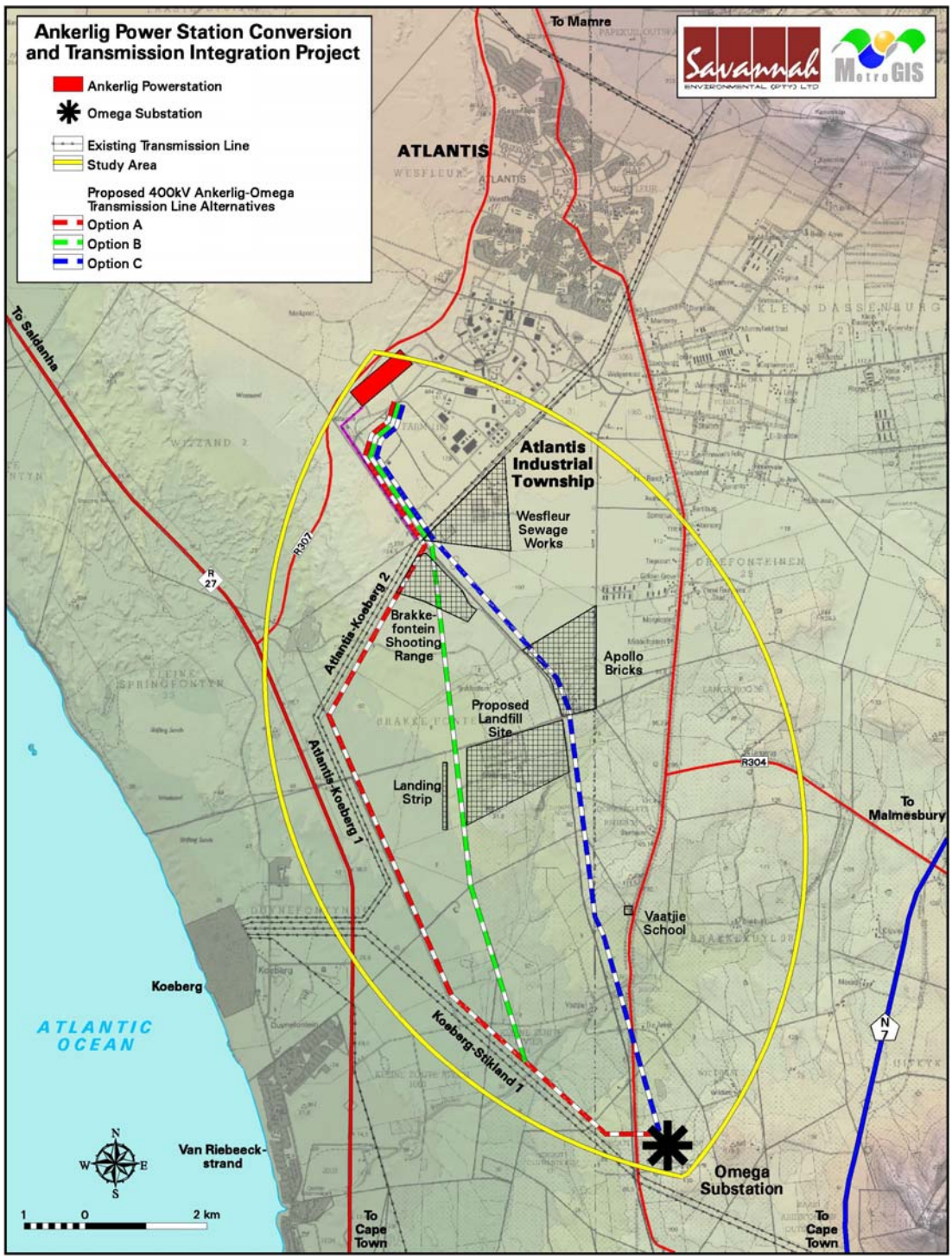


Figure 3.3: Map indicating land uses between Ankerlig Power Station and the Omega substation site which may be impacted by the proposed transmission power line alternatives

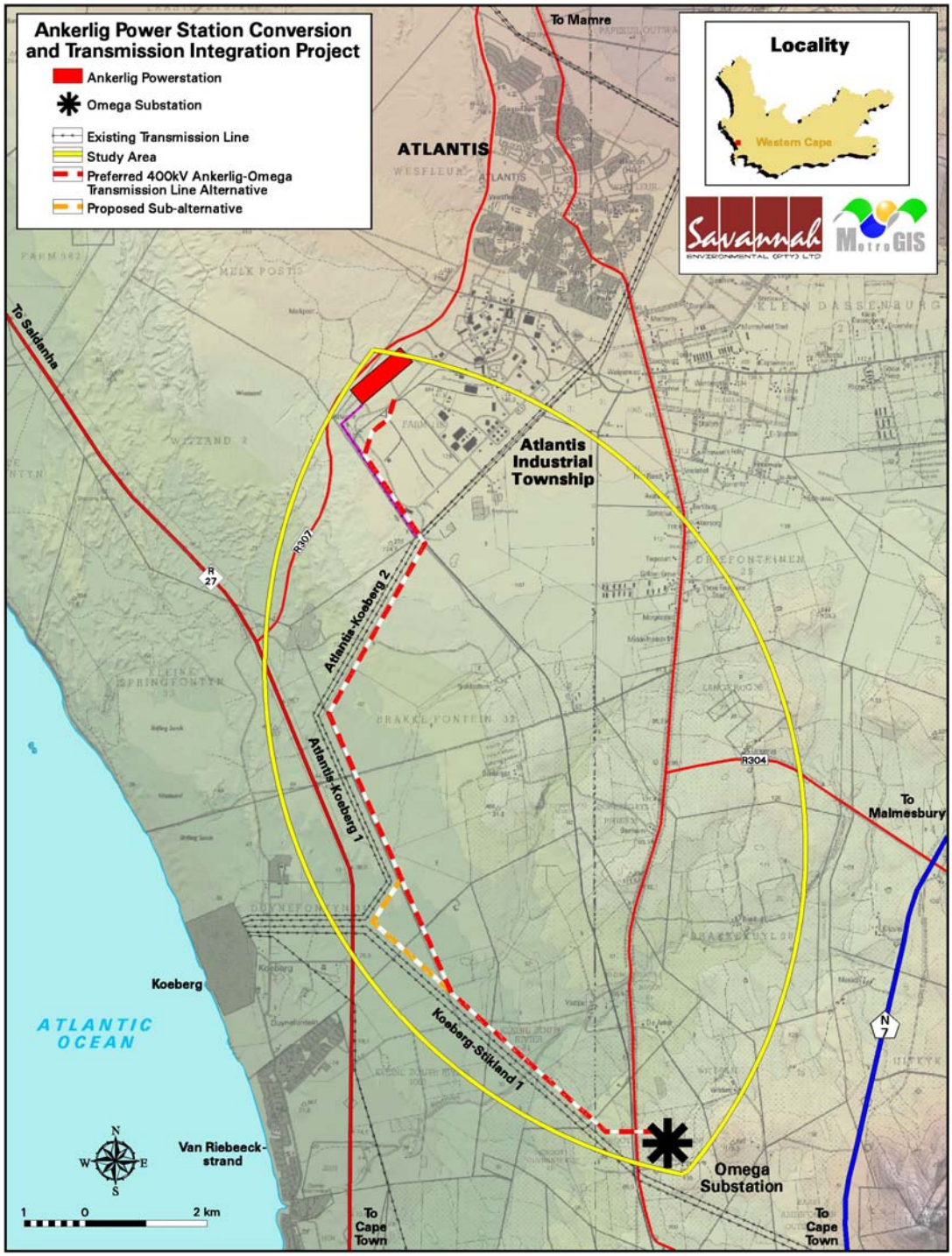


Figure 3.4: Map showing the transmission power line corridor alternatives between Ankerlig and Omega Substation nominated for detailed consideration in the EIA phase of the EIA process

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

landowner. The negotiation process is undertaken directly by Eskom and is independent of the EIA process.

While there should be reasonable confidence in the environmental feasibility of the preferred corridor nominated, other criteria may require minor alteration to the final alignment within the corridor which received environmental authorisation during the land negotiation process undertaken by Eskom. These may include:

» Identification of a technical problem during the detailed design phase which will require excessive cost to resolve (e.g. unstable subsurface conditions identified by detailed geotechnical investigations).
» Identification of sensitive environmental features during the final design phase, which were not evident through the EIA process (e.g. wetland areas, sensitive vegetation, heritage sites of significance, etc).
» Request by a landowner during the course of the negotiation process that the alignment be shifted to avoid disruption of a particular activity on his property, but provide a feasible new alignment.

Provided such potential deviations are not unreasonable, it is fair for Eskom Transmission to investigate and negotiate local adjustments within the authorised corridor alignment. This may be required at a number of points along the alignment.

3.2.1. Project Construction Phase

It is expected that the construction for transmission power line will commence in early 2010, and would take approximately 9 months to complete. In order to meet the urgent need for additional electricity generation capacity, Eskom would aim to fast-track this construction timeframe as far as possible.

Construction crews will constitute mainly skilled and semi-skilled workers. No employees will reside on the construction site at any time during the construction phase, and the intention is for appropriate accommodation to be sought and provided within the neighbouring residential area.

3.2.2. Project Operation Phase

The expected lifespan of the proposed transmission power line is between 35 and 40 years, depending on the maintenance undertaken on the power line structures. The creation of additional employment opportunities during the operational phase of the power line will be limited, and will be restricted to skilled maintenance personnel employed by Eskom.

APPROACH TO UNDERTAKING THE ENVIRONMENTAL IMPACT ASSESSMENT PHASE CHAPTER 4

An Environmental Impact Assessment (EIA) process refers to that process (as per the EIA Regulations) which involves the identification of and assessment of direct, indirect and cumulative environmental impacts associated with the proposed project. The EIA process comprises two phases: **Scoping Phase** and **EIA Phase**. The Scoping process culminates in the submission of a Scoping Report to the competent authority (DEAT in this case) for review and acceptance before proceeding onto the next phase of the process. The EIA culminates in the submission of an EIA Report (including an Environmental Management Plan (EMP)) to the competent authority for decision-making.

The phases of the EIA process are as follows:

The EIA Phase for the proposed Ankerlig Power Station Conversion and Transmission Integration project has been undertaken in accordance with the EIA Regulations published in Government Gazette (GG) 28753 of 21 April 2006, in terms of Section 24(5) of NEMA (Act No 107 of 1998).

The environmental studies for this proposed project were undertaken in two phases, in accordance with the EIA Regulations.

4.1. Phase 1: Scoping Study

The Scoping Study, which commenced in August 2007, provided I&APs with the opportunity to receive information regarding the proposed project, participate in the process and raise issues of concern.

The Scoping Report aimed at detailing the nature and extent of the proposed project, identifying potential issues associated with the proposed project, and defining the extent of studies required within the EIA. This was achieved through an evaluation of the proposed project, involving the project proponent, specialist consultants, and a consultation process with key stakeholders that included both

relevant government authorities and I&APs. In accordance with the requirements of the EIA Regulations, feasible project-specific alternatives (including the "do nothing" option) were identified for consideration within the EIA process.

The draft Scoping Report compiled was made available at public places for I&AP review and comment. All the comments, concerns and suggestions received during the Scoping Phase and the draft report review period were included in the final Scoping Report and Plan of Study for EIA. The Scoping Report was submitted to DEAT and DEA&DP in March 2008. The Final Scoping Report was accepted by DEAT, as the competent Authority (refer to correspondence included in Appendix C). In terms of this acceptance, DEAT required that an EIA be undertaken for the proposed project.

4.2. Phase 2: Environmental Impact Assessment

Through the Scoping Study, a number of issues requiring further study for all components of the project (i.e. the power station and power line) were highlighted. These issues have been assessed in detail within the EIA phase of the process.

The EIA Phase aimed to achieve the following:

» Provide an overall assessment of the social and biophysical environments affected by the proposed alternatives put forward as part of the project.
» Assess potentially significant impacts (direct, indirect and cumulative, where required) associated with the proposed project.
» Comparatively assess identified alternatives put forward as part of the project.
» Nominate a preferred power line alternative corridor for authorisation by DEAT.
» Identify and recommend appropriate mitigation measures for potentially significant environmental impacts.
» Undertake a fully inclusive public involvement process to ensure that I&AP are afforded the opportunity to participate, and that their issues and concerns are recorded.

The EIA addresses potential environmental impacts and benefits (direct, indirect and cumulative impacts) associated with all phases of the project including design, construction, operation and decommissioning, and aims to provide the environmental authorities with sufficient information to make an informed decision regarding the proposed project.

The EIA process followed for this project is described below.

4.3. Overview of the EIA Phase

The EIA Phase has been undertaken in accordance with the EIA Regulations published in GG 28753 of 21 April 2006, in terms of NEMA. The potential impacts associated with the installation of 720 MW of additional electricity generation capacity at Ankerlig Power Station, as well as the transmission of this additional power to the national electricity network have been assessed. Key tasks undertaken within the EIA phase included:

» Consultation with relevant decision-making and regulating authorities (at National, Provincial and Local level).
» Undertaking a public involvement process throughout the EIA process in accordance with Regulation 56 of GN No R385 of 2006 in order to identify any additional issues and concerns associated with the proposed project.
» Preparation of a Comments and Response Report detailing key issues raised by I&APs as part of the EIA Process (in accordance with Regulation 59 of GN No R385 of 2006).
» Undertaking of independent specialist studies in accordance with Regulation 33 of GN No R385 of 2006.
» Preparation of a Draft EIA Report in accordance with the requirements of the Regulation 32 GN No R385 of 2006.
» Preparation of a Draft Environmental Management Plan (EMP) in accordance with the requirements of the Regulation 34 GN No R385 of 2006.

These tasks are discussed in detail below. As part of a quality system, control sheets detailing the requirements for the key tasks as listed above have been completed by the EIA team, and are included in Appendix D

4.3.1. Authority Consultation

The National DEAT is the competent authority for this application. Consultation with the regulating authorities (i.e. DEAT and DEA&DP) has continued throughout the EIA process. On-going consultation included the following:

» Submission of a Final Scoping Report (March 2008) following a 30-day public review period (and consideration of stakeholder comments received).
» A site inspection during the authority review period of the Scoping Report (i.e. 13 February 2008).
» Ad hoc discussions with DEAT and DEA&DP in order to clarify the findings of the Scoping Report and the issues identified for consideration in the EIA process.
» Receipt of Acceptance of Scoping Report from DEAT.

The following will also be undertaken as part of this EIA process:

» Submission of a Final Environmental Impact Assessment (EIA) Report following the 30-day public review period.
» A consultation meeting with DEAT and DEA&DP in order to discuss the findings and conclusions of the EIA Report.

Consultation with Organs of State that may have jurisdiction over the project has been undertaken as part of the project process. This consultation has included:

» Department of Water Affairs and Forestry
» Department of Agriculture
» Heritage Western Cape
» City of Cape Town

A record of all authority consultation undertaken prior to the commencement of the EIA Phase is included within the Scoping Report. A record of the consultation in the EIA process is included within Appendix C.

4.3.2. Comparative Assessment of Alternatives

The following project alternatives were investigated in the EIA:

» The proposed conversion on the site of the existing Ankerlig Power Station.
» The use of potable water from the Witzand Water Treatment Works within the power station process.
» Dry-cooling technology (air-cooled condensers).
» The use of diesel and natural gas as alternative fuel sources.
» Transmission power line Option A (and the sub-alternative nominated by stakeholders) (refer to Figure 3.4).

The assessment of these alternatives included the consideration of direct, indirect and cumulative impacts and the possibility of implementing mitigation measures for potentially significant impacts. These alternatives have been assessed within Chapters 6 and 7 and within the specialist studies contained within Appendices E - M.

The do-nothing alternative for both the power station conversion and transmission line integration was evaluated within the Scoping Report (Savannah Environmental, March 2008). This alternative was rejected as a feasible alternative and therefore did not require further investigation in the EIA Phase. This conclusion has been accepted by DEAT through their acceptance of the Scoping Report (refer to Appendix C).

4.3.3. Public Involvement and Consultation

The aim of the public participation process was primarily to ensure that:

» Information containing all relevant facts in respect of the proposed project was made available to potential stakeholders and I&APs.
» Participation by potential I&APs was facilitated in such a manner that all potential stakeholders and I&APs were provided with a reasonable opportunity to comment on the proposed project.
» Comment received from stakeholders and I&APs was recorded and incorporated into the EIA process.

Through on-going consultation with key stakeholders and I&APs, issues raised through the Scoping Phase for inclusion within the EIA study were confirmed. All relevant stakeholder and I&AP information has been recorded within a database of affected parties (refer to Appendix N for a listing of recorded parties). While I&APs were encouraged to register their interest in the project from the onset of the process, the identification and registration of I&APs has been ongoing for the duration of the EIA process and the project database has been updated on an on-going basis. 470 parties have registered their interest in the project to date.

In order to accommodate the varying needs of stakeholders and I&APs, as well as ensure the relevant interactions between stakeholders and the EIA specialist team, the following opportunities were provided for I&APs issues to be recorded and verified through the EIA phase, including:

» Focus group meetings (pre-arranged and stakeholders invited to attend).
» One-on-one consultation meetings and telephonic consultation sessions (consultation with various parties, for example with directly affected landowners, by the project participation consultant as well as specialist consultants).
» Written, faxed or e-mail correspondence.

Table 4.1 provides details of the formal focus group meetings held during the EIA phase of the public consultation process.

Table 4.1: Details of the focus group meetings held during the EIA phase of the public consultation process

Organisation	Date
Kleine Zoute Rivier residents	17 June 2008
City of Cape Town	1 July 2008

4.3.4. Identification and Recording of Issues and Concerns

Issues and comments raised by I&APs over the duration of the EIA process have been synthesised into Comments and Response Reports (refer to Appendix O for the Comments and Response Reports compiled from both the Scoping and EIA Phases).

The Comments and Response Reports include responses from members of the EIA project team and/or the project proponent. Where issues are raised that the EIA team considers beyond the scope and purpose of this EIA process, clear reasoning for this view is provided.

4.3.5. Assessment of Issues Identified through the Scoping Process

Based on the findings of the Scoping Study, potential impacts on avifauna are expected to be of low significance and further investigations are only required to verify the presence or absence of key breeding species (Blue Crane, African Marsh Harrier, Black Harrier and possibly others) within the impact area of the line (once an alignment has been selected). These studies can only be adequately undertaken once the authorised power line route has been surveyed and the tower positions are known. Therefore, these should be undertaken as part of a walk-through survey within the site-specific EMP phase for the power line.

Issues which required further investigation within the EIA phase, as well as the specialists involved in the assessment of these impacts are indicated in Table 4.2.

Table 4.2: Specialist studies undertaken within the EIA phase

Specialist	Area of Expertise	Refer Appendix
Demos Dracoulides of DDA	Air quality impact assessment for the power station conversion	Appendix E
Demos Dracoulides of DDA	Noise impact assessment for the power station conversion	Appendix F
Lourens du Plessis of MetroGIS	Visual impact assessment and GIS mapping for the power station conversion and transmission power line	Appendix G
Liezl Coetzee of Southern Hemisphere	Social impact assessment for the power station conversion and transmission power line	Appendix H
Nick Helme of Nick Helme Botanical Surveys	Vegetation impact assessment for the proposed fuel tank area on the power station site and power line	Appendix I

Specialist	Area of Expertise	Refer Appendix
Prof. Le Fras Mouton of the Department of Botany & Zoology, Stellenbosch University	Terrestrial fauna impact assessment for the proposed transmission power line	Appendix J
Tim Hart of the Archaeology Contracts Office, Department of Archaeology: University of Cape Town	Heritage impact assessment for the proposed transmission power line	Appendix K
Mark Pinder of Arup	Traffic Impact Assessment for the proposed construction and operation of the converted power station	Appendix L
Mike Oberholzer of Riscom	Risk Assessment of the power station site	Appendix M

A peer review of the EIA process was undertaken by Jeremy Blood of CCA Environmental.

Specialist studies considered direct and indirect environmental impacts associated with the development of all components of the project. Issues were assessed in terms of the following criteria:

» The **nature**, a description of what causes the effect, what will be affected and how it will be affected.
» The **extent**, wherein it is indicated whether the impact will be local (limited to the immediate area or site of development), regional, national or international. A score of between 1 and 5 is assigned as appropriate (with a score of 1 being low and a score of 5 being high).
» The **duration**, wherein it is indicated whether:
  * the lifetime of the impact will be of a very short duration (0–1 years) – assigned a score of 1;
  * the lifetime of the impact will be of a short duration (2-5 years) - assigned a score of 2;
  * medium-term (5–15 years) – assigned a score of 3;
  * long term (> 15 years) - assigned a score of 4; or
  * permanent - assigned a score of 5.
» The **magnitude**, quantified on a scale from 0-10, where a score is assigned:
  * 0 is small and will have no effect on the environment;
  * 2 is minor and will not result in an impact on processes;
  * 4 is low and will cause a slight impact on processes;
  * 6 is moderate and will result in processes continuing but in a modified way;
  * 8 is high (processes are altered to the extent that they temporarily cease); and
  * 10 is very high and results in complete destruction of patterns and permanent cessation of processes.

» The probability of occurrence, which describes the likelihood of the impact actually occurring. Probability is estimated on a scale, and a score assigned:
  * Assigned a score of 1–5, where 1 is very improbable (probably will not happen);
  * Assigned a score of 2 is improbable (some possibility, but low likelihood);
  * Assigned a score of 3 is probable (distinct possibility);
  * Assigned a score of 4 is highly probable (most likely); and
  * Assigned a score of 5 is definite (impact will occur regardless of any prevention measures).
» The significance, which is determined through a synthesis of the characteristics described above (refer formula below) and can be assessed as low, medium or high.
» The **status**, which is described as either positive, negative or neutral.
» The degree to which the impact can be reversed.
» The degree to which the impact may cause irreplaceable loss of resources.
» The degree to which the impact can be mitigated.

The **significance** is determined by combining the criteria in the following formula:

S=(E+D+M)P; where

S = Significance weighting
E = Extent
D = Duration
M = Magnitude
P = Probability

The **significance weightings** for each potential impact are as follows:

» **< 30 points:** Low (i.e. where this impact would not have a direct influence on the decision to develop in the area),
» **30-60 points:** Medium (i.e. where the impact could influence the decision to develop in the area unless it is effectively mitigated),
» **> 60 points:** High (i.e. where the impact must have an influence on the decision process to develop in the area).

As Eskom has the responsibility to avoid or minimise impacts and plan for their management (in terms of the EIA Regulations), the mitigation of significant impacts is discussed. Assessment of impacts with mitigation is made in order to demonstrate the effectiveness of the proposed mitigation measures. A draft Environmental Management Plan is included as Appendix P.

4.3.6. Assumptions and Limitations

The following assumptions and limitations are applicable to the studies undertaken within this EIA Phase:

» All information provided by Eskom and I&APs to the Environmental Team was correct and valid at the time it was provided.
» The transmission line corridors identified by Eskom are technically and economically viable. The final power line route will be determined after the EIA process within the nominated preferred power line corridor.
» Strategic, forward planning deliberations are reflected in the IEP, NIRP and ISEP planning processes and do not form part of this EIA.
» This report and its investigations are project-specific, and consequently the environmental team did not evaluate any other power generation or transmission alternatives.

4.3.7. Public Review of Draft EIA Report and Feedback Meeting

Hard copies of the Draft EIA Report were made available for public review from **10 October – 9 November 2008** at the following locations:

» Wesfleur Library
» Atlantis Residents and Ratepayers Association office
» Red Door Local LED Office
» Atlantis Development Forum Office
» Avondale Library
» Melkbosstrand Residents and Ratepayers Association
» Melkbostrand Library
» www.savannahSA.com
» www.eskom.co.za/eia

In order to facilitate comments on the Draft EIA Report, a stakeholder meeting was held during the review period for the Draft EIA Report on 21 October 2008 at Koeberg Visitors Centre from 11:00.

The public review process was advertised in regional and local newspapers: Die Burger, Cape Times, Table Talk, and the Swartland and Weskus Herald, and the Daily Despatch. In addition, all registered I&APs were notified of the availability of the report and public meeting by letter. Identified key stakeholders were personally invited to attend the key stakeholder meeting by letter.

A first round of adverts was placed where a review period of 22 September to 22 October 2008 was advertised. However, due to unforeseen circumstances, the report was not available to be released to the public at this time. The report

availability was therefore again advertised with the revised review period. All registered I&APs were notified of this change in the review period for the draft report by letter. Copies of all adverts and notices are included within Appendix O.

4.3.8. Final EIA Report

The final stage in the EIA Phase will entail the capturing of responses from I&APs on the Draft EIA Report in order to refine this report. It is this final report upon which the decision-making environmental Authorities make a decision regarding the proposed project.

4.4. Regulatory and Legal Context

The South African energy industry is evolving rapidly, with regular changes to legislation and industry role-players. The regulatory hierarchy for an energy generation project of this nature consists of three tiers of authority who exercise control through both statutory and non-statutory instruments – that is National, Provincial and Local levels.

4.4.1. Regulatory Hierarchy

At National Level, the main regulatory agencies are:

» *Department of Minerals and Energy (DME):* This department is responsible for policy relating to all energy forms, including renewable energy. It is the controlling authority in terms of the Electricity Act (Act No 41 of 1987).
» *National Energy Regulator (NER):* This body is responsible for regulating all aspects of the electricity sector, and will ultimately issue generating licenses for power station developments to generate electricity.
» *Department of Environmental Affairs and Tourism (DEAT):* This Department is responsible for environmental policy and is the controlling authority in terms of NEMA and the EIA Regulations. DEAT is the competent authority for this project, and charged with granting the relevant environmental authorisation.
» *Department of Transport and Public Works:* This department is responsible for roads and the granting of exemption permits for the conveyance of abnormal loads (as may be associated with the construction phase) on public roads.

At Provincial Level, the main regulatory agency is:

» *Provincial Government of the Western Cape (PGWC) – Department of Environmental Affairs and Development Planning (DEA&DP).* This is the principal authority involved in the EIA process and determines many aspects of Provincial Environmental policy. The department is a commenting authority for this project.

At Local Level the local and municipal authorities are the principal regulatory authorities responsible for planning, land use and the environment. The proposed project falls within the Koeberg and Blaauwberg sub-councils of the City of Cape Town Metropolitan Municipality.

» In terms of the Municipal Systems Act (Act No 32 of 2000) it is compulsory for all municipalities to go through an Integrated Development Planning (IDP) process to prepare a five-year strategic development plan for the area under their control. The IDP process, specifically the spatial component (Spatial Development Framework), in the Western Cape Province is based on a bioregional planning approach to achieve continuity in the landscape and to maintain important natural areas and ecological processes.
» By-laws and policies have been formulated by local authorities to protect environmental resources relating to issues such as air quality, community safety, etc.

4.4.2. Legislation and Guidelines that have informed the preparation of this EIA Report

The following legislation and guidelines have informed the scope and content of this Draft EIA Report:

» National Environmental Management Act (Act No 107 of 1998)
» EIA Regulations, published under Chapter 5 of the NEMA (GN R385, GN R386 and GN R387 in Government Gazette 28753 of 21 April 2006)
» Guidelines published in terms of the NEMA EIA Regulations, in particular:
  * **Guideline 3:** General Guide to Environmental Impact Assessment Regulations, 2006 (DEAT, June 2006)
  * **Guideline 4:** Public Participation in support of the Environmental Impact Assessment Regulations, 2006 (DEAT, May 2006)
  * **Guideline 5:** Assessment of alternatives and impacts in support of the Environmental Impact Assessment Regulations, 2006 (DEAT, June 2006)
  * Guideline on Public Participation, 2006 (DEA&DP, July 2006)
  * Guideline on Alternatives, 2006 (DEA&DP, July 2006)
» Specialist study guidelines published by DEA&DP (June 2005)

Acts, standards or guidelines relevant to the establishment of the OCGT Power Station at Atlantis were identified in the previous EIA processes undertaken for the Ankerlig Power Station. Those Acts, standards or guidelines which have informed the project process and the scope of issues evaluated in this EIA Study are summarised in Table 4.3.

Table 4.3: List of applicable legislation and compliance requirements required for the Ankerlig Power Station conversion and transmission integration project, Western Cape Province

Legislation	Applicable Requirements	Relevant Authority	Compliance requirements
National Legislation			
National Environmental Management Act (Act No 107 of 1998)	EIA Regulations have been promulgated in terms of Chapter 5. Activities which may not commence without an environmental authorisation are identified within these Regulations. In terms of Section 24(1) of NEMA, the potential impact on the environment associated with these listed activities must be considered, investigated, assessed and reported on to the competent authority (the decision-maker) charged by NEMA with granting of the relevant environmental authorisation. In terms of GNR 387 of 21 April 2006, a scoping and EIA process is required to be undertaken for the proposed power station conversion and transmission integration project	National Department of Environmental Affairs and Tourism – lead authority. Western Cape Department of Environmental Affairs and Development Planning – commenting authority.	This EIA report is to be submitted to DEAT and DEA&DP in support of the **application for authorisation** submitted in August 2007.
National Environmental Management Act (Act No 107 of 1998)	In terms of the Duty of Care provision in S28(1) Eskom as the project proponent must ensure that reasonable measures are taken throughout the life cycle of this project to ensure that any pollution or degradation of the environment associated with this project is avoided, stopped or minimised. In terms of NEMA, it has become the legal duty of a project proponent to consider a project holistically, and to consider the cumulative effect of a variety of impacts.	Department of Environmental Affairs and Tourism (as regulator of NEMA).	While **no permitting or licensing requirements** arise directly by virtue of the proposed project, this section will find application during the EIA phase and will continue to apply throughout the life cycle of the project.

Legislation	Applicable Requirements	Relevant Authority	Compliance requirements
Environment Conservation Act (Act No 73 of 1989)	Section 20(1) provides that where an operation accumulates, treats, stores or disposes of waste on site for a continuous period, it must apply for a permit to be classified as a suitable waste disposal facility.	National Department of Environmental Affairs and Tourism and Department of Water Affairs and Forestry.	As no waste disposal site is to be associated with the proposed project, **no permit** is required in this regard.
Environment Conservation Act (Act No 73 of 1989)	National Noise Control Regulations (GN R154 dated 10 January 1992). Provincial noise control regulations have been promulgated for the Western Cape in Provincial Notice (PN 627/P5309/2299) dated 20 November 1998. In terms of these Regulations, industrial noise limits are 61 dBA and noise limits from any source other than an industrial source are 65 dBA. Draft regulations relating to noise control published in Provincial Gazette No 6412, PN 14 dated the 25th of January 2007. Noise limits are based on the acceptable rating levels of ambient noise contained in SANS 10103.	National Department of Environmental Affairs and Tourism Western Cape Department of Environmental Affairs and Development Planning Local authorities, i.e. City of Cape Town	There is **no requirement for a noise permit** in terms of the legislation. A **Noise Impact Assessment** is required to be undertaken in accordance with SANS 10328. This has been undertaken as part of the EIA process (refer to Appendix F).
National Water Act (Act No 36 of 1998)	Section 21 sets out the water uses for which a water use license is required.	Department of Water Affairs and Forestry	As no water use (as defined in terms of S21 of the NWA) will be associated with the proposed project (as water will be obtained from the City of Cape Town water treatment works), **no water use permits or licenses** are required to be applied for or obtained. The City of Cape Town are required to reflect Eskom's water use from the water treatment works within their water balance which is submitted to

Legislation	Applicable Requirements	Relevant Authority	Compliance requirements
			DWAF.
National Water Act (Act No 36 of 1998)	In terms of Section 19, Eskom as the project proponent must ensure that reasonable measures are taken throughout the life cycle of this project to prevent and remedy the effects of pollution to water resources from occurring, continuing or recurring.	Department of Water Affairs and Forestry (as regulator of NWA)	While **no permitting or licensing requirements** arise directly by virtue of the proposed project, this section will find application during the EIA phase and will continue to apply throughout the life cycle of the project.
Atmospheric Pollution Prevention Act (Act No 45 of 1965)	Scheduled Processes: A specifications standard applies to the production of noxious or offensive gases. This means that pollution control equipment used in operating the process must conform to certain design criteria. Currently sixty nine (69) scheduled processes are listed in the Second Schedule to the Act. No person may carry on a Scheduled Process in or on any premises unless he is the holder of a current registration certificate. The granting of a permit is subject to compliance with certain minimum standard specifications. To be replaced by the National Environmental Management: Air Quality Act (Act No 39 of 2004) on promulgation of Section 22 of this Act.	National Department of Environmental Affairs and Tourism - Chief Air Pollution Control Officer (CAPCO) Western Cape Department of Environmental Affairs and Development Planning - Chief Air Pollution Control Officer (CAPCO)	Eskom have applied for an emissions permit for the current operations at the Ankerlig Power Station and are in consultation with CAPCO in this regard. Eskom may need to **obtain an amended registration certificate** from the Chief Air Pollution Control Officer (CAPCO) at DEA&DP in the event that the emissions from the power station are altered as a result of the proposed conversion project. Eskom must ensure that the conditions in the certificate are complied with at all times.
National Heritage Resources Act (Act No 25 of 1999)	Section 38 states that Heritage Impact Assessments (HIAs) are required for certain kinds of development including » the construction of a road, power line, pipeline, canal or other similar linear development or barrier exceeding 300 m in length; » any development or other activity which	South African Heritage Resources Agency (SAHRA) - National Heritage Sites (grade 1 sites) as well as all historic graves and human remains Heritage Western Cape - all Provincial Heritage Sites (grade 2 sites), generally protected	The area proposed for the location of the CCGT units associated with the power station conversion project is within the existing Ankerlig power station site, and was the subject of previous EIAs and specialist surveys (including heritage surveys). This area has been disturbed through

Legislation	Applicable Requirements	Relevant Authority	Compliance requirements
	will change the character of a site exceeding 5 000 m^2 in extent. The relevant Heritage Resources Authority must be notified of developments such as linear developments (such as roads and power lines), bridges exceeding 50 m, or any development or other activity which will change the character of a site exceeding 5 000 m^2; or the re-zoning of a site exceeding 10 000 m^2 in extent. This notification must be provided in the early stages of initiating that development, and details regarding the location, nature and extent of the proposed development must be provided. Stand alone HIAs are not required where an EIA is carried out as long as the EIA contains an adequate HIA component that fulfils the provisions of Section 38. In such cases only those components not addressed by the EIA should be covered by the heritage component.	heritage and structures (grade 3a – 3c sites) and prehistoric human remains	construction activities associated with the OCGT power station. No heritage sites are expected to be located within this area. Therefore, **no permits** will be required to be obtained. An **HIA** will be required to be undertaken for the proposed power line (refer to Appendix K). An **HIA** may be required to be undertaken for the proposed water pipeline to the power station, depending on the length and location of this pipeline. Should this pipeline be required as part of a separate tap-off point for supply of water to the power station[12], an HIA may be required to be undertaken. A **permit** may be required should identified **cultural/heritage sites** along the proposed transmission power line be required to be **disturbed or destroyed** as a result of the proposed development.
National Environmental Management: Biodiversity Act (Act No 10 of 2004)	In terms of Section 57, the Minister of Environmental Affairs and Tourism has published a list of critically endangered, endangered, vulnerable and protected species in GNR 151 in Government Gazette 29657 of 23 February 2007 and the regulations associated	National Department of Environmental Affairs and Tourism	As Eskom will not carry on any restricted activity, as is defined in Section 1 of the Act, **no permit** is required to be obtained in this regard. **Specialist flora and fauna studies** have been undertaken as part of the

[12] To be determined through technical feasibility studies being undertaken by Eskom

Legislation	Applicable Requirements	Relevant Authority	Compliance requirements
	therewith in GNR 152 in GG29657 of 23 February 2007, which came into effect on 1 June 2007. In terms of GNR 152 of 23 February 2007: Regulations relating to listed threatened and protected species, the relevant specialists must be employed during the EIA phase of the project to incorporate the legal provisions as well as the regulations associated with listed threatened and protected species (GNR 152) into specialist reports in order to identify permitting requirements at an early stage of the EIA phase.		EIA process (refer to Appendices H and I). A **permit** may be required should any **protected plant species** within the power line corridor or on the power station site be **disturbed or destroyed** as a result of the proposed development.
Conservation of Agricultural Resources Act (Act No 43 of 1983)	Regulation 15 of GNR1048 provides for the declaration of weeds and invader plants, and these are set out in Table 3 of GNR1048. Weeds are described as Category 1 plants, while invader plants are described as Category 2 and Category 3 plants. These regulations provide that Category 1, 2 and 3 plants must not occur on land and that such plants must be controlled by the methods set out in Regulation 15E.	Department of Agriculture	While **no permitting or licensing requirements** arise from this legislation, this Act finds application during the EIA phase and will continue to apply throughout the life cycle of the project. In this regard, soil erosion prevention and soil conservation strategies must be developed and implemented. In addition, the existing weed control and management plan within the EMP must be implemented.

Legislation	Applicable Requirements	Relevant Authority	Compliance requirements
Minerals and Petroleum Resources Development Act (Act No 28 of 2002)	A mining permit or mining right may be required where a mineral in question is to be mined (e.g. materials from a borrow pit) in accordance with the provisions of the Act.	Department of Minerals and Energy	As no borrow pits are expected to be required for the power station conversion and transmission integration project, **no mining permit or mining right** is required to be obtained.
National Veld and Forest Fire Act (Act No 101 of 1998)	In terms of Section 12 Eskom would be obliged to burn firebreaks to ensure that should a veldfire occur on the property, that same does not spread to adjoining land. In terms of Section 13 Eskom must ensure that the firebreak is wide enough and long enough to have a reasonable chance of preventing a veldfire from spreading; not causing erosion; and is reasonably free of inflammable material. In terms of Section 17, Eskom must have such equipment, protective clothing and trained personnel for extinguishing fires as are prescribed or in the absence of prescribed requirements, reasonably required in the circumstances.	Department of Water Affairs and Forestry	While **no permitting or licensing requirements** arise from this legislation, this Act will find application during the operational phase of the project.
Hazardous Substances Act (Act No 15 of 1973)	This Act regulates the control of substances that may cause injury, or ill health, or death by reason of their toxic, corrosive, irritant, strongly sensitising or inflammable nature or the generation of pressure thereby in certain instances and for the control of certain electronic products. To provide for the rating of such substances or products in relation to the degree of danger; to provide for the prohibition	Department of Health	It is necessary to identify and list all the Group I, II, III and IV hazardous substances that may be on the site by the activity and in what operational context they are used, stored or handled. If applicable, a **license** is required to be obtained from the Department of Health.

Legislation	Applicable Requirements	Relevant Authority	Compliance requirements
	and control of the importation, manufacture, sale, use, operation, modification, disposal or dumping of such substances and products. Group I and II: Any substance or mixture of a substance that might by reason of its toxic, corrosive etc, nature or because it generates pressure through decomposition, heat or other means, cause extreme risk of injury etc., can be declared to be Group I or Group II hazardous substance; Group IV: any electronic product; Group V: any radioactive material. The use, conveyance or storage of any hazardous substance (such as distillate fuel) is prohibited without an appropriate license being in force.		
National Road Traffic Act (Act No 93 of 1996)	The Technical Recommendations for Highways (TRH 11): "Draft Guidelines for Granting of Exemption Permits for the Conveyance of Abnormal Loads and for other Events on Public Roads" outline the rules and conditions which apply to the transport of abnormal loads and vehicles on public roads and the detailed procedures to be followed in applying for exemption permits are described and discussed. Legal axle load limits and the restrictions imposed on abnormally heavy loads are discussed in relation to the damaging effect on road pavements, bridges and culverts. The general conditions, limitations and escort	Western Cape Department of Transport and Public Works (provincial roads) South African National Roads Agency (national roads)	An **abnormal load/vehicle permit** will be required to transport the various CCGT and power line components to site for construction. These include: » Route clearances and permits will be required for vehicles carrying abnormally heavy or abnormally dimensioned loads. » Transport vehicles exceeding the dimensional limitations (length) of 22m. » Depending on the trailer configuration and height when

Legislation	Applicable Requirements	Relevant Authority	Compliance requirements
	requirements for abnormally dimensioned loads and vehicles are also discussed and reference is made to speed restrictions, power/mass ratio, mass distribution and general operating conditions for abnormal loads and vehicles. Provision is also made for the granting of permits for all other exemptions from the requirements of the National Road Traffic Act and the relevant Regulations.		loaded, some of the power station components may not meet specified dimensional limitations (height and width).
National Road Traffic Act (Act No 93 of 1996)	Regulation 274 (read with SABS Code 0232 which deals with transportation of dangerous goods and emergency information systems) states that the regulations are applicable where dangerous goods are transported in quantities, which exceed the exempt quantities (listed in Annex E of SABS Code 0232). Dangerous goods may only be transported in accordance with the provisions in the Regulations, unless the Minister of Transport has granted an exemption.	Department of Transport Western Cape Department of Transport and Public Works (provincial roads) South African National Roads Agency (national roads)	Eskom will need to ensure that **procedures** are in place **to prevent that the quantities of dangerous goods transported exceed the prescribed quantity** (listed in Annex E of SABS Code 0232). Apply for an exemption, if applicable.
Development Facilitation Act (Act No 67 of 1995)	Provides for the overall framework and administrative structures for planning throughout the Republic.	Western Cape Department of Environmental Affairs and Development Planning Local authorities, i.e. City of Cape Town	As the power station conversion project is planned to be undertaken within the existing Ankerlig power station site, no rezoning or sub-division of land is required. Therefore, no land development application is required to be submitted. Eskom must submit a land development application for the proposed transmission power line in the prescribed manner and form as

Legislation	Applicable Requirements	Relevant Authority	Compliance requirements
			provided for in the Act.
Occupational Health and Safety Act 1993 (Act No 85 of 1993)	Major Hazard Installation Regulations The regulations essentially consists of six parts, namely 1. The duties for notification of a major hazard installation (existing or proposed), including a. Fixed; and, b. Temporary installations. 2. The minimum requirements for a quantitative risk assessment 3. The requirements of an on-site emergency plan 4. The reporting steps of risk and emergency occurrences 5. The general duties required of suppliers 6. The general duties required of local government	Local authorities, i.e. City of Cape Town	Should the facility be determined to be a Major Hazard Installation (MHI) through the quantitative risk assessment, an **MHI Risk Assessment** will be required to be undertaken. This has been concluded to be the case for the Ankerlig Power Station site should the additional fuel storage be implemented (refer to Appendix M).
Provincial Legislation			
Land Use Planning Ordinance 15 of 1985	Details land subdivision and rezoning requirements & procedures	Western Cape Department of Environmental Affairs and Development Planning Local authorities, i.e. City of Cape Town	As the power station conversion project is planned to be undertaken within the existing Ankerlig power station site, no rezoning or sub-division of land is required. Therefore, no application in terms of LUPO is required to be submitted. Given that the transmission power line is proposed on land that is zoned for agricultural use, a rezoning application in terms of Section 17 of LUPO to an alternative appropriate zone will be required. Rezoning is required to be

Legislation	Applicable Requirements	Relevant Authority	Compliance requirements
			undertaken following the issuing of an environmental Authorisation for the proposed project.
Nature Conservation Ordinance (Act 19 of 1974)	Article 63 prohibits the picking (defined in terms of article 2 to include, cut, chop off, take, gather, pluck, uproot, break, damage or destroying of certain flora. Schedule 3 lists endangered flora and Schedule 4 lists protected flora. Articles 26 to 47 regulates the use of wild animals	CapeNature	A permit may be required should any endangered or protected plant species within the power line corridor or on the power station site be disturbed or destroyed as a result of the proposed development.
Local Legislation			
City of Cape Town Air Pollution Control By-Law 12649- 4 February 2004- Provincial Gazette Extraordinary 5979	Section 7: No person shall install, alter, extend or replace any fuel-burning equipment on any premises without the prior written authorisation of the Council, which may only be given after consideration of the relevant plans and specifications.	City of Cape Town	Eskom will need to **obtain written authorisation** from the local council for the alteration of the fuel-burning equipment at the Ankerlig power station (i.e. addition of the CCGT units)
By-law relating to Community Fire Safety 11257 – 28 February 2002 – Provincial Gazette Extraordinary 5832	Section 37(1): Prior to the construction of a new installation or the alteration of an existing installation, whether temporary or permanent, for the storage of a flammable substance, the owner or person in charge of the installation must submit a building plan to the Municipality, in accordance with the National Building Regulations. A copy of the approved plan must be available at the site where the installation is being constructed.	City of Cape Town	Eskom must **submit a building plan** to the Municipality, in accordance with the National Building Regulations prior to installing the additional facilities for fuel storage on the site. A copy of the approved plan must be available at the site where the installation is being constructed.
By-law relating to Community Fire Safety	Section 37(2): Prior to the commissioning of an aboveground or underground storage tank	City of Cape Town	Eskom must ensure that additional fuel tanks proposed to be installed at the

Legislation	Applicable Requirements	Relevant Authority	Compliance requirements
11257 – 28 February 2002 – Provincial Gazette Extraordinary 5832	installation, liquid petroleum gas installation or associated pipework, the owner or person in charge of the installation must ensure that it is pressure-tested in accordance with the provisions of the National Building regulations (T1), SABS 0131: Parts1 and 2, SABS 089:Part 3 and SABS 087: Parts 1,3 and 7 in the presence of the controlling authority.		power station site are **pressure-tested** in accordance with the relevant provisions as stated in the by-law.
By-law relating to Community Fire Safety 11257 – 28 February 2002 – Provincial Gazette Extraordinary 5832	Section 37(6): The owner or person in charge of the premises, who requires to store a flammable gas in excess of 19 kilogram, or a flammable liquid of a danger group (i),(ii),(iii),or (iv) in excess of 200 litres must obtain a flammable substance certificate from the controlling authority.	City of Cape Town	Eskom must obtain a **flammable substance certificate** for the additional fuel storage at the power station site, as prescribed in Schedule 2 of this By-law.
By-law relating to Community Fire Safety 11257 – 28 February 2002 – Provincial Gazette Extraordinary 5832	Section 41: The handling, storage and distribution of flammable substances at bulk depots must be in accordance with the National Building regulations (T1), read in conjunction with SABS 089: Part 1.	City of Cape Town	If applicable, Eskom must ensure that handling, storage and distribution of flammable substances (such as fuel) is in accordance with National building regulations.
By-law relating to Community Fire Safety 11257 – 28 February 2002 – Provincial Gazette Extraordinary 5832	Section 53: The operator of a vehicle designed for the transportation of dangerous goods may not operate such a vehicle in the jurisdiction of the controlling authority, unless he has obtained a dangerous goods certificate issued by a fire brigade service in terms of the National Road Traffic Act	City of Cape Town	Eskom must ensure that the contractor/s responsible for the transportation of fuels and other dangerous goods to the power station site have obtained the **dangerous goods certificates** in respect of all vehicles transporting dangerous goods and keep the certificate available in the relevant vehicle.

DESCRIPTION OF THE AFFECTED ENVIRONMENT CHAPTER 5

This chapter provides a description of the environment that may be affected by the proposed Power Station Conversion and Transmission Integration Project. This information is provided in order to assist the reader in understanding the possible effects of the proposed project on the environment. Aspects of the biophysical, social and economic environment that could be affected by, or could affect the proposed development have been described. This information has been sourced largely from existing information available for the area, and aims to provide the overall context within which this environmental impact assessment process is being conducted. A more detailed description of each aspect of the affected environment is included within the specialist reports contained within Appendices E – M.

5.1. Location of the Study Area and Property Description

The study area is located within the Koeberg and Blaauwberg sub-councils of the City of Cape Town Metropolitan Municipality in the Western Cape Province. The existing Ankerlig OCGT Power Station is located in the Atlantis Industrial Township (refer to Figure 5.1), which is located ~40 km from the Cape Town city centre. According to 2006 Municipal Demarcation, Atlantis falls between Ward 29 (north-west) and Ward 32 (south-east) of the Koeberg sub-council. Regardless of the alignment selected, the proposed transmission power line would pass through Ward 23 of the Blaauwberg sub-council, through the Klein Zoute River Agricultural Holdings, in the vicinity of the residential areas of Melkbosstrand, Van Riebeeckstrand and Duynefontein.

The Ankerlig Power Station is located within the western portion of the existing proclaimed Industrial Area of Atlantis on the Farm No 1183 and a Portion of Farm Witzand 2, Atlantis, Cape Town, both of which are owned by Eskom. Infrastructure associated with CCGT units will be developed on the site of the existing Ankerlig Power Station, and will not require any additional land take outside of the existing power station boundaries.

The power station site is far removed from major centres, tourist attractions and major roads. It is located next to the R307 (Dassenberg Road) that functions as the primary access route to Atlantis and Mamre (north of Atlantis) from Cape Town. The closest major road is the R27 (about 5 km from the site). The R27 functions as the primary connector between Cape Town, Saldanha and the West Coast National Park.

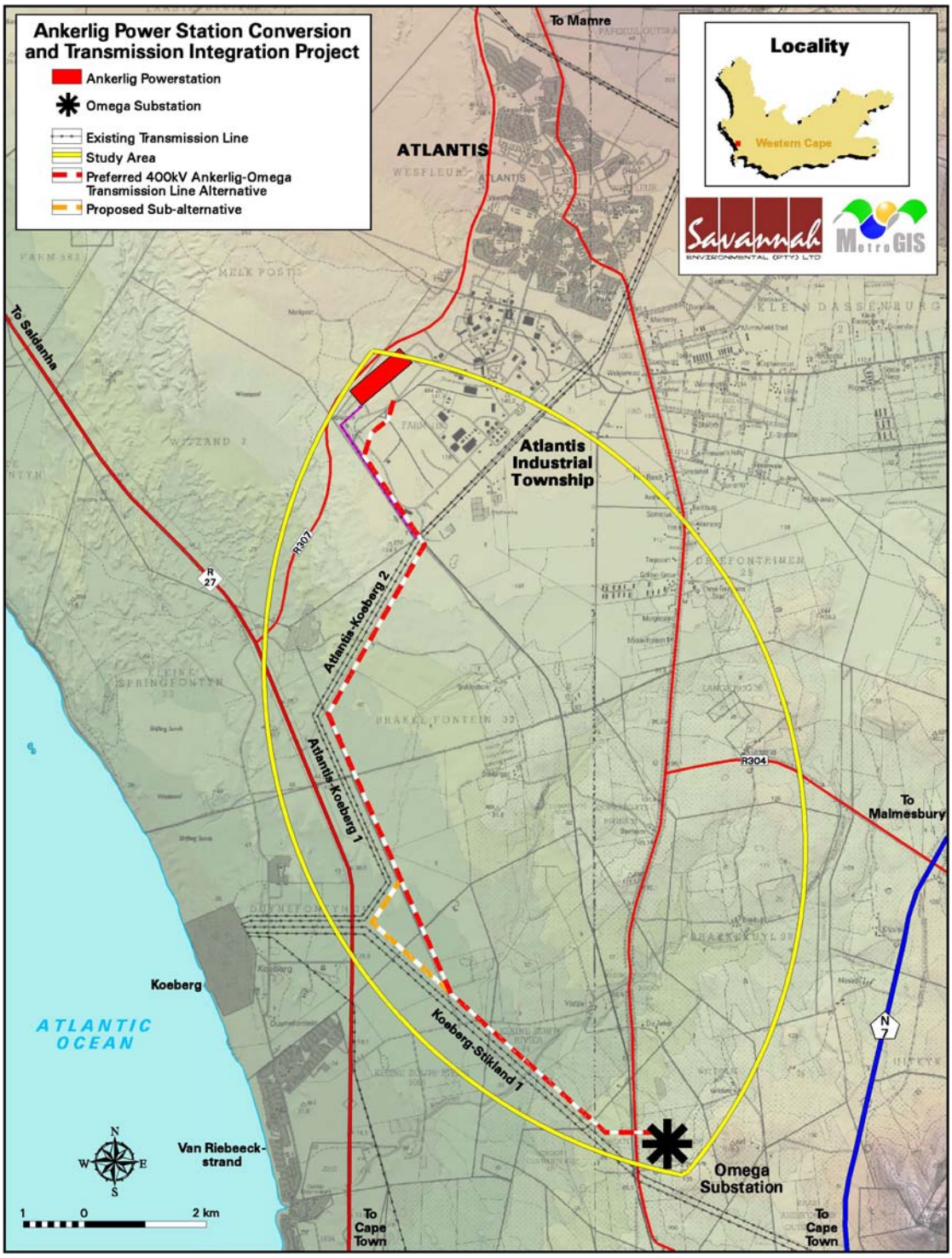


Figure 5.1: Locality map showing the location of the existing Ankerlig Power Station, the study area and the proposed transmission power line corridor alternatives between Ankerlig and Omega Substation identified for investigation in the EIA phase

5.2. Social Characteristics of the Study Area

Atlantis Industria and its adjoining residential suburb Wesfleur are located 7 km inland on the Cape West Coast, some 40 km north of Cape Town. Significant

landmarks in the wider area are the existing Ankerlig Power Station, Koeberg Nuclear Power Station located ~9 km to the south-west, and the town of Mamre located ~3 km to the north. Arterial access to the area is provided by the West Coast road (R27) and the N7 national road, and locally by the R307.

The Atlantis Industrial Zone was established as an industrial growth point in the mid-1970s and set up with adequate infrastructure and services to support future growth in the area. The Atlantis industrial area is already served by a tarred industrial road network and essential services (including stormwater, municipal sewer and water supply services and street lighting) which support most of the industrial area. A railway spur is located south of the Ankerlig Power Station site. This railway line is currently not in use.

The residential townships of Atlantis and the informal settlement of Witzand are located between 3-6 km to the north-east and approximately 1 km south of the Ankerlig Power Station site respectively (refer to Figure 5.2). Open farmlands are present to the north, south and east of the site. The area surrounding the power station site is visually dominated by the presence of various types of industrial stacks and buildings located within the surrounding industrial area, and the existing transmission power lines associated with the Ankerlig and Koeberg power stations. The power station site is zoned for industrial use.

The population potentially affected by the proposed power station conversion and transmission integration project include:

» Residents of Atlantis, particularly the suburbs of Avondale, Wesfleur, Protea Park, Beacon Hill and Robinvale, and the nearby informal settlement of Witzand, situated in close proximity to the industrial area.
» Residents of Atlantis non-urban[13]
» Residents of Melkbosstrand, Duynefontein and Van Riebeeckstrand

» Users of land which could be affected by the proposed power line, including:
  * Users of the Delta 200 Airstrip (used as a drop zone for members of the sky diving club)
  * Residents of Klein Zoute River Agricultural Holdings
  * Landowners of farms situated immediately south of the Atlantis Industrial Area and along the R27.

[13] Comprised of the rural area surrounding Atlantis to the north, south, east and west stretching South to include the Klein Zoute Rivier and Morning Star Agricultural Holdings, as well as the regions indicated as 'Malmesbury non-urban' and 'Koeberg' on the City of Cape Town Census suburb map.

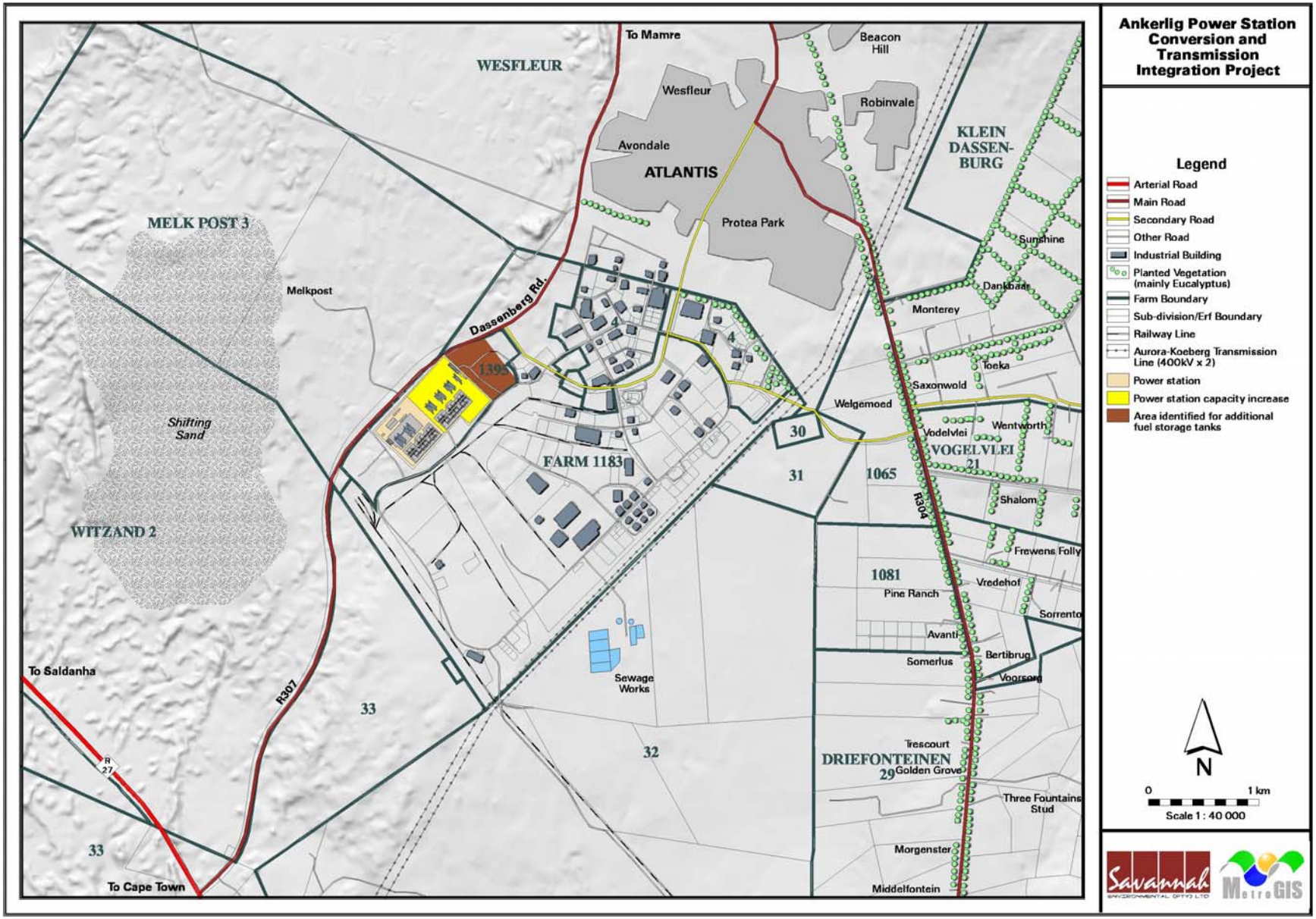


Figure 5.2: Map showing Ankerlig Power Station and surrounding areas

The existing noise environment in the Atlantis communities is typical of a suburban residential area next to an industrial zone. The noise environment is affected by localised vehicular traffic, human activities and the industrial activities in the Atlantis Industrial Zone. There is, however, an adequate buffer zone between the industries and the Atlantis communities in order to maintain the noise levels within the recommended guidelines for suburban residential areas.

5.2.1 Demographic Profile

According to the 2001 Census, the total population of the City of Cape Town was approximately 2.9 million. Within the study area, the Atlantis population comprised of just under 55 000 people, while the surrounding non-urban areas (Atlantis non-urban according to suburb profiles) housed just over 4 000 people, and just under 6 500 people resided in the Melkbosstrand area.

5.2.2. Population Groups

The Atlantis population is predominantly Coloured (92.6%), with a small percentage (6.6%) being Black African and less than 1% respectively White and Indian. It is worth noting that population projections for the Western Cape show significantly larger growth amongst the Black African population than other groups (Romanovsky 2006). It can therefore be expected that this group may have increased proportionately within Atlantis and surrounding areas.

The population of Atlantis non-urban[14] is also predominantly Coloured (68%) according to the 2001 census, with a significantly greater percentage of Whites (22%) and slightly more Black African (10%). By contrast Melkbosstrand is predominantly White (89%).

Afrikaans is the most common language spoken in Atlantis (87%), Atlantis non-urban (78%) and to a somewhat lesser extent Melkbosstrand (58%). English is the first language of 38% of Melkbosstrand residents, 16% of those in Atlantis non-urban, and less than 10% of the Atlantis community.

5.2.3. Age and Gender Distribution

Gender distribution is reasonably equal across the study area, with slightly more females than males in all areas except Atlantis non-urban, where males predominate by a slight margin. This could indicate this area to have more male (possibly migrant) employees working on farms.

[14] Comprised of the rural area surrounding Atlantis to the north, south, east and west stretching South to include the Klein Zoute Rivier and Morning Star Agricultural Holdings, as well as the regions indicated as 'Malmesbury non-urban' and 'Koeberg' on the City of Cape Town Census suburb map.

The age distribution in Atlantis is slightly younger than the average for the City of Cape Town, with a larger percentage (just under 40%) aged under 17. The corresponding percentage in Melkbosstrand is significantly lower at only 24%. By contrast the percentage of older people in the age categories above 35 is significantly higher in Melkbosstrand (~55%) than in the broader Cape Town (~35%) or Atlantis (28%) and surrounding non-urban areas (37%). Almost a third of the population in Atlantis is between the ages of 18 and 34, while a quarter is aged 35 to 54. These age groups may be considered as the potential labour force, together comprising about 55% of the Atlantis population, and 57% of Atlantis non-urban.

5.2.4. Educational Profile

Approximately 20% of Atlantis residents aged over 20 had completed matric in 2001, and of these less than 4% had attained any further levels of education (the majority (3%) being a certificate or diploma with less than 0.5% citing any types of degrees). The percentage with 'no schooling' was slightly higher in Atlantis non-urban at 9%, compared to 4% in Atlantis (similar to that for Cape Town as a whole). By contrast Melkbosstrand had less than 2% with no education, over three quarters had completed matric, and just under a third had attained some level of tertiary education, about half of which certificates, with the other half being various levels of degrees.

5.2.5. Employment and Income

The labour force, or economically active population[15] comprised of about 46% of City of Cape Town residents aged between 15 and 65 in 2001. Figures for the study area are similar, though slightly lower for Atlantis at 44%, and higher for Melkbosstrand (48%). Of those indicated as economically active, who can be considered the actual and potential labour force, 31% in Atlantis are unemployed, slightly higher than the average for the City of Cape Town as a whole. Corresponding percentages are much lower for Atlantis non-urban (13%), and Melkbosstrand (7%).

Of the economically active residents of Atlantis that are employed, approximately 12% commute to jobs outside Atlantis. Another 25% are employed by local industries, and 5% are employed by small- medium- and micro-enterprises (SMMEs). A significant number of jobs in Atlantis (2700) are held by outsiders who commute to the area. These jobs generally fall in the educational and other professional occupational categories (Afrosearch 2005).

[15] A person of working age (15–65 years) who is available for work, and is either employed or unemployed.

Over half of those employed in Atlantis, and 62% in Atlantis non-urban earned less than R1 600 per month in 2001, with almost all the remainder (45% in Atlantis and 32% in Atlantis non-urban) earning between R1 600 and R6 400 per month. Income of Melkbosstrand residents was notably higher, with about half earning over R6 400 per month.

5.2.6. Housing

Atlantis has experienced land invasions and the growth of informal settlements, especially in the area that has become known as Witzand. These informal settlements are home to locals who have lost their homes as a result of rising unemployment, farm labourers who are no longer able to secure work and accommodation on the surrounding farms and smallholdings, and job seekers attracted to the area by the prospect of finding work (Afrosearch 2005).

The percentage of households residing in a 'house or brick structure on a separate stand or yard' is higher across the study area than in the City of Cape Town as a whole, but most so in Melkbosstrand (80%), followed by Atlantis at 75%, and least in Atlantis non-urban (68%). Atlantis non-urban has the greatest percentage residing in traditional dwellings (12%), while Atlantis and Melkbosstrand both have around 9% residing in flats. The percentage in informal dwellings is lower than that for the broader Cape Town in all parts of the study area, but notably higher in Atlantis non urban (mostly shacks in back yards) and Atlantis (predominantly not in back yards, which would include residents of the Witzand settlement).

The City of Cape Town's Blaauwberg Sub-council has earmarked R1.9 million for a Melkbos Housing Project, while the Koeberg sub-council has earmarked R3 million for Phase 2 of the Witzand Housing Project and R2 million for the Atlantis Housing Project respectively between 2007 and 2010.

5.2.7. Access to Electricity

According to the 2001 Census, 70% of South Africa's population used electricity as primary source of energy for lighting. The corresponding figure in the Western Cape was significantly higher at 88%, with that in the City of Cape Town being 89%.

Within the study area electricity use for lighting is almost universal in Melkbosstrand (98% of households) and only slightly less common in Atlantis (92%) where paraffin is the other form most cited (7%). Atlantis non-urban noted this to be slightly less common at only 64% of households using electricity for lighting, with a 32% relying on candles, and smaller percentages on gas, paraffin and other sources of energy.

5.2.8. Water and Sanitation

Atlantis receives the bulk of its water supply from the Witzand Water Treatment Works which abstract water from the Atlantis aquifer. Access to piped water inside dwellings is higher in Atlantis (83%) and Melkbosstrand (93%) than in the broader Cape Town (69%). This percentage is significantly lower in Atlantis non-urban at only 36%, with 23% citing piped water in the yard, and over 30% piped water on a community stand, mostly over 200 m from the dwelling.

The comparatively lower levels of living prevalent in the Atlantis non-urban area is highlighted in terms of access to sanitation facilities, with only half of all households having access to flush toilets (including both sewerage and septic tanks), compared to over 90% in Atlantis and Melkbosstrand. About 1/5th of Atlantis non-urban households have no sanitation facilities, while 17% rely on bucket latrines. The remainder use chemical toilets and pit latrines.

5.2.8. Road Network

The existing road network is well established in the local area consisting of Provincial Roads (Proclaimed Truck, Main, Divisional and minor roads – in terms of the Roads Ordinance) and many of which that now fall within the "Inner Municipal Area" of the City of Cape Town. The Provincial Government is the controlling authority for the N7 and the R27 while all other roads in the vicinity fall under the City of Cape Town.

» *R27 West Coast Road*

In the vicinity of the site, the R27 is classified as a Class 1 Expressway running from the Northern Suburbs of Cape Town to the Silverstream Road intersection after which is classified a Freeway all the way along the West Coast to Langebaan.

Next to the N7 Highway it is the main road for vehicles travelling up north and shows high traffic volumes on weekends or in holiday times as well as a higher number of heavy vehicles.

Photograph 5.1: R27 West Coast Road

» *R307 Dassenberg Road*

Dassenberg Road (R307) is classified as a Class 2 Primary Distributor. This road links the R27 with the town centre of Atlantis and further with the R304 in a north-east direction. The R307 is a two-way single carriageway with wide tarred shoulders.

Photograph 5.2: R307 Dassenberg Road

» *Neil Hare Road*

Neil Hare Road can be classified as a Class 4 Local Distributor. This road is a two-way single carriageway with gravel shoulders. Neil Hare Road intersects with Charel Uys Drive at a four-way stop to the north-east and with the R307 to the south-west. The Ankerlig Power Station gains access from Neil Hare Road.

Photograph 5.3: Neil Hare Road

» *Charel Uys Drive*

Charel Uys Drive (R304) is defined as a Class 3 Secondary Arterial. It carries medium traffic in both peak periods. It is an important link through Atlantis Industrial to Dassenberg Road (R307) in the west and to the Atlantis Town Centre to the north.

Photograph 5.4: Charel Uys Drive (R304)