Report No : 4005/400850

ENVIRONMENTAL IMPACT ASSESSMENT:

Proposed Open Cycle Gas Turbine Power Plant, Fuel Supply Pipeline, Substation and Transmission Lines at Mossel Bay

FINAL ENVIRONMENTAL IMPACT REPORT

Prepared by

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UPDATE SUMMARY: FINAL ENVIRONMENTAL IMPACT REPORT: OCTOBER 2005

This Update Summary describes the process followed since the Draft Environmental Impact Report (EIR) was made available to interested and affected parties (I&APs) for their comment. It also indicates how the finalisation of the EIR has responded to public and review input and outlines the way forward in the environmental decision-making process.

PROCESS SINCE RELEASING THE DRAFT ENVIRONMENTAL IMPACT REPORT

The public participation process undertaken during the EIR phase was as follows:

- Registered I&APs were notified of the availability of the draft EIR by means of a letter which included a copy of the Draft EIR Summary.
- Media notices were placed in the Mossel Bay Advertiser on 2 September 2005 in order to notify I&APs of the availability of the Draft EIR and to invite them to the third public forum.
- The Draft EIR was lodged at the Mossel Bay and D'Almeida Public Libraries and on the Eskom website on 7 September 2005. The commenting period ended on 28 September 2005, but submissions up to 5 October 2005 were accepted and incorporated into the Issues Trail compiled for the EIR phase.
- The third pubic forum, which comprised a formal presentation and an Open House at the Mossel Bay Public Library, was held in Mossel Bay on 15 September 2005. The findings of the Draft EIR were presented and an opportunity provided for I&APs to raise concerns and comments.

The comments received during the commenting period for the Draft EIR are presented in an Issues Trail as an annexure to the Final EIR.

UPDATING OF THE DRAFT ENVIRONMENTAL IMPACT REPORT

Updating of the Draft EIR to the Final EIR has entailed the following:

- Thirteen I&APs attended the third public forum and the comments and concerns that were raised have been captured in the Issues Trail in the Final EIR.
- Eight written submissions were received and these have also been captured in the Issues Trail in the Final EIR.
- The avifaunal specialist study report was reviewed by the Endangered Wildlife Trust and concerns that they expressed were responded to by revising the report and the relevant sections of the EIR accordingly. This comprised the inclusion of a non-Red Data Book species that nevertheless has conservation significance, and an enhanced mitigatory recommendation in acknowledgement of the habitat requirements of another species.

- Due to the late availability and incompleteness of certain information, the noise specialist study needed to be revised subsequent to the release of the Draft EIR. This comprised a better description of the legislative background to noise and the more reliable determination of the calculated noise contours. It also allowed for the consideration of certain guarantees provided by the supplier of the gas turbine equipment, and a clearer understanding of the implications of noise impacts and the recommended mitigations.
- Additional annexures have been incorporated in the Final EIR, *viz*.

Annexure Q: Framework EMP
Annexure R: Review of Draft EIR
Annexure S: Issues Trail
Annexure T: Siemens noise guarantees and calculations
Annexure U: List of registered I&APs

The Draft EIR has been updated to the Final EIR by means of the inclusion of this Update Summary, the incorporation of the above changes in the text of the report, as well as the additional annexures as listed. Amendments to the report are indicated by means of underlining in the final version, to enable readers to track the changes.

THE WAY FORWARD

This finalised EIR has been submitted to DEA&DP for their review and decision.

Once they have considered the document and are satisfied that it provides sufficient information to make an informed decision, DEA&DP will determine the environmental acceptability of the preferred options. Thereafter, DEA&DP will issue an Record of Decision (RoD) and any conditions of approval attached to the authorisation, should the proposed activity be approved.

Following the issuing of the RoD, DEA&DP's decision will be communicated by means of letters to all identified I&APs. A 30-day appeal period follows, during which I&APs will have an opportunity to appeal against the decision to the Minister of Environmental Affairs and Development Planning in terms of the Environment Conservation Act.

We would like to thank all those who have participated in the Environmental Impact Assessment process for the proposed Open Cycle Gas Turbine power plant and associated infrastructure.

10 October 2005

REPORT SUMMARY

BACKGROUND AND INTRODUCTION

Eskom has commissioned an Environmental Impact Assessment (EIA) process for a proposed Open Cycle Gas Turbine (OCGT) power plant and associated activities in the Mossel Bay area. The Scoping Report was released in June 2005, and together with the Plan of Study for the Environmental Impact Report (EIR), was accepted by the competent environmental authorities, *viz*. the Department of Environmental Affairs and Development Planning (DEA&DP), in August 2005. The assessment phase of the EIA process has thus been initiated and a draft EIR has been released. After comment has been received from interested and affected parties (I&APs), the draft EIR will be finalised and submitted for consideration by DEA&DP.

The need to expand the electricity generation capacity in South Africa is essentially based on the following strategic documentation and policies:

- South Africa's White Paper on the Energy Policy - 1998
- Integrated Energy Plan - 2003
- National Integrated Resource Plan - 2003/2004
- Integrated Strategic Electricity Planning - 2003

As a consequence of the above-mentioned forward planning process, Eskom has proposed commissioning two OCGT power plants in the Western Cape, one in Atlantis north of Cape Town and the other adjacent to the PetroSA facility (previously known as Mossgas) near Mossel Bay. This EIA is being undertaken for the activities relating to the proposed OCGT power plant, fuel supply pipeline, substation and transmission lines at Mossel Bay. Ninham Shand Consulting Services is the lead consultant for the EIA, assisted by The Environmental Partnership and various specialist sub-consultants.

PROJECT DESCRIPTION

The proposed OCGT power plant would be located approximately 13km west of the town of Mossel Bay and approximately 1 km northwest of the PetroSA facility. The proposed project comprises the following main components:

- The OCGT power plant (made up of three gas turbines each with an output of 150 MW) adjacent to the existing PetroSA facility.
- A fuel supply pipeline to transport liquid distillate fuel (kerosene-based or diesel) from the PetroSA facility to the OCGT power plant;
- A substation adjacent to the OCGT power plant, to distribute the generated electricity to the transmission lines;
- Two 400kV transmission lines to run from the OCGT substation to Proteus substation, thus feeding the generated electricity into the national grid;
- Upgrading of the Proteus substation within the boundaries of the substation; and
- An access road from the N2 National Road to the proposed OCGT power plant and substation site.

ALTERNATIVES AND THEIR ASSESSMENT

Besides providing the environmental authorities (i.e. DEA&DP) with sufficient and appropriate information on which to base an informed decision, the EIA process also requires that practicable and feasible alternatives are investigated. To this end, an array of alternative project actions were identified during the Scoping phase of the EIA and have now been assessed during the EIR phase, as follows (see attached figures showing proposed alternative alignments and impact significance summary table):

- The location of the OCGT power plant and associated substation.
- Two alternative routes for the fuel supply pipeline.
- Three alternative routes for the dual 400 kV transmission lines connecting the power plant to Proteus substation.
- Three alternative routes for an access road to the OCGT facility.

The assessment of the alternatives has been informed by a variety of specialist studies that addressed the biophysical and socio-economic impacts related to each alternative. These comprised the following:

- Botanical impacts;
- Avifaunal impacts;
- Heritage impacts;
- Visual impacts;
- Air pollution impacts
- Risks related to the fuel pipeline;
- Traffic impacts;
- Noise impacts; and
- Socio-economic impacts.

Besides the specialist studies mentioned above, other areas of possible impact have also been investigated, as follows:

- Water consumption;
- Effluent management issues;
- Geology and drainage;
- Existing infrastructure;
- Impact of adjacent activities; and
- Construction phase impacts.

Construction and operational environmental controls have been addressed by means of the formulation of a framework Environmental Management Plan (fEMP). The fEMP is provided as an annexure to the draft EIR.

FINDINGS OF THE ASSESSMENT

Based on the assessment of the biophysical and socio-economic factors relevant to the proposed development, i.e. excluding engineering costs and technical constraints, the following are regarded as the environmentally most acceptable alternatives:

Location of the OCGT power plant and associated substation

As far as visual and botanical impacts are concerned, it is recommended that the site should be located as close to the PetroSA facility as possible, while remaining outside of the identified botanically sensitive areas. Although the impact of noise is somewhat mitigated by the noise emanating from the PetroSA facility, situating the plant as distant as possible from the adjacent rural boundaries to the north and west will reduce the impact further. The marginal changes that would result in the lengths of the transmission lines, access road and fuel supply pipeline are not regarded as significant.

Alternative routes for the fuel supply pipeline

As far as risks to human health are concerned, neither of the two alternative routes offer significant constraints. However, the botanical study recommends that a 50 m buffer is maintained between the route and any sensitive botanical areas and this would suggest a marginal preference for Alternative 2 as it avoids the sensitive area northeast of the proposed site.

Alternative routes for the transmission lines

In terms of floral, avifaunal and visual impacts, the central route option (Alternative 2) is preferred. Cross-rope suspension tower designs are also recommended in the avifaunal and visual specialist reports, although the additional land take and related implications for agricultural activity are acknowledged.

Alternative routes for the access road

In order to avoid an additional intersection on the N2 National Road, and the implications that this would have for approval by the South African National Roads Authority Limited, the traffic study suggests that either Alternatives 1 or 2 are preferable to Alternative 3. The visual impact study also refers to either Alternative 1 or 2 being preferred. From a botanical perspective there is a marginal preference for Alternative 2 as it avoids the sensitive area northeast of the proposed site.

Other possible impacts that were assessed but that proved to not be significant factors in the proposed development were:

Water consumption

The concern that large volumes of water might have been required to reduce the level of air pollution proved to be unfounded, since the OCGT technology available is such that air emissions would be within prescribed standards, even without the use of wet nitrous oxide abatement methods.

Effluent, geology and drainage, infrastructure, adjacent activities and construction phase impacts

In the assessment of these possible impacts it was shown that each could be adequately managed in the normal course of development and that none presented significant impacts that required extraordinary mitigation.

PUBLIC PARTICIPATION

A comprehensive public consultation process has underpinned the entire EIA process. To date, this has comprised the following:

Scoping phase

- Consultation with authorities, landowners and other stakeholders;
- Publishing media notices;
- Distributing a Background Information Document (BID);
- Holding two public forums (an initial meeting and a meeting to present the findings of the draft Scoping Report);
- Placing the BID on Eskom's website;
- Releasing the draft Scoping Report for comment by I&APs via website and libraries;
- Meeting with agricultural sector NGO;
- Distributing a summary of the draft Scoping Report to registered I&APs;
- Incorporating comments received into final Scoping Report; and
- Making final Scoping Report available via website and libraries and advising registered I&APs of its release.

EIR phase

- Releasing the draft EIR for comment by I&APs via website and libraries;
- Publishing media notices regarding the availability of the draft EIR and invitation to a public forum; and
- Distributing this summary of the draft Scoping Report to registered I&APs and including an invitation to a public forum.
- Holding the third pubic forum, which comprised a formal presentation and an Open House at the Mossel Bay Public Library in Mossel Bay on 15 September 2005. The findings of the draft EIR was presented and the opportunity for I&APs to raise concerns and comments was provided.
- Capturing the comments received regarding the draft EIR and consolidating these into an Issues Trail, which summarises the issues raised and provides responses thereto.

The final step in the Public Participation Process entailed notifying registered I&APs of the lodging of this final EIR in the Mossel Bay and D'Almeida libraries. In addition, the Update Summary, which summarises the significant changes that were made to the draft report, was posted to registered I&APs.

CONCLUSION AND WAY FORWARD

This EIR has been updated and finalised in light of comments received on the draft report and has been submitted to DEA&DP for their review and decision. All registered I&APs will be informed of the Record of Decision when it has been issued, and be notified of the commencement of the 30 day appeal period.

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GLOSSARY OF TERMS

Base load	the electricity produced by a power station operating at a load factor of > 60 %.
Environment	the external circumstances, conditions and objects that affect the existence and development of an individual, organism or group; these circumstances include biophysical, social, economic, historical, cultural and political aspects.
Environmental impact	an environmental change caused by some human act
Environmental Impact Assessment (EIA)	a study of the environmental consequences of a proposed course of action.
Environmental Impact Report (EIR)	a report describing the assessment of the environmental consequences of a proposed course of action
Public Participation Process	a process of involving the public in order to identify needs, address concerns, choose options, plan and monitor in terms of a proposed project, programme or development
Red Data Book (South African)	an inventory of rare, endangered, threatened or vulnerable species of South African plants and animals
Scoping	a procedure for determining the extent of, and approach to, an EIA, used to focus the EIA to ensure that only the significant issues and reasonable alternatives are examined further
Scoping Report	a report describing the issues identified
Stays	Cables required to support a tower carrying electrical conductors

ABBREVIATIONS

BID	Background Information Document
CARA	Conservation of Agricultural Resources Act (No. 43 of 1983)
DEA&DP	Department of Environmental Affairs and Development Planning (provincial)
DEAT	Department of Environmental Affairs and Tourism (national)
ECA	Environment Conservation Act (No. 73 of 1989)
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EIR	Environmental Impact Report
GTL	Gas-to-liquid
HIA	Heritage Impact Assessment
HWC	Heritage Western Cape
I&APs	Interested and Affected Parties
IEP	Integrated Energy Plan
IEM	Integrated Environmental Management
ISEP	Integrated Strategic Electricity Planning
Km	Kilometer
kV	Kilovolts
m	Metres
m^3	Cubic metres
MW	Megawatt
NEMA	National Environmental Management Act (No. 107 of 1999)
NER	National Electricity Regulator
NIRP	National Integrated Resource Plan
NO_x	Oxides of nitrogen
OH	Open House
OCGT	Open Cycle Gas Turbine
ppm	Parts per million
RoD	Record of Decision
ToR	Terms of Reference
VIA	Visual Impact Assessment

1 INTRODUCTION

This Environmental Impact Report has been updated in the light of comments received on the draft report. The amendments are synthesised in the update summary above. To enable readers to track the changes, amended text is underlined in this report.

1.1 BACKGROUND

Eskom is the primary supplier of electricity in South Africa, providing approximately 95% of the electricity used. An on-going challenge is meeting the increasing energy demands, whilst continuing to provide cost-effective electricity and minimising the impact on the environment.

The need to expand Eskom's electricity generation capacity in South Africa is informed by an on-going strategic planning exercise, that is reflected in the following policy and planning documentation:

- **White Paper on the Energy Policy of the Republic of South Africa – 1998**, which sets out five objectives for the further development of the energy sector. Furthermore, the Energy Policy identified the need to undertake an Integrated Energy Planning (IEP) process in order to achieve a balance between the energy demand and resource availability, whilst taking into account the health, safety and environmental[1] parameters.
- **Integrated Energy Plan – 2003**, provides 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 among the provision of affordable electricity for social and economic development, ensuring security of supply and minimising the associated environmental impacts.
- **National Integrated Resource Plan (NIRP) – 2003/2004**, the objective of which is to determine the least-cost supply option to the country, provide information on the opportunities for investment into new power stations and evaluate the security of supply. The outcome of the NIRP determined that, while the coal-fired option of generating electricity would still be required from 2010 and over the next 20 years for base load supply, and that additional energy generation facilities, such as Combined Cycle Gas Turbines would also be investigated, peaking options such as Open Cycle Gas Turbines (OCGTs) and pumped storage schemes would be required by 2007 and 2013 respectively. The NIRP includes research and demonstration projects such as wind energy, solar thermal, nuclear (Pebble Bed Modular Reactor) and imported hydro energy.
- **Eskom Integrated Strategic Electricity Planning – 2003**, identifies the long-term options regarding both the supply and demand sides of electricity provision in South Africa. In the most recently approved ISEP plan (June 2003), the need for increased

[1] Environmental parameters include economic and social aspects.

electricity supply by about 2006/7 was identified. This is to meet the annual growth of approximately 3% in electricity demand, coupled with current moderate generating reserves. Reinstating power stations that have been mothballed[2] is an option identified as a priority in the ISEP, while various other options, ranging from plants using coal and nuclear fuels to renewable energy sources (mainly wind and solar projects), are being investigated. Another technology identified for generating electricity is using OCGTs. This method is considered as effective and appropriate for providing a supply of electricity during peak demand periods. Peak demand periods refer to those times in the mornings and evenings when electricity demand is greatest. OCGTs are a favoured means of meeting peak demand for two reasons. Firstly, they can be constructed within a relatively short space of time and secondly, once operational they can begin to generate electricity within 30 minutes of starting the power plant.

As a consequence of the above-mentioned forward planning process, two OCGT power plants are proposed in the Western Cape, one in Atlantis near to Cape Town and the other adjacent to the PetroSA facility (previously known as Mossgas) near Mossel Bay. This Environmental Impact Assessment is being undertaken for the activities relating to the proposed OCGT power plant, fuel supply pipeline, substation and transmission lines at Mossel Bay (see locality map, Figure 1). An access road to the proposed power plant site has also been included in the environmental assessment.

The site of the proposed OCGT power plant is located approximately 13 km west of the town of Mossel Bay and approximately 1 km northwest of the PetroSA facility. A fuel supply pipeline is required between the PetroSA facility and the OCGT power plant. Two sets of overhead transmission lines are required between the OCGT power plant and the existing Proteus substation. The Proteus substation is located approximately 10km northwest of the proposed power plant.

The Mossel Bay OCGT power plant would be fuelled with liquid distillate fuel (kerosene-based or diesel) from the adjacent PetroSA gas-to-liquid (GTL) facility. A substation is required to allow for two transmission lines of 400 kV capacity each to link in with the existing transmission national grid.

[2] Deactivating the power station for an indefinite period.

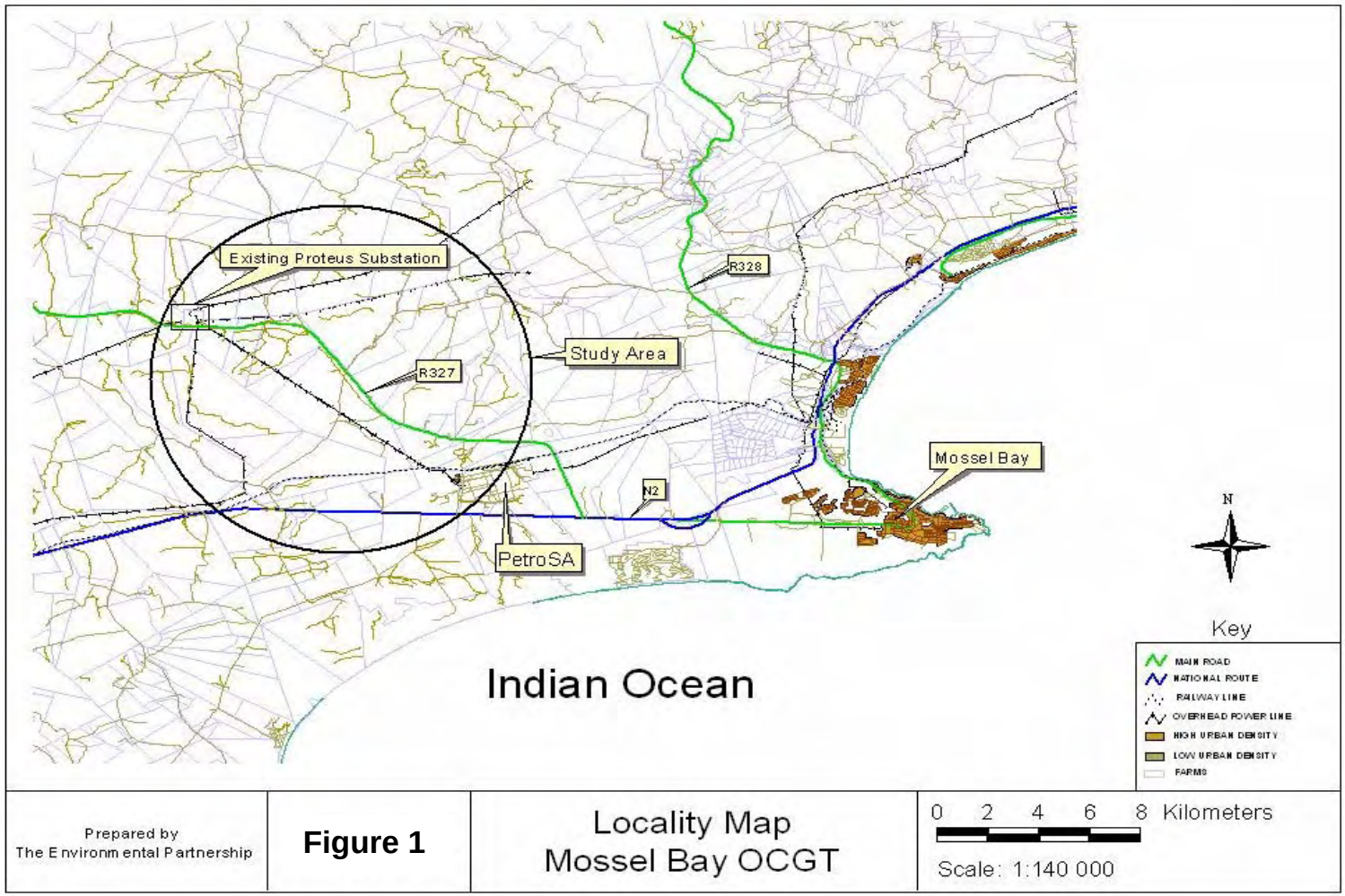


Figure 1: Locality map : Mossel Bay OCGT

1.2 THE EIA PROCESS TO DATE

The Environmental Impact Assessment (EIA) being undertaken was initiated in March 2005 with the completion and submission of the Department of Environmental Affairs and Development Planning's (DEA&DP) Application Form and Scoping Checklist. Note that while the Department of Environmental Affairs and Tourism (DEAT) is the primary responsible authority at the national level, they have delegated the authority to the provincial department, viz. DEA&DP.

The sequence of documents produced thus far in the EIA process is:

- DEA&DP Application Form and Scoping Checklist, providing the formal application for the project;
- a Plan of Study for Scoping which described the proposed scoping process;
- a draft Scoping Report which was reviewed by interested and affected parties (I&APs);
- a Final Scoping Report which incorporated the comments elicited from the release of the draft Scoping Report;
- a Plan of Study for the Environmental Impact Report (EIR);
- a draft EIR, i.e. an earlier version of this report; and
- this Final EIR which incorporates comments elicited from the release of the draft EIR[3].

The aforementioned documents were submitted to DEA&DP, who have ratified the proposed process to be followed in the EIR phase by accepting the Plan of Study for EIR, in a letter dated 24 August 2005 (see Annexure A). It was on the basis of this approval that the EIR phase commenced.

Please note that this Final EIR should be read in conjunction with the preceding Scoping Report of June 2005, particularly with reference to the various pieces of legislation relevant to this proposed project.

1.3 STRUCTURE AND SCOPE OF THIS REPORT

This report is structured as follows:

Chapter One	*Provides the introduction, legislative requirements and background to the study*
Chapter Two	*Describes the study area*
Chapter Three	*Describes the project components*
Chapter Four	*Describes the public participation process*
Chapter Five	*Discusses the assessment of issues identified*
Chapter Six	*Concludes the report and provides recommendations*

[3] Note that sections in the text that are underlined indicate amendments to the draft EIR during its updating to this final version.

1.4 APPROACH TO THE PROJECT

1.4.1 The EIR phase

There are three distinct phases in the EIA process, as required in terms of the Environment Conservation Act (73 of 1989), namely the Initial Application, the Scoping phase and the Assessment phase (refer to Figure 2 for an overview of these phases). This report covers the final phase, *viz.* the Assessment phase, which culminates in an EIR. The Initial Application phase entailed the submission of the Application Form and Scoping Checklist and Plan of Study for Scoping to DEA&DP, whilst the Scoping phase entailed the compilation and submission of the Final Scoping Report and Plan of Study for the EIR.

The purpose of the EIR is to describe and assess the range of feasible alternatives identified during the Scoping process in terms of the potential environmental impacts identified. The ultimate purpose of the EIR is to provide a basis for informed decision, firstly by the proponent (i.e. Eskom) with respect to the option they wish to pursue, and secondly by the environmental authority (i.e. DEA&DP) regarding the environmental acceptability of the proponent's preferred option.

The approach to the EIR phase entailed the following:

- Undertaking a further review of relevant literature.
- Appointing various specialists to undertake the specialist studies identified during the Scoping Report phase[4].
    - Nick Helme of Nick Helme Botanical Surveys was appointed to undertake a specialist botanical investigation (refer to Annexure B for a copy of his report);
    - Brett Lawson from Ninham Shand undertook an avifaunal specialist study (refer to Annexure C for the full report);
    - Tim Hart of the Archaeology Contracts Office was appointed to undertake a specialist heritage assessment (refer to Annexure D for the full report);
    - Tanya de Villiers and Albert van der Stok of CNdV Africa were appointed to undertaken a visual impact assessment (VIA) (refer to Annexure E for the full report);
    - Adrian Jongens of Jongens Keet Associates was appointed to undertake a noise impact assessment (refer to Annexure F for the full report);
    - Lucian Burger of Airshed Planning Professionals was appointed to undertake an air quality assessment (refer to Annexure G for the full report);
    - Mike Oberholzer of Ilitha RisCom was appointed to describe the risks related to the fuel supply pipeline (refer to Annexure H for the full report);
    - Alex Kempthorne of Urban-Econ Development Economists was appointed to undertake a socio-economic assessment (refer to Annexure I for the full report); and

[4] The proposed specialists and their draft Terms of Reference were outlined in the Scoping Report and Plan of Study for EIR, both of which were subjected to public scrutiny.

- Brenda Sudano and Brian Alexander of Ninham Shand were appointed to undertake the traffic impact assessment (refer to Annexure J for the full report).

- Integrating the various specialist reports into this draft EIR.
- Reviewing of the draft EIR by the review consultant, Mark Wood of Mark Wood Consultants (refer to Annexure R for the review and consultant team's response).

Consultation with the public forms an integral component of this investigation and enables I&APs, *e.g.* neighbouring landowners, local authorities, environmental groups, civic associations and communities, to comment on the study team's assessment of the potential environmental impacts associated with the proposed development and to identify additional issues which they feel have not be adequately addressed in the draft EIR. A summary of the public participation process to date is provided in Chapter 3.

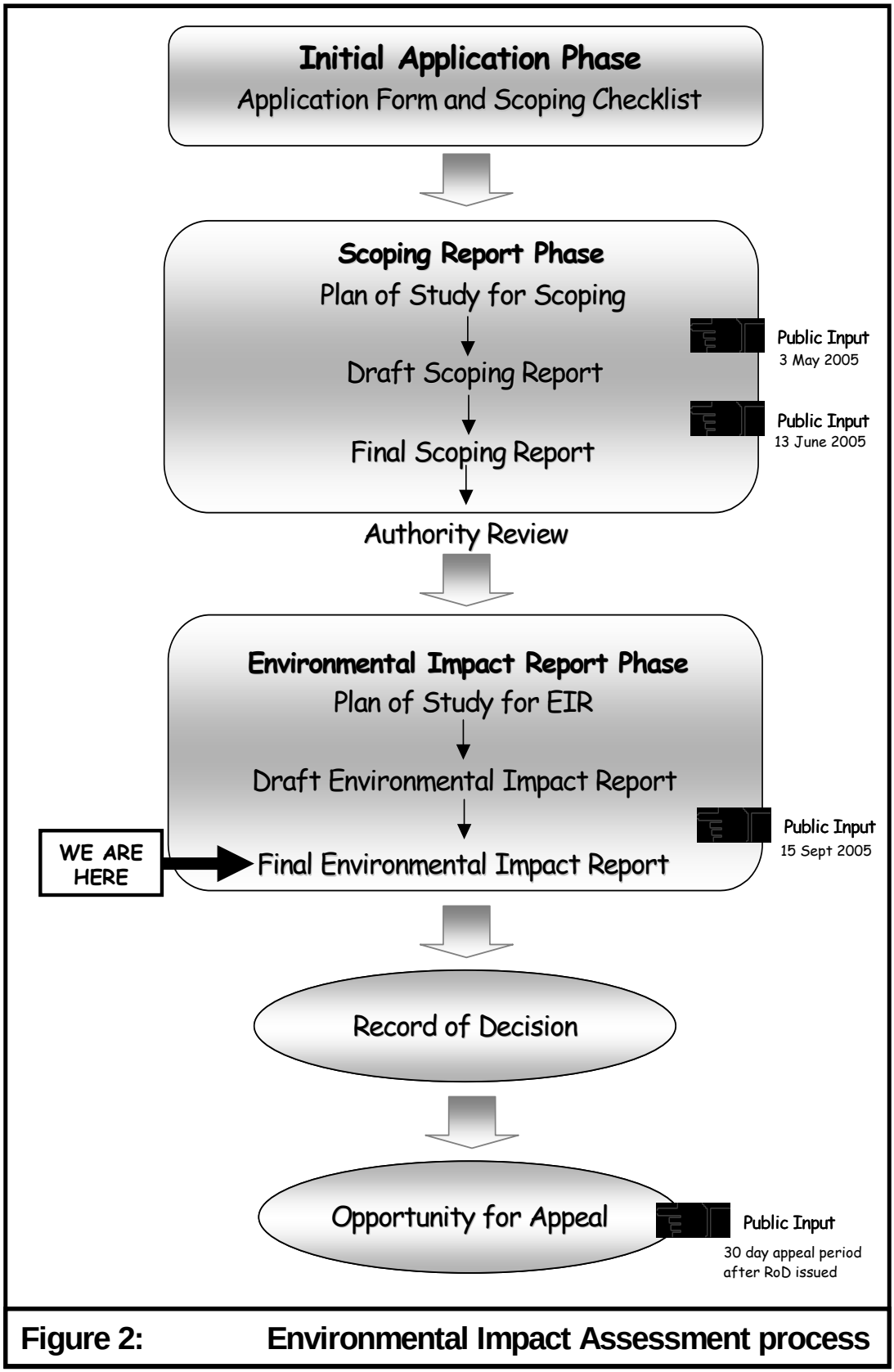


Figure 2: Environmental Impact Assessment process

1.4.2 Authority involvement

As per the requirements of the Environmental Conservation Act (73 of 1989), the final Scoping Report and Plan of Study for EIR for the proposed project was submitted to DEA&DP in May 2005. DEA&DP endorsed the proposed EIA process by approving the Plan of Study for EIR in a letter dated 24 August 2005. A copy of this letter appears in Annexure A.

1.4.3 Decision making

Based on the assessment of the biophysical and socio-economic factors relevant to the proposed development, i.e. excluding engineering costs and technical constraints, the alternatives that have the least environmental impact become apparent. Table 6.1 provides a synopsis of the significance ratings determined for each alternative. This information, together with input from I&APs, will serve to clarify the final suite of environmentally acceptable alternatives. This finalised EIR has been submitted to DEA&DP for their review and decision.

Once they have reviewed the document and are satisfied that it contains sufficient information to make an informed decision, DEA&DP will determine the environmental acceptability of the preferred options. Thereafter DEA&DP will issue a Record of Decision (RoD) and any conditions of approval attached to the authorisation, should the proposed activity be approved.

Following the issuing of the RoD, DEA&DP's decision will be communicated by means of a letter to all identified I&APs and there will be a 30-day appeal period within which I&APs will have an opportunity to appeal the decision in terms of the Environment Conservation Act.

1.5 ASSUMPTIONS AND LIMITATIONS

- Alternative technologies for generating electricity are identified in the IEP, NIRP and ISEP planning processes and do not form part of this EIA.
- A comprehensive internal screening study was undertaken by Eskom, which investigated potential sites for the proposed OCGT power plants, i.e. both at Atlantis and Mossel Bay (refer to the *Environmental Screening for Siting Open Cycle Turbines in the Western Cape* that appeared in the Scoping Report). The screening study also resulted in the site for the OCGT power plant at Mossel Bay being identified in the position reflected in the present EIA. The ratification of Eskom's screening study by the environmental team has been accepted by the environmental authorities as the point of departure in this EIA, since it provides the necessary strategic level context.
- While there is a requirement to examine the "no go" alternative, this option would amount to there being no changes in the regional biophysical and socio-economic situation, or in the national electricity generation situation. Consequently, without the proposed project, electricity shortfalls in South Africa can be expected by 2007. From a strategic, social and economic perspective, this is considered to be unacceptable by the

proponent. As a result, the "no go" alternative is not being evaluated at the same level of comparative detail as the project alternatives.

- There are no listed activities associated with the work required at the Proteus substation.
- The extent of the site set aside for the OCGT plant and associated substation was initially determined to be 9 ha. The need for an increased area, up to 25 ha, was reflected in the Scoping Report and made known to the I&APs. It has subsequently been clarified that the extent of the proposed site would be approximately 28 ha (of which the development itself would comprise approximately 14 ha, and the remainder would be buffer area).
- At the time of compiling the draft version of the EIR, the exact location of the 28 ha was not fixed. The intention was for the visual and botanical assessments, together with other technical information, to inform the fixing of the site.

2 STUDY AREA

2.1 FLORA

2.1.1 Introduction and context

The specialist botanical investigation was undertaken by Nick Helme of Nick Helme Botanical Surveys. The information provided below has been extracted from the specialist report (refer to Annexure B for a copy of the botanical specialist report).

According to the report, at least three different recent projects have mapped the original vegetation of the study area. Because all three studies use different terminology and do not draw the same boundaries, a definitive picture is lacking. However, inconsistency in terminology is not a shortcoming in the specialist botanical report in question.

The CAPE project (Cowling *et al* 1999) maps the whole study area (at a relatively coarse scale) as being on the edge of Blanco Fynbos / Renosterveld Mosaic and Riversdale Coast Renosterveld (57% and 83.5% Irreplaceable respectively, according to that analysis). The SANBI vegetation map (Mucina & Rutherford 2003) maps the Mossgas area as a mix of Albertinia Sand Fynbos and Mossel Bay Shale Renosterveld. The vegetation in the Proteus area is indicated as being Swellendam Silcrete Fynbos. The recent National Spatial Biodiversity Assessment (Rouget et al 2004) indicates that the Sand Fynbos is a Vulnerable vegetation type (74% remaining), that the Silcrete Fynbos (57% remaining) and Shale Renosterveld (42% remaining) are both Endangered vegetation types. However, the STEP project, which refers to the entire study area as Herbertsdale Renoster Thicket (Cowling *et al* 2003), accurately describes the mix of Thicket and Renosterveld vegetation in the area. This vegetation type is dominant in the area between the Gouritz River and Mossel Bay, occurring on the shale and conglomerate hills, but has been heavily impacted by agriculture, and as a result persists mostly on the steeper slopes. Rapid urbanisation is having a substantial negative impact on this vegetation type (on both flats and steep slopes) in the Mossel Bay, Hartenbos, and Groot Brak areas, where it is also impacted by quarrying activities. Herbertsdale Renoster Thicket has been reduced to 38% of its original extent, with a conservation target of 25% (of the original extent), and it is thus regarded as an Endangered vegetation type in terms of STEP (Pierce 2003). The fact that both STEP (Pierce 2003) and the National Spatial Biodiversity Assessment (Rouget *et al* 2004) find that the area supports endangered vegetation types in a regional and national context is significant.

2.1.2 OCGT power plant and transmission substation site

The field on which the proposed OCGT plant, and associated transmission substation, would be located has been recently and regularly ploughed, and is also grazed by livestock. The site is dominated by grazing grasses such as *Eragrostis curvula* (weeping lovegrass), *Lolium* sp. (ryegrass), and *Cynodon dactylon* (fynkweek), along with a few indigenous but weedy species such as *Gnidia* sp., *Kyllinga* sp., *Oxalis obtusa* (suuring)*, Lobelia erinus, Arctotheca calendula*

(Cape weed), and the alien dandelion at the time of the site visits. No rare or localised plant species are likely to persist. This area has a very low local and regional conservation value.

Sensitive areas in the vicinity of the proposed plant include a 10m wide strip immediately south of the railway line, where remnant Renosterveld can be found (see Figure 3). Species diversity is reduced due to agricultural activities, but includes *Barleria pungens, Digitaria velutina, Gnidia laxa, Gerbera piloselloides, Pycreus polystachyos, Hermannia saccifera, Aspalathus hispida, Drimia capensis* (maerman, jeukbol), and *Scabiosa columbaria*. No rare or localised species were found, and the likelihood of such species is low. This area has a moderate local and regional conservation value.

The most sensitive area in the vicinity of the proposed OCGT plant is a patch of approximately 1ha of Shale Renosterveld about 200m to the east. This patch occurs immediately east of a farm fence, and its northern border is the railway line. The vegetation here is a remnant piece of Mossel Bay Shale Renosterveld, which is, as noted, an Endangered vegetation type (Rouget et al 2004). The site is dominated by *Bobartia robusta*, which is a " Rare" Red Data listed species (Hilton Taylor 1996) restricted to this vegetation type west and north of Mossel Bay. Other species include *Rhus lucida* (blinktaaibos), *Metalasia pungens* (blombos), *Cynodon dactylon*, *Hypoxis setosa*, and *Falkia repens*. Various bulbs species are likely to be common, some of which may be rare and/or localised. This area has a very high local, and high regional conservation value, and should not be disturbed. Similar, but larger patches of remnant Renosterveld occur about 0.7km west of the proposed site (see Figure 3).

In addition, the other habitat of moderate concern is a grassy wetland area to the southeast of the proposed site. This was a natural drainage line, but has been dammed and quite heavily transformed by agriculture, notably heavy stock grazing. The vegetation is dominated by grasses and sedges, most of which are common and widespread, resilient species, but occasional rare bulb species could be present. Botanical conservation value is low - moderate. The value of this area is of an ecological nature in that it is a wetland area supporting populations of frogs, invertebrates, and birds. The wetland effect extends at least 200m towards the current PetroSA plant from the small dam.

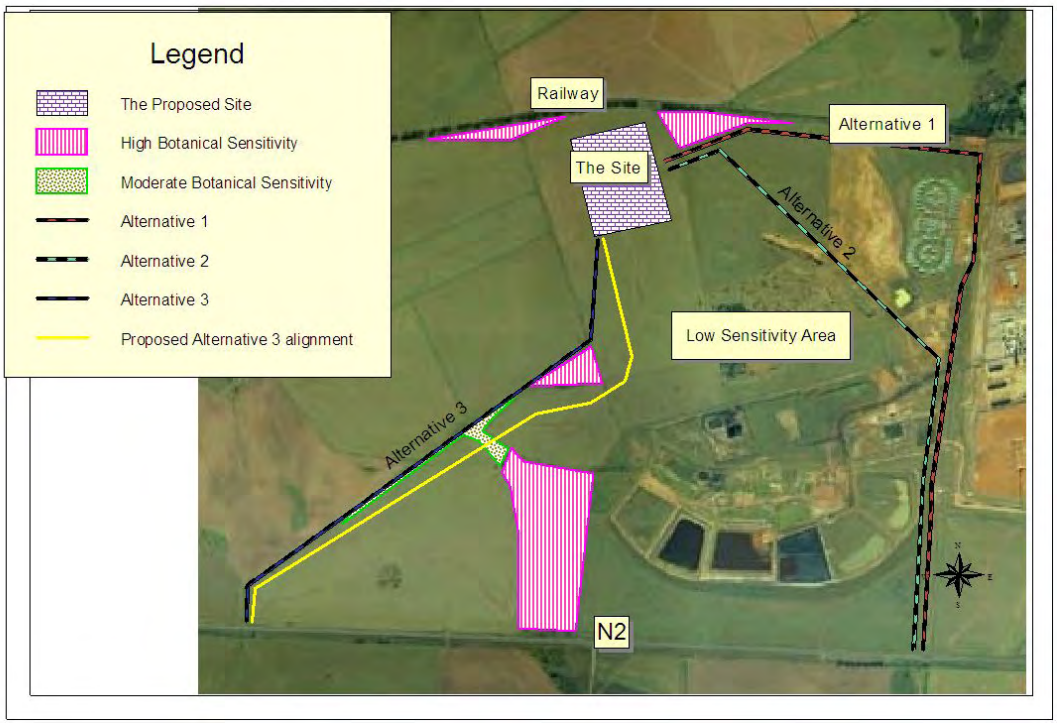


Figure 3 : Botanical sensitivity

2.1.3 Transmission lines

Due to the distances involved and lack of exact routings, the entire routes were not surveyed in detail, but the following observations are relevant.

The natural vegetation type in the area that could be affected by the proposed transmission lines is Swellendam Silcrete Fynbos, with elements of Shale Renosterveld, especially on the lower slopes. In the gulleys and drainage lines a type of Thicket is present (along with wetland elements in some cases), with an abundance of large shrubs. Species include *Aloe ferox, Rhus pterota, Rhus rehmanniana, Rhus lucida* (blinktaaibos), *Rhus pallens, Diospyros dichrophylla* (bladder nut), *Polygala myrtifolia* (Septemberbossie), *Carissa bispinosa* (num num), *Euclea undulata* (guarrie), *Gymnosporia buxifolia* (pendoring), *Sideroxylon inerme* (milkwood), *Schotia latifolia* (boerboon), *Sarcostemma viminale* (melkbos), *Rhoicissus digitata,* and *Grewia occidentalis* (cross berry).

Dominant species in the Renosterveld component here are *Rhus lucida*, *Oedera genistifolia, Elytropappus rhinocerotis* (renosterbos), *Merxmuellera stricta* (wiregrass), *Ficinia oligantha*, *Cymbopogon* sp. (turpentine grass), *Cynodon dactylon* (kweekgras), and *Themeda triandra* (rooigras). There are numerous bulb species, including *Polyxena ensifolia*, *Crossyne guttata* (Maartblom), *Babiana* prob. *patersoniae* (uintjie), *Massonia depressa* (krimpvarkies), *Oxalis pardalis, Oxalis heterophylla* (suuring), *Hypoxis setosa* (dwarf African potato), *Drimia capensis* (jeukbol), and *Ledebouria ovalifolia*. Other species include *Knowltonia vesicatoria*, *Falkia repens, Hibiscus aethiopicus, Pelargonium elongatum*, *Gerbera pilosellifolia*, *Sutera revoluta,*

Eriocephalus africanus (kapokbossie), *Crassula ericoides, Crassula nudicaulis, Stachys sublobata, Hermannia saccifera, Hermannia cuneifolia* (poprosie), *Hermannia lavandulifolia*, *Asparagus capensis* (katdoring), *Barleria pungens*, *Muraltia linearis, Muraltia juniperifolia, Trichodiadema* cf*. attonsum, Freesia fergusoniae*, *Ischyrolepis triflorus*, *Acrodon bellidiflorus*, *Tephrosia capensis, Commelina africana, Tribolium uniolae* (haasgras), *Agathosma ovata* (buchu), *Falkia repens*, and *Indigofera alopecuroides*. The high bulb diversity is typical of the Renosterveld vegetation. There is a low to moderate likelihood of rare species being present.

At least two rare species are common and widespread in the loams on conglomerate (*Bobartia robusta* - Red Data Book listed as "Rare", and *Protea lanceolata* – recently listed as "Endangered" [Rebelo *et al*, in press]), and there is a low - moderate likelihood of certain very rare cryptic dwarf succulents such as *Euphorbia bayeri* (local endemic) or various *Haworthia* species occurring. There is also a small likelihood that the very rare *Satyrium muticum* could occur here. In addition, the Milkwood trees (*Sideroxylon inerme*) are a protected species.

All areas of natural vegetation have a high local and regional conservation value in this area.

2.2 AVIFAUNA

The specialist avifaunal investigation was undertaken by Brett Lawson of Ninham Shand. The information provided below has been extracted from the specialist report (refer to Annexure C for the avifaunal specialist report).

According to the South African Bird Atlas Project (SABAP) data available for the study area (1:50 000 topo sheet no. 3421BB, Herbertsdale), one hundred and fifty seven bird species have been recorded in the area, of which 22 species are known to have been breeding.

Of the swimming, diving and wading birds, the expected array of cormorants, herons, egrets, geese and ducks have been recorded. It is interesting that flamingoes have not been recorded, probably due to the absence of suitable shallow water bodies. African black duck have also not been recorded but this might be due to their cryptic nature.

As far as diurnal raptors are concerned, the only two surprising absentees are the black eagle and the African goshawk. The fact that no owls were recorded can only be ascribed to observational shortcomings, since barn and eagle owls are likely to occur. Neither the common European or fierynecked nightjar have been recorded and this, together with the absence of owls, would suggest that nocturnal observations were limited.

Terrestrial and ground nesting birds are well represented, as are the aerial-feeders. As far as the latter are concerned, a few of the summer visitors are absent from the records.

The conglomeration of species that make up the passerines comprises the bulk of the remaining records. The array that is represented is typical of what would be expected to occur in the variety of habitats represented in the study area. With reference to the bird species within the study area which would have a particular conservation status, the following have been identified as being present:

- Cape cormorant ~ near threatened

This cormorant is endemic to southern Africa and is more common on the west coast than the east, where the study area is located. Essentially a marine species, they breed on offshore islands and feed in coastal waters. Nesting occasionally occurs on the mainland close to the shoreline or in estuaries but always in dense colonies. There are no records of them breeding in the study area. Given their preferred habitats for foraging and breeding, it is unlikely that the OCGT power plant, substation and transmission lines would pose any risk to this species.

- Secretary bird ~ near threatened

Widespread throughout South Africa, this large ground-feeding bird does not spend much time in flight. Nevertheless, although they are ungainly on take-off and landing, secretary birds are strong fliers and can soar to great heights. Roosting and nesting occurs on the tops of trees but there are no breeding records in the study area. Due to their foraging in the open veld, they would certainly be found in proximity to the proposed transmission lines. The risk to this species is recognised, particularly since their frequency of occurrence in the area appears from the SABAP records to be high. However, this risk must be seen in the light of the little time they spend in the air, the height and visibility of the transmission line structures and their strong flying ability.

- Cape vulture ~ vulnerable

Cape vultures were historically known to roost in a deeply incised section of the Gourits River just north of where it cuts through the Langeberg mountains south of Van Wyksdorp. Although these birds forage very widely, the records from the study area indicate no breeding activity and a low frequency of reporting. Cape vultures often perch on transmission line towers. However, their low level of incidence and little likelihood of electrocution would suggest that the risk to this species is slight.

- African marsh harrier ~ vulnerable

Typically found over marshlands, this resident raptor also occurs over cultivated lands. However, their feeding behaviour is to fly low over the ground. They also nest at ground level, although there are no records of breeding in the study area. This harrier is known to perch on low structures such as fences but also soars to some height. The risk to this species is not considered to be significant.

- Black harrier ~ near threatened

The black harrier is a local migrant and occurs in a wide range of habitats. It typically hunts close to the ground where it also perches on termite mounds or low structures. Nesting also occurs close to the ground, although there are no breeding records from the study area. Given its feeding and nesting behaviour, it is unlikely that the transmission line structures would pose a significant risk to this species.

- Blue crane ~ vulnerable

The blue crane has broadened its range in the last few decades into the extensive croplands of the Western Cape. Feeding and nesting on the ground, this bird nevertheless flies strongly and soars to considerable height. There are records of it breeding in the study area but it is not

known to perch on transmission line towers. Their flight behaviour would suggest some threat from collision with transmission line conductors and more particularly the earth wires mounted above the conductors. While acknowledging the high incidence of blue crane mortality through collision with transmission lines generally, the size and visibility of 400kV transmission line conductors make this less of a risk than with smaller transmission and distribution line structures.

- Stanley's bustard ~ vulnerable

A resident of the eastern arid and grassveld areas of South Africa, this bustard feeds and nests on the ground. There are no breeding records from the study area. Although it is a strong flyer and achieves some height, it is not known to use elevated perches such as trees or transmission line towers. While there may be some risk to this species, since they are known to collide with smaller transmission and distribution line conductors, the greater size and visibility of the 400kV structures would suggest that this likelihood is not particularly significant.

- White stork ~ Protected under Bonn Convention on Migratory Species

The white stork visits southern Africa from Europe during the northern winter. Although they do not breed here, these storks congregate in large numbers where sources of food are to be found. They are ground foraging birds and although they seek out dry savannahs and open grasslands when wintering, they also tend to congregate near to drainage lines and impoundments. The flight behaviour of white storks is to soar at considerable height on thermal air currents. They are nevertheless vulnerable to collision with transmission lines and the risk to this species is recognised.

2.3 VISUAL SIGNIFICANCE OF THE AREA

The visual assessment was undertaken by Tania de Villiers and Albert van der Stok of CNdV Africa. The information provided below has been extracted from the specialist report compiled by them (refer to Annexure E for the full report).

The N2 National Road carries a high volume of tourist and other traffic between Cape Town and the Garden Route. The visual quality of the area is important for tourists. Any changes to the landscape can therefore have an impact on the tourist trade as well as affecting the visual experience of the local population.

Many people consider Mossel Bay as the start of the Garden Route. When driving towards Mossel Bay from Cape Town, there is a sense of the changing landscape as the sea draws closer in the south and the jagged peaks of the Outeniqua Mountains rise more and more spectacularly above the proximate landscape to the north.

Approximately 7.5km east of the site, along the N2, at the Mossel Bay turnoff, the land drops dramatically away and the bay, the mountains, the seaside villages and the water bodies that are characteristic of the Garden Route are suddenly laid out before the viewer. This view is one of the signature vistas in the area and on the Garden Route. Compared to the landscape east of this point on the N2, (the Garden Route proper), the scenic quality of the landscape west of this

point, (in the vicinity of the proposed OCGT plant) is less visually stimulating although it is still a beautiful and interesting landscape.

The signature vista will not be affected in any way by the proposed development, but views along the N2 west of Mossel Bay tend to be drawn northwards to the promise of the mountains in the distance. This means that travellers tend to look to the peaks beyond, across the PetroSA site, Mossdustria, the site of the proposed OCGT plant and the path of the proposed transmission lines.

Although Mossel Bay and the areas to the east of Mossel Bay entertain significant tourist activity, there do not appear to be any tourist facilities in the area that will be visually affected by the development of the plant and transmission lines. Only tourists travelling through the area may be visually affected.

The "viewshed" refers to the theoretical outer-most extent or area from which a site can be seen. It must, however, be remembered that visibility may be obscured in reality by objects within the viewshed such as existing buildings, trees, lower ridges, outcrops and other geographical or natural features, and also by distance where an object can visually blend into its background or be completely lost to sight.

Because of the gentle slope and undulation of the land surrounding the site, there are few visual barriers that stand out from the landscape to create a natural viewshed. The ridge line to the east and west of Proteus and northeast of the R327 does, however, form a visual barrier to views from the north and east.

The exception to this is the possible visibility of the towers and extra structures at Proteus from the north. Because of the lack of views in this area, and the presence of the existing substation against which these additions will be seen, these visual intrusions are not expected to be significant.

To the east, south and west of the proposed plant and transmission lines, the viewshed is broken by the local topography with the various elements of the proposed development sliding in and out of sight as they are viewed in relation to the local topography. In many instances the mitigation of distance will form the viewshed for specific views rather than the geographical features.

2.4 FAUNA

Due to the farming activities within the study area, indigenous terrestrial faunal diversity is restricted. However, there is evidence of various small mammals such as rodents, porcupines, and small antelope within the study area. In addition, PetroSA's nature reserve is located adjacent to the refinery, between the southern security fence and the N2 National Road. Species found with the Nature Reserve include springbok, Burchell's Zebra, grysbok and Cape hares.

2.5 GEOLOGY AND DRAINAGE

The study area is underlain by sandstone and shale beds of the Table Mountain and Bokkeveld Groups. North of Mossel Bay, rocks of the Enon Formation and other similar younger deposits (of Cretaceous and Tertiary age) are found. These rocks are deposited in an east to west elongated trough and are considered to extend offshore.

The Kouga Formation is the principal aquifer in the study area and its recharge area lies north of the refinery.

A minor seasonal tributary of the Blinde River, which drains to the south, has its source approximately 1 km to the south-southwest of the proposed OCGT power plant site. However, the site is particularly flat and as a consequence is not well drained. A shallow water table is likely to occur in an area approximately 800 m to the east of the proposed site, i.e. closer to the PetroSA facility.

2.6 CLIMATE

The study area falls within a Mediterranean-type climate with hot summers and wet winters. The annual precipitation is approximately 400-600 mm, peaking in spring and autumn. Winds are typically from the southeast during summer months, while winter frontal systems cause north and westerly winds. Strong winds with an average speed of 20 km/h are experienced during winter, whilst the average wind speed in summer is approximately 15 km/h (PetroSA, undated).

The average mean temperature in summer is approximately 25^{o}C and the average mean temperature in winter is approximately 14^{o}C.

2.7 EXISTING INFRASTRUCTURE

The N2 National Road is located approximately 1.5 km south of the proposed OCGT power plant and substation site, whilst the R327 is located to the north of the proposed site. The Kleinberg-Mossdustria railway line is located immediately north of the site. The Proteus substation is located 10 km northwest of the proposed power plant site and two 132 kV transmission lines run in a northwesterly direction between the PetroSA facility and the Proteus substation.

2.8 HERITAGE / CULTURAL RESOURCES

The specialist heritage assessment was undertaken by Tim Hart of the Archaeology Contracts Office. The information presented below has been extracted from the specialist report (refer to Annexure E for the full report).

This paragraph provides an overview of archaeological knowledge of the greater Mossel Bay area, to contextualise the study area in particular. A cave at Cape St Blaize that was excavated in 1888 by Lieth (Nilssen pers com) and by Goodwin in the 1920's revealed an extensive

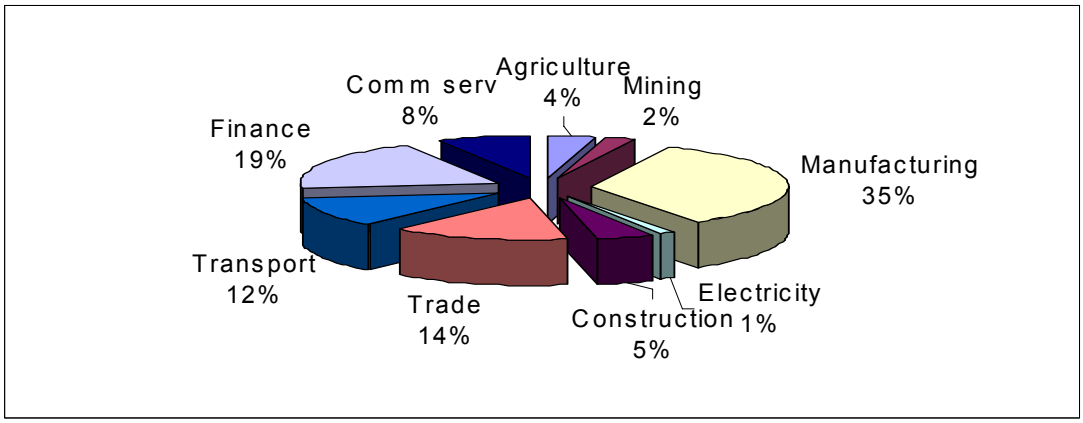
archaeological deposit dating from 200 000 years ago (Middle Stone Age) to the relatively recent shell middens of pre-colonial San and/or Khoekhoen herders. For many years since the excavations of Cape St Blaize cave, very little archaeological research has taken place in the area until the extensive cave and rock shelters of Pinnacle Point were brought to the attention of Prof Curtis Marean (Stoneybrook University, New York and Dr Peter Nilssen (Mossel Bay Archaeological Project). A detailed program of research commenced, funded by the American National Science Foundation. This has resulted in the excavation of several sites resulting in the discovery of some very early fragmentary human remains and a complex Middle Stone Age sequence. Work is currently in progress. No colonial period archaeological research has ever taken place in the area so very little is known about early colonial period settlement, apart from that which is historically recorded. In terms of the study area itself, no prior studies have taken place.

Since the study area lies in a rolling open landscape away from the coast, the expectation is that the kind of archaeological material that will be found will consist of open scatters of Early and Middle Stone Age artifacts (with rarer concentrations of later material) which tend to occur ubiquitously throughout Southern Africa. It is only when such scatters are found in association with fossil bone or in clusters of discernable density that significant impacts can occur. Since no rocky outcrops, shelters or natural foci were found during a site inspection of the study area, occurrences of Late Stone Age archaeological material are not expected to be frequent.

2.9 SOCIO-ECONOMIC ASPECTS

The specialist socio-economic assessment was undertaken by Alex Kempthorne of Urban Econ. The information presented below has been extracted from the specialist report (refer to Annexure I for the full report).

The Gross Geographic Product (GGP) of the greater Mossel Bay area is the value of all the final goods and services produced within the local economy during a specific period. It is therefore an indication of the level of production and size of the local economy in the study area. The Mossel Bay economic profile is provided in Figure 4.



(Source: StatsSA, 2005)

Figure 4 : Mossel Bay economic profile, 2003 (current values)

Figure 4 illustrates that the Mossel Bay economy is fairly well diversified, namely it is not concentrated in a specific sector, with the most important sector contribution being the Manufacturing Sector (35%) followed by the Finance and Community Services Sectors (8%) and the Trade Sector (14%). The Electricity Sector which consists of electricity, water and gas contributes 1%. The Mossel Bay area's economic performance is therefore not dependent on a single economic activity for its future growth and sustainability and has reduced influence from negative external factors.

The degree to which an economy is diversified can be illustrated in a terms of a Tress Index. The Tress Index is measured on a scale of 1 to 100. The higher the value of the Tress Index in an area, the more concentrated is the economy and the lower the value the more diversified the economy. The local Tress Index is 44.55, showing that the economy of Mossel Bay is more diversified than those of Knysna (49.81) and the Western Cape Province (54.75) as a whole. This is good as the majority of local economies in South Africa are struggling with concentrated economies that desperately need to be diversified. Mossel Bay, on the other hand, appears to have a healthy distribution of economic activity.

Mossel Bay has always had a very strong industrial character that was traditionally driven by the large oil storage reserves located at Voorbaai, as well as a large number of industries involved in shipbuilding and ship repair. Most of these industries are concentrated around the harbour and predominantly serve the fishing industry. Other industries are related to agro-processing (specifically milk extracts) and therefore an agglomeration of agro-industries in Mossel Bay has been developing. There are surprisingly few industries using products or by-products of the PetroSA refinery.

In addition, during recent years, the town has developed a fairly strong tourism industry. The industrial character of the town initially hampered the development of the tourism industry. However, it would appear as if the very strong tourism development in the neighbouring towns along the Eden coast, most notably George and Knysna, has now spilled over to Mossel Bay. The tourism market in Mossel Bay is mainly middle income and domestically based.

A summary of the Mossel Bay economy's main trends and dynamics is as follows:

- The primary sector of the Mossel Bay economy appears to be declining, the secondary sector is experiencing growth in its share of the economy and the tertiary sector appears to be increasing its proportionate share.
- Sectors showing strong growth in general are Building and Construction, Trade, Transport and Finance while the Manufacturing and Electricity Sectors show a slow decline. These trends are expected to continue into 2007, although future decisions for Eskom could influence growth for the Electricity Sector post 2010. The implications of this proposed growth has positive implications for the property market. The additional growth combined with the growth in the construction sector, implies that in the medium term there will be a continued growth in the property market.

- The economy of Mossel Bay is relatively well diversified. This is a good sign as the majority of local economies in South Africa are struggling with concentrated economies that desperately need to be diversified.
- The main sectors in which Mossel Bay has a comparative advantage in the region are Tourism, Construction, Utilities (electricity/gas/water), Manufacturing and Agriculture. This has further good implications for the property market as these sectors can be more fully developed.

As a separate exercise to the project-level EIA documented in this report, Eskom commissioned an evaluation study on the broad macroeconomic impact of the construction of the two OCGT power plants at Atlantis and Mossel Bay[5]. To provide the contextual background to the present study, a summary of the macroeconomic study is presented in Annexure K.

2.10 PLANNING FRAMEWORK

The proposed OCGT power plant and transmission substation site is located within PetroSA's landholding and is thus zoned for industrial use, although it is presently used for agricultural activities (pasturage and crops). The alternative alignments for the proposed transmission lines would traverse land zoned for agriculture.

A discrepancy in the delineation of the urban edge in the Mossel Bay Growth Management Framework should be noted, where it is indicated as running along the western security fence rather than along the extreme western boundary of PetroSA's landholding. The landfill site, evaporation ponds and construction village are all outside of the security fence. However, formal confirmation of the industrial zoning of the OCGT power plant site has been obtained from the Mossel Bay Municipality. A copy of this documentation is provided in Annexure L.

[5] Global Insight SA, 2005. *High-level Macroeconomic Impact Analysis: The Construction of Two OCGT Peaking Power Stations.* Final Report.

3 DESCRIPTION OF PROJECT PROPOSAL AND POTENTIAL IMPACTS IDENTIFIED FOR DETAILED ASSESSMENT

3.1 INTRODUCTION

This chapter provides a brief overview of the proposed project together with the applicable feasible alternatives identified for each of the components of the proposed project, namely:

- The OCGT power plant (made up of three gas turbines with an output of 150 MW each) adjacent to the existing PetroSA facility;
- A fuel supply pipeline to transport liquid distillate fuel (kerosene-based or diesel) from the PetroSA facility to the OCGT power plant;
- A substation adjacent to the OCGT power plant;
- Two 400kV transmission lines from the OCGT substation to Proteus substation;
- The upgrade of the Proteus substation within the boundaries of the substation; and
- An access road from the N2 National Road to the proposed OCGT power plant and substation site.

In addition, this chapter describes the potential impacts that have been identified which are applicable to the construction and operational phases of the proposed project.

3.1.1 Open cycle gas turbine power plant

The OCGT power plant would produce electricity by means of hot gas turning a turbine that powers a generator (see Figure 5). The OCGT power plant is based on the Brayton cycle which describes what happens to air as it passes through the system and specifies the relationship between the volume of air in the system and the pressure it is under.

According to the Brayton cycle, air is initially compressed, increasing its pressure as the volume of space it occupies is reduced. This compressed air is then heated at a constant pressure. Heat is added by injecting fuel into the combustor and igniting it on a continuous basis. The hot compressed air is then allowed to expand, reducing the pressure and temperature and increasing its volume. This expansion takes place within the turbine, where the expansion of the hot gasses against the turbine blades turns a shaft. This shaft extends into a generator, which produces electricity. The Brayton cycle is completed by a process where the volume of air is decreased (that is, the temperature decreases) as heat is absorbed into the atmosphere.

It is envisaged that the OCGT power plant would operate for an average of two hours per day during weekdays, one hour in the morning and one hour in the evening. This, however, is dependent on electricity demand and system requirements. It could thus be necessary to operate in an emergency situation for up to eight hours at a time. Such situations are unlikely,

however, and the objective of the OCGT power plant is to provide peaking power within a relatively short time after starting the plant.

The operation of the gas turbine results in airborne particles being deposited on the compressor blades. Because soiling of the compressor results in the reduction of the thermal efficiency of the gas, the compressor blades require regular cleaning. The cleaning may occur while the plant is off-line or on-line. The cleaning is undertaken using a hydrocarbon-based solvent, which will be mixed with water to form an emulsion. Effluent produced by the off-line cleaning would be drained from the compressor using a controlled process which passes through an oil separator and thereafter would be transported to the PetroSA waste disposal site.

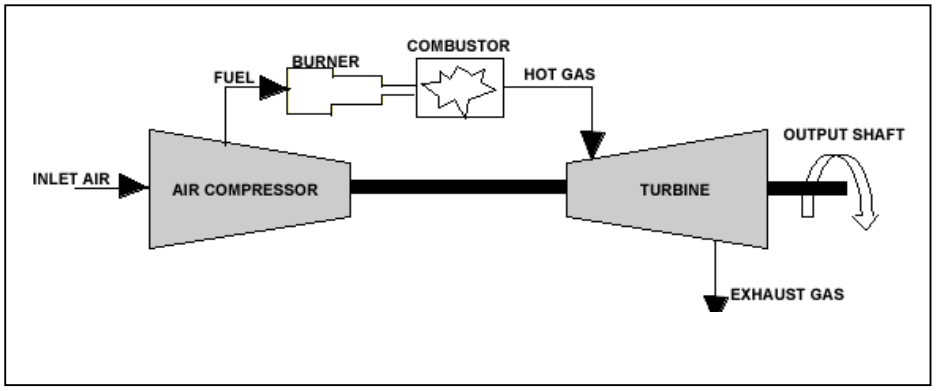


Figure 5 : A typical gas turbine

(a) OCGT Power Plant Extent and Layout

The site layout (refer to Figure 6 and 7) was formulated so as to ensure that the appropriate configuration is achieved from an environmental and technical perspective. This would be within the boundary of the site allowed for the OCGT power plant and adjacent substation. The OCGT power plant and transmission substation would occupy an area of approximately 14,2 ha, although allowance for buffer zones would result in a total land take of 28,7 ha[6]. The highest points of the plant would be the three emission stacks, likely to be about 30 m high.

The intention is to install three turbines each with a nominal capacity of 150 MW. As indicated previously, hot gas is produced by introducing fuel to compressed air in a combustion chamber. The fuel in this case would be a form of liquid distillate fuel (kerosene-based or diesel) acquired from PetroSA.

(b) Emission Control Measures Relating to the OCGT Power Plant

Although the OCGT power plant is considered a 'clean' technology in comparison to coal-burning power stations, it produces emissions such as oxides of sulphur, oxides of nitrogen (NO_x) and greenhouse gasses e.g. carbon dioxide. The exhaust gasses of the OCGT power plant would be discharged to the atmosphere through the stacks. Two possible NO_x abatement measures have been investigated for possible implementation:

[6] The buffer zone areas would not contain any OCGT power plant infrastructure but may contain landscaped berms, for instance, for visibility and noise attenuation.

(i) Dry NO_x Abatement Measures

Most gas turbine manufacturers offer low NO_x burners in their gas turbines. These burners limit the formation of thermal NO_x through lean and staged combustion of the fuel. When burning natural gas, these systems can achieve NO_x levels as low as 25ppm. These systems are called dry low NO_x systems because they do not require water for NO_x abatement.

(ii) Wet NO_x Abatement Measures

Wet abatement refers to the injection of water or steam into the combustor to quench the flame temperature and thereby limit the formation of thermal NO_x. While all major suppliers have dry low NO_x systems for natural gas fuels, they have had varying success with dry low NO_x systems for liquid fuels such as diesel or kerosene. Therefore wet NOx abatement is usually specified for liquid fuels.

It is estimated that approximately 87 000 kilo litres[7] of de-mineralised water per year would be required should wet NO_x abatement measures be implemented[8].

[7] Based on 5 % load factor (i.e. 10 hours/week).
[8] Section 5.6.3 deals with this issue in detail, *viz*. that wet NO_x abatement would not be necessary.

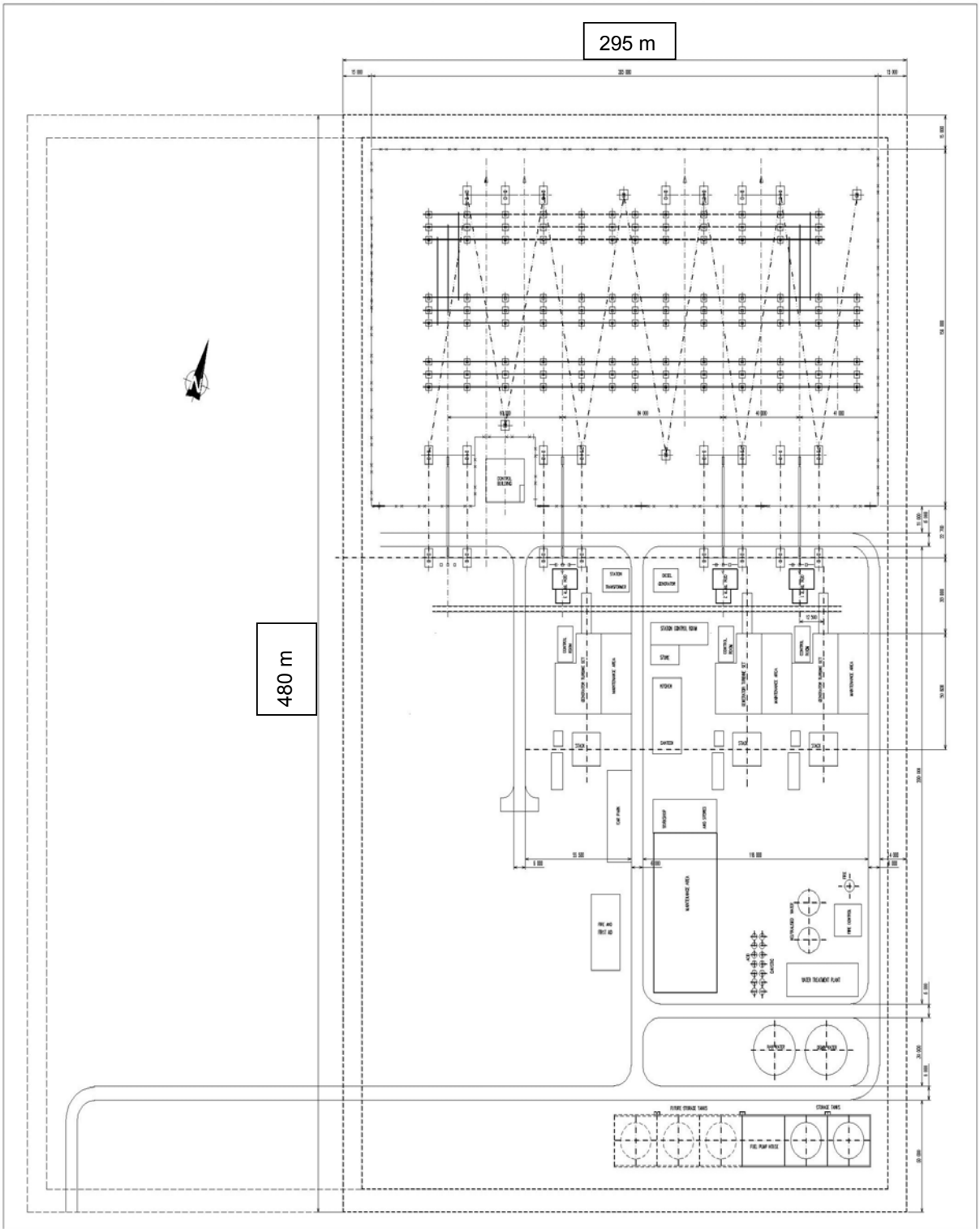


Figure 6 : Site layout plan for OCGT and transmission substation

3.1.2 Fuel supply pipeline

PetroSA would supply the fuel for the proposed OCGT power plant via a pipeline of between 3 and 5 km in length. Approximately 52 000 tons (67 000 m^3) of liquid distillate fuel (kerosene-based or diesel) would be required per year in order to operate the power plant for approximately 10 hours per week. The proposed pipeline would be installed above the ground for maintenance and safety reasons, e.g. to detect possible leaks which would have a potential environmental impact. It would be of mild steel, 100 mm or 150 mm in diameter and designed to operate at 10 bar gauge. Two alternative routes have been identified. See Figure 7.

(a) Fuel pipeline alignment - Alternative 1

This alternative entails the fuel pipeline exiting the PetroSA refinery on its western boundary. Thereafter, it would run along the existing 132 kV transmission lines route, terminating at the OCGT power plant.

(b) Fuel pipeline alignment - Alternative 2

This alternative entails the fuel pipeline exiting the PetroSA refinery at its north-western boundary corner. The pipeline would then run adjacent to the railway line and terminate at the OCGT power plant.

3.1.3 Transmission substation

A proposed transmission substation is to occupy an area adjacent to the OCGT power plant, within the 14,2 ha area. The purpose of the transmission substation is to feed the generated electricity via transformers to the transmission lines, which then carry it to the Proteus substation. The substation would consist of three to four 400 kV transformers with their associated infrastructure and steelwork (see Figure 6).

3.2 TRANSMISSION LINES

In order to connect the proposed OCGT power plant to the existing transmission network, two 400 kV transmission lines would be required between the power plant and the existing Proteus substation. The towers would be erected approximately 400 m apart within a confined servitude width of 55 m for each line. Two sets of transmission lines are required in order to secure a constant and reliable supply to the Proteus substation in the event of one of the lines requiring maintenance or experiencing faults.

3.2.1 Proposed route alignments

Three route alignments between the OCGT power plant site and the Proteus substation have been identified (see Figure 7). A description of each proposed alternative route follows. For all the alternatives, the two transmission lines would run parallel to each other within the minimum

required combined servitude. In addition, for all alternatives, the transmission lines would pass south of the Proteus substation and then around to enter the substation at its north-western side, since the vacant space allocated for the purpose is located there (see Figure 7). The servitude rights will be acquired by Eskom and certain constraints would be imposed on the types of activities that could be permitted within the servitude.

(a) Route Alignment - Alternative 1

The two transmission lines would exit the OCGT power plant on its north-western side, cross over the railway line, run in a north-northwesterly direction for approximately 2 km along a farm boundary, towards the R327. Thereafter the proposed route runs adjacent to the R327 for the remaining 10 km to Proteus substation. This alternative crosses farmland before forming part of an existing utility corridor comprising a road, telephone lines and distribution lines. The total length would be approximately 12 km (see Figure 7).

(b) Route Alignment - Alternative 2

The two transmission lines would exit the OCGT power plant on its north-western side and follow the alignment of the existing two 132 kV transmission lines that run between PetroSA and Proteus substation. The proposal is to erect the two new transmission lines parallel and to the west of the existing transmission lines. The alignment would traverse a number of farms, a secondary road and cultivated land. The total length would be approximately 10 km.

(c) Route Alignment - Alternative 3

This route alignment exits the OCGT power plant on its western side and runs parallel and to the north of the railway line in a westerly direction for approximately 4 km to Kleinberg. The transmission lines would cross over an existing secondary road to run parallel to an existing 66 kV distribution line. The transmission lines would then follow a route of about 10 km running northwards along a valley to the Proteus substation. This alignment follows an existing utility corridor (railway line), and traverses cultivated land as well as less disturbed valleys. The total length would be approximately 14 km.

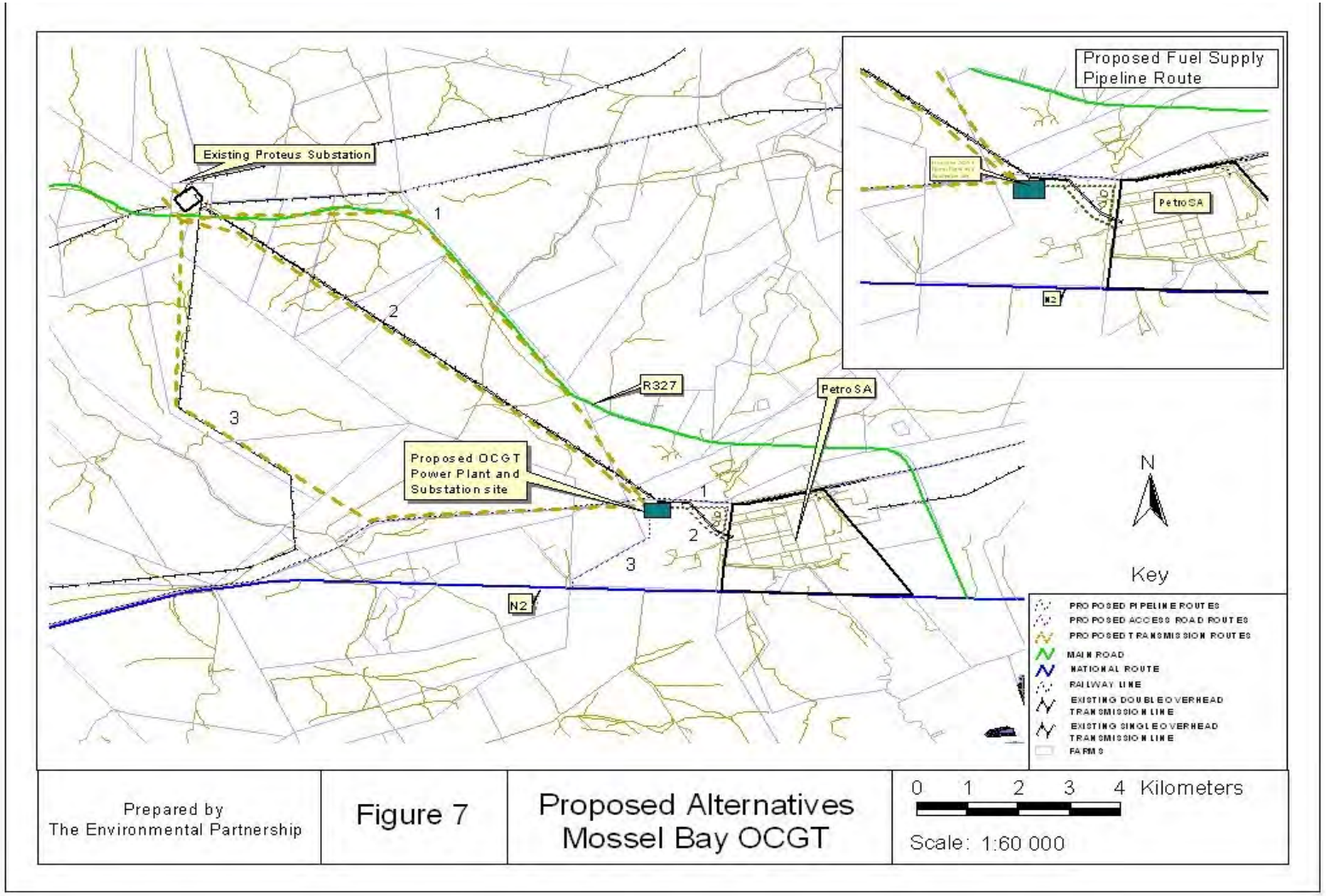


Figure 7: Proposed alternative alignments

3.2.2 Proposed tower configurations

Alternatives in tower structures have also been identified. Tower structures that are being considered for the project are:

- Compact cross rope suspension towers;
- Cross rope suspension towers;
- Self supporting bend or strain towers; and
- Self supporting towers.

To a large degree, the choice of tower design would depend on the terrain and route alignment. A combination of the following tower designs would be used:

(a) Compact cross rope suspension towers

The compact cross rope suspension tower (including stay wires) is approximately 49 m wide and 38 m high (see Figure 8). The conductors are suspended in a triangular configuration and the tower resembles a V-type structure with the top being 19 m wide.

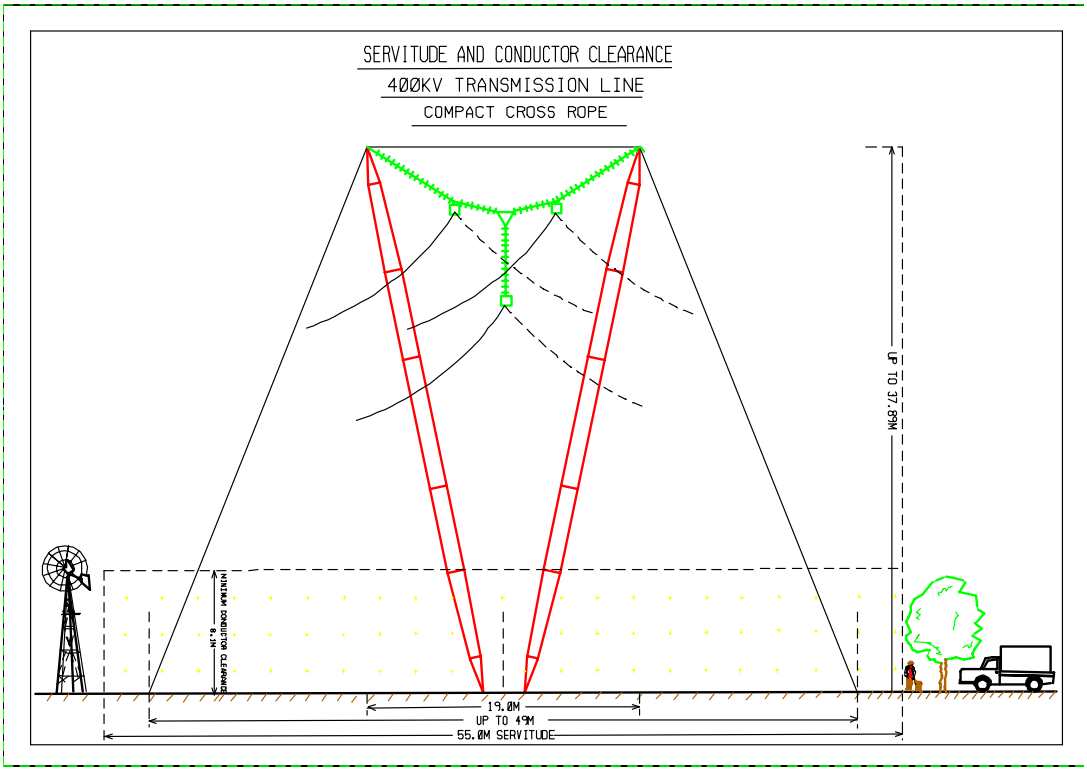


Figure 8 : Diagrammatic representation of the compact cross-rope suspension tower configuration

(b) Cross rope suspension tower

A larger version of the compact cross-rope tower, these structures are characterised by two steel vertical legs and a cross-rope forming the horizontal arm from which the conductors are suspended. Stay wires are used to securely anchor the structure (see Figure 9). This tower

configuration is approximately 38 m high and 21 m wide (excluding the stay wire anchors). The distance between the anchors at the base of the structure can be up to 80 m.

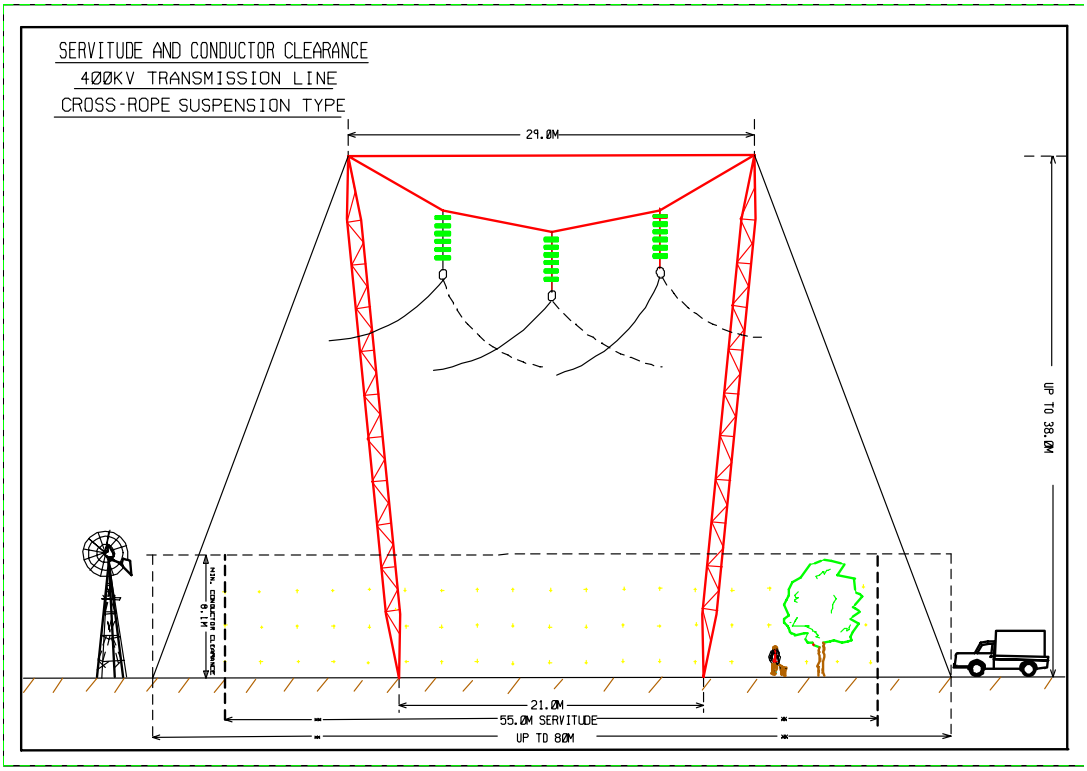


Figure 9 : Diagrammatic representation of the cross-rope suspension tower configuration

(c) Self supporting bend or strain towers

These suspension towers consist of a number of steel components that are joined together to form a steel-intensive structure. The tower is approximately 30 m high and 22,5 m wide (see Figure 10). These types of structures are typically used at bend points on a transmission line.

(d) Self supporting tower

The self-supporting towers consist of a number of steel components that are joined together to form a steel-intensive structure (see Figure 11). The tower is approximately 30 m high and 20 m wide at the apex. The base of the tower is approximately 8,8 m wide.

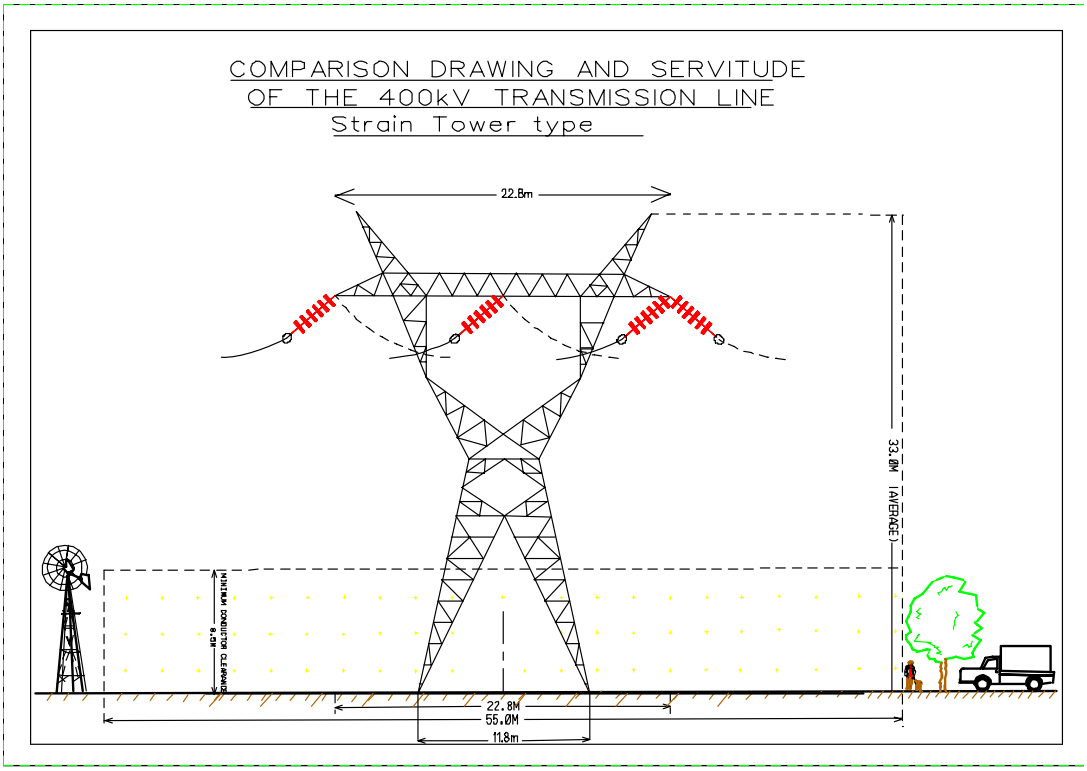


Figure 10 : Diagrammatic representation of the self supporting strain tower configuration

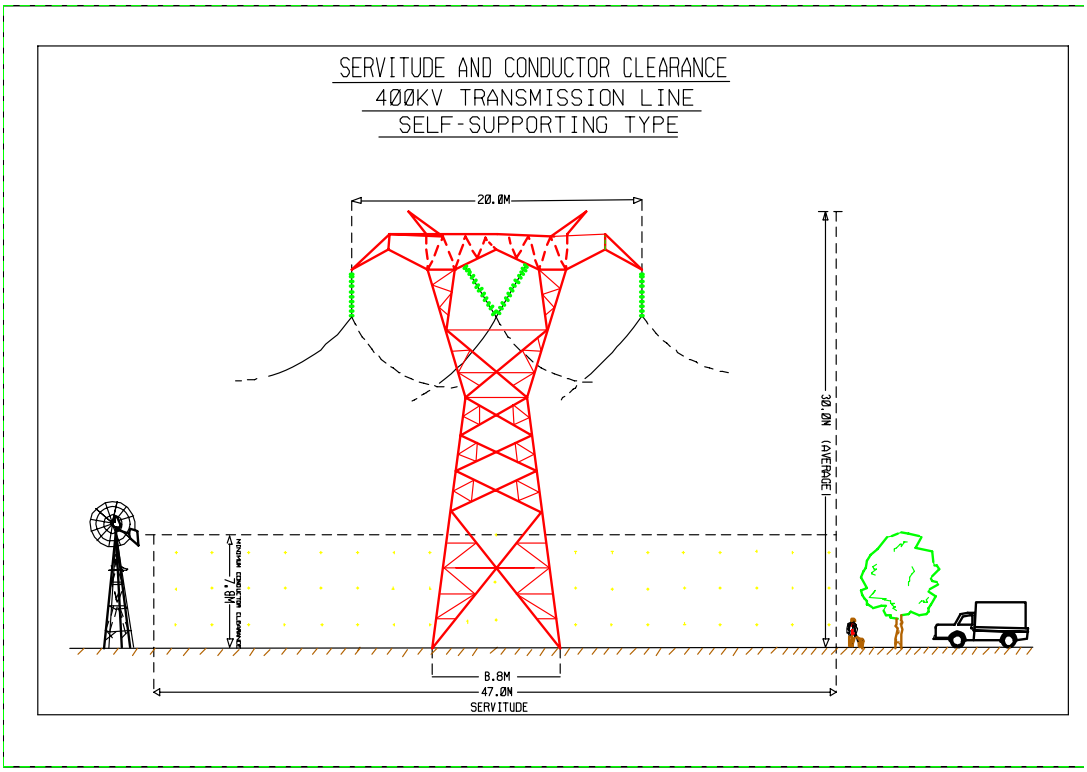


Figure 11 : Diagrammatic representation of the self supporting tower configuration

3.2.3 Access

(a) Road Access to OCGT Power Plant

It is proposed to provide road access to the OCGT power plant off the N2 National Road. There is an existing access road to the landfill site (west of PetroSA), from which point a new access road could be constructed.

From the landfill site to the OCGT power plant site, two alternative access routes have been identified. Both routes would run along the western boundary of PetroSA and would either continue along the alignment of the existing 132 kV overhead transmission lines or along the railway line (see Figure 7). The alternative routes would allow for the alignment of the proposed fuel supply pipeline with the road access route, thereby optimising on a single utility corridor.

An additional alternative access road route was identified by the proponent during the Scoping Phase. This alternative route takes access from the N2 approximately 2,5 km west of PetroSA's western-most security access road (to the landfill site) and runs in a north-easterly direction along the western boundary of the PetroSA property (refer to Figure 7). The route would be approximately 2 km long and would allow for dedicated access to the OCGT power plant without having to intrude on PetroSA's property. A new intersection on the N2 would be required.

(b) Road access to proposed transmission line routes

Temporary access tracks will also be required to reach the various transmission line towers in order to construct the overhead transmission lines. The access tracks would also be used for maintenance purposes during the operational phase of the transmission lines.

3.2.4 Water supply

Since water for wet NO_x abatement is no longer necessary, as described in Section 5.6.3 below, the proposed power plant would only require potable water for blade washing, domestic use and fire protection. The approximate volume required per month for these purposes would amount to 30 kl. This equates to roughly the monthly usage of a middle-income household and would be supplied by the Mossel Bay Municipality.

Effluent from blade washing would need to be disposed of appropriately. See Section 5.5 below.

3.2.5 Storage tank farm

The proposed development includes the installation of a number of storage tanks within the boundary of the OCGT power plant site. The number and volume of the tanks initially envisaged were dependent on the type of NO_x abatement measures implemented. Given that dry NO_x abatement measures have been decided upon, the only tanks required would be:

- Liquid distillate fuel (kerosene-based or diesel);
- Raw water; and
- Waste water.

3.3 POTENTIAL IMPACTS IDENTIFIED

This section outlines the potential environmental impacts identified during the Scoping phase. In particular, it distinguishes between operational phase impacts and construction phase impacts. Please refer to the preceding Scoping Report of June 2005 for a detailed account of scoped issues.

3.3.1 Operational phase impacts on the biophysical environment

The following potential operational phase impacts on the biophysical environment were identified for further investigation during the EIR phase and are assessed in Chapter 4 of this report:

- Impact on flora;
- Impact on avifauna;
- Impact on air quality;
- Potential risks from fuel pipeline;
- Impact on water availability;
- Effluent management issues; and
- Impact on geology and drainage.

3.3.2 Operational phase impacts on the socio-economic environment

The following potential operational phase impacts on the socio-economic environment were identified for further investigation during the EIR phase and are assessed in Chapter 4 of this report:

- Visual impact;
- Impact on heritage resources;
- Impact on traffic flow;
- Impact on ambient noise quality;
- Potential risks from fuel pipeline:
- Impact on the existing infrastructure;
- Implications of the constraints imposed on the project by existing activities; and
- Impact on socio-economic conditions.

3.3.3 Construction phase impacts on the biophysical and socio economic environments

A number of negative impacts on the biophysical and socio-economic environment are likely to arise as a result of the construction phase. The potential impacts on the biophysical and socio-economic environment during the construction phase could include the following:

- Impact on flora;
- Impact on fauna;
- Erosion and land degradation;
- Noise disturbances adjacent landowners;
- Waste and litter pollution;
- Water pollution and conservation;
- Dust management;
- Traffic and access disturbances; and
- Safety risks.

As was indicated in the Scoping Report, it is the intention to compile a comprehensive Environmental Management Plan (EMP), to regulate and minimise the impacts of the construction activities. This EMP would be implemented in entirety for the OCGT power plant construction phase. The transmission line construction will be addressed by means of an existing proceduralised approach that Eskom will apply. Section 6.1.3 addresses the framework EMP that has been compiled as a precursor to the specified EMP.

4 THE PUBLIC PARTICIPATION PROCESS

4.1 INTRODUCTION

Public participation is an essential component of the EIA process. The process of public involvement encourages interested and affected parties (I&APs) to contribute their comments and concerns during the planning and design phases of the proposed development. A summary of the public participation undertaken thus far is presented below, as well as an indication of what will be undertaken during the EIR phase.

4.2 SUMMARY OF PUBLIC PARTICIPATION DURING THE SCOPING PHASE

The approach to the public participation undertaken during the Scoping phase was detailed in the Plan of Study for Scoping which was approved by DEA&DP on 24 May 2005. The key components of the public participation undertaken to date are summarised below:

- Placing media notices in the Sunday Times and Rapport on 17 April 2005, the Cape Times and Die Burger on 15 April 2005 as well as in the local community newspaper, the Mossel Bay Advertiser, on 15 April 2005. The media notices informed the public about the proposed project, invited the public to register and comment, indicated the availability of a Background Information Document (BID) and included an invitation to the public forums held at Mossel Bay Public Library. The media notice was published in English and Afrikaans.
- Disseminating the BID to key I&APs via fax and mail as well as at the public forums. The BID was also placed on the Eskom website (www.eskom.co.za/eia) and was made available in English and Afrikaans.
- Meeting with stakeholders such as the affected adjacent property owners and local authorities on 24 February 2005.
- Holding an initial pubic forum, which comprised a Stakeholder Meeting, an Open House and a Public Meeting on 3 May 2005. Information relating to the project proposal in terms of description, motivation and proposed environmental process to be followed was displayed and presented at each of the public engagement opportunities and allowed I&APs to raise any comments or concerns they might have. The comments and concerns received were reflected in an Issues Trail contained in the draft and final Scoping Report.
- Lodging the draft Scoping Report for public review and comment at the Mossel Bay and D'Almeida Public Libraries on 6 June 2005. In addition, the report was placed on Eskom's website. All registered I&APs were informed of the availability of the report by means of a letter and a copy of the Executive Summary which was posted on 3 June 2005. The availability of the draft Scoping Report was also published in the Mossel Bay Advertiser on 3 June 2005 in English and Afrikaans. A 21-day commenting period was allowed, which terminated on 23 June 2005.
- Holding a second pubic forum, which comprised of formal presentations and an Open House at the Mossel Bay Library in Mossel Bay on 13 June 2005. The findings of the

draft Scoping Report were presented at each of the stakeholder engagement opportunities and an opportunity to raise concerns and comments was provided.

- Presenting the findings of the draft Scoping Report at a meeting of the Voëlvlei Landbouvereniging on 23 June 2005.
- Incorporating all the comments received during the commenting period for the draft Scoping Report into the final Scoping Report.
- Lodging the final Scoping Report for public review at the Mossel Bay and D'Almeida Public Libraries. In addition, the report was placed on Eskom's website. All registered I&APs were informed of the availability of the report by means of a letter dated 15 July 2005. The letter included details regarding the revised project scope which related to the size of the proposed OCGT site and the inclusion of an additional road access route alternative. See Annexure M.

4.3 PUBLIC PARTICIPATION DURING THE EIR PHASE

The public participation process undertaken during the EIR phase was as follows:

- The draft EIR was lodged at the Mossel Bay and D'Almeida Public Libraries and the Eskom website on 7 September 2005. The commenting period ended on 28 September 2005, but a late submission on 5 October 2005 was accepted and incorporated into the Issues Trail compiled for the EIR phase.
- Registered I&APs were notified of the availability of the draft EIR by means of a letter which included a copy of the draft EIR Summary. See Annexure N.
- Media notices were placed in the Mossel Bay Advertiser on 2 September 2005 in order to notify I&APs of the availability of the draft EIR and to invite them to the third public forum. See Annexure O.
- The third pubic forum, which comprised a formal presentation and an Open House at the Mossel Bay Public Library, was held in Mossel Bay on 15 September 2005. The findings of the draft EIR were presented and an opportunity provided for I&APs to raise concerns and comments.

The comments received during the commenting period for the draft EIR, as well as the Issues Trail compiled in response to comments, are presented in Annexure S of this finalised EIR.

4.4 DECISION AND APPEAL PERIOD

This finalised EIR has been submitted to DEA&DP for their review and decision.

Once they have considered the document and are satisfied that it provides sufficient information to make an informed decision, DEA&DP will determine the environmental acceptability of the preferred options. Thereafter, DEA&DP will issue an RoD and any conditions of approval attached to the authorisation, should the proposed activity be approved.

Following the issuing of the RoD, DEA&DP's decision will be communicated by means of letters to all identified I&APs. A 30-day appeal period follows, during which I&APs will have an

opportunity to appeal against the decision to the Minister of Environmental Affairs and Development Planning in terms of the Environment Conservation Act.

5 DESCRIPTION OF POTENTIAL IMPACTS AND POSSIBLE MITIGATION MEASURES

5.1 INTRODUCTION

This chapter provides a detailed description of the potential impacts which may occur as a result of the implementation of the proposed project described in Chapter 2. These impacts have been subject to a detailed assessment and include potential biophysical and social impacts which may arise during the operational phase of the proposed activities (long-term), as well as potential construction-related impacts (short-term).

5.2 ASSESSMENT METHODOLOGY

For each of the potential impacts, the EXTENT (spatial scale), MAGNITUDE (severity) and DURATION (time scale) were assessed. These criteria were used to ascertain the significance of the impact, firstly in the case of no mitigation and then with mitigation measures in place. The tables below show the rating scale used to assess these variables, and defines each of the rating categories.

Table 5.1 : Assessment criteria for the evaluation of impacts

CRITERIA	CATEGORY	DESCRIPTION
Extent or spatial influence of impact	**Large**	Beyond 5 km of the proposed activity (regional).
	Medium	Within 5 km of the proposed activity (local).
	Small	On Site or within 1 km of the proposed activity.
Magnitude of impact (at the indicated spatial scale)	**High**	Natural and/ or social functions and/ or processes are *severely* altered
	Medium	Natural and/ or social functions and/ or processes are *notably* altered
	Low	Natural and/ or social functions and/ or processes are *slightly* altered
	Very Low	Natural and/ or social functions and/ or processes are *negligibly* altered
	Zero	Natural and/ or social functions and/ or processes remain unaltered
Duration of impact	**Short Term**	During Construction
	Medium Term	During Operation (1 year)
	Long Term	Following Closure/ decommissioning

The SIGNIFICANCE of an impact is derived by taking into account the temporal and spatial scales and magnitude. The means of combining these factors to arrive at the different significance ratings is explained in Table 5.2.

Table 5.2 : Definition of significance ratings

SIGNIFICANCE RATINGS	LEVEL OF CRITERIA REQUIRED
High	▪ High magnitude with large extent and duration ▪ High magnitude with either large extent and medium duration or medium extent and long duration ▪ Medium magnitude with large extent and long duration
Medium	▪ High magnitude with both a medium extent and duration ▪ High magnitude with either medium extent and short duration or small extent and medium duration ▪ High magnitude with large extent and short duration or small extent and long duration ▪ Medium magnitude with any combination of extent and duration except small and short and large and long. ▪ Low magnitude with large extent and long term duration
Low	▪ High magnitude with small extent and short duration ▪ Medium magnitude with small extent and short duration ▪ Low magnitude with any combination of extent and duration except small and short and large and long. ▪ Very low magnitude with large extent and long duration
Very low	▪ Low magnitude with small extent and short duration ▪ Very low magnitude with any combination of extent and duration except large and long
Neutral	▪ Zero magnitude with any combination of extent and duration

Once the significance of an impact has been determined, the PROBABILITY of this impact occurring as well as the CONFIDENCE in the assessment of the impact, are estimated using the rating systems outlined in Tables 5.3 and 5.4 respectively. It is important to note that the significance of an impact should always be considered in concert with the probability of that impact occurring. Lastly, the REVERSIBILITY of the impact is estimated using the rating system outline in Table 5.5.

Table 5.3 : Definition of probability ratings

PROBABILITY RATINGS	CRITERIA
Definite	Estimated greater than 95 % chance of the impact occurring.
Probable	Estimated 20 to 95 % chance of the impact occurring.
Possible	Estimated 5 to 20 % chance of the impact occurring.
Unlikely	Estimated less than 5 % chance of the impact occurring.

Table 5.4 : Definition of confidence ratings

CONFIDENCE RATINGS	CRITERIA
Certain	Wealth of information on, and sound understanding of, the environmental factors potentially influencing the impact.
Sure	Reasonable amount of useful information on, and relatively sound understanding of, the environmental factors potentially influencing the impact.
Unsure	Limited useful information on, and understanding of, the environmental factors potentially influencing this impact.

Table 5.5 : Definition of reversibility ratings

REVERSIBILITY RATINGS	CRITERIA
Irreversible	The activity will lead to an impact that is permanent.
Partially reversible	The impact is reversible to a degree e.g. acceptable revegetation measures can be implemented but the pre-impact species composition and/or diversity may never be attained. Impacts may be partially reversible within a short (during construction), medium (during operation) or long term (following decommissioning) timeframe.
Fully reversible	The impact is fully reversible, within a short, medium or long term timeframe.

The following abbreviations are used:

Mit = Mitigation	No Mit = Without mitigation	S = short	(+) = Positive	V = Very
Sig = Significance	Partial = Partially reversible	L = long	(-) = Negative	Med = Medium

A summary of the significance of the potential impacts is presented in the final chapter, Table 6.1 in Chapter 6.

5.3 SUBJECTIVITY IN ASSIGNING SIGNIFICANCE

Despite attempts at providing a completely objective and impartial assessment of the environmental implications of development activities, EIA processes can never escape the subjectivity inherent in attempting to define significance. The determination of the significance of an impact depends on both the context (spatial scale and temporal duration) and intensity or magnitude of that impact. Since the rationalisation of context and intensity will ultimately be prejudiced by the observer, there can be no wholly objective measure by which to judge significance.

This notwithstanding, it is an inescapable reality that to facilitate informed decision-making, EIAs must endeavour to come to terms with the significance of the potential environmental impacts associated with particular development activities. Recognising this, we have attempted to address potential subjectivity in the current process as follows:

- Being explicit about the difficulty of being completely objective in the determination of significance, as outlined above;
- Developing an explicit methodology for assigning significance to impacts and outlining this methodology in detail in the Plan of Study and in this EIR. Having an explicit methodology not only forces the assessor to come to terms with the various facets contributing towards the determination of significance, thereby avoiding arbitrary assignment, but also provides the reader of the EIR with a clear summary of how the assessor derived the assigned significance;
- Wherever possible, differentiating between the likely significance of potential environmental impacts as experienced by the various affected parties; and

- Utilising a team approach to the assessment and internal review to facilitate a rigorous and defendable system.

Although these measures may not totally eliminate subjectivity, they provide an explicit context within which to review the assessment of impacts.

5.4 CONSIDERATION OF CUMULATIVE IMPACTS

Section 24(7) of the National Environmental Management Act requires the consideration of cumulative impacts as part of any environmental assessment process. EIAs have traditionally, however, failed to come to terms with such impacts, largely as a result of the following considerations:

- Cumulative effects may be local, regional or global in scale and dealing with such impacts requires co-ordinated institutional arrangements; and
- EIAs are typically carried out on specific developments, whereas cumulative impacts may result from broader biophysical, social and economic considerations, which typically cannot be addressed at the project level.

When assessment and evaluation occurs, cumulative effects are considered as far as possible.

5.5 SCREENED IMPACTS

The following impacts are anticipated to be of sufficiently low significance to be excluded from detailed assessment:

- Geology and drainage

Due to the fact that the proposed OCGT power plant would introduce hardened surfaces into the landscape, runoff would need to be properly managed. Provided that suitable design to manage runoff is implemented, this impact is likely to be negligible given the flat gradient, soil characteristics and nature of the local rainfall patterns

- Risk relating to fuel pipeline

Although transporting flammable liquids by means of pipelines is a generally safe method, loss of containment does occur. There are risks in such occurrences to both the biophysical environment as well as to humans. The former results from the pollution and contamination of natural resources such as soil and water, which lead to damage to plant and animal life. The latter results from injury to humans and damage to equipment, particularly when ignition and explosion occur.

The chances of containment loss from the proposed pipeline are influenced by design standards, by materials employed in the pipeline construction and by the physical environment,

as well as operational and maintenance issues. Town planning principles would not allow such a pipeline in high density residential areas or in the proximity of hospitals, schools, old-age homes etc. Given that the proposed pipeline would be located in a non-populated[9] area within a noxious industrial zone, and that stringent standards would have to be applied as a matter of course, the potential risks are regarded as negligible. Provided that prescribed standards are applied and acknowledging the presence of other infrastructure in the area, either pipeline route alternative would be acceptable from a risk perspective. See Annexure H.

To ensure compliance with the Major Hazard Installation Regulations, Eskom has commissioned a separate risk assessment of the Mossel Bay OCGT power plant. Although not yet completed, the results will be obtainable from Eskom. Please note that this study is in terms of Eskom's health and safety obligations and does not specifically inform this EIR.

- Impact of effluent on the receiving environment

If water were to be used to abate noxious gasses in the operation of the OCGT power plant, de-mineralised water would be required for this purpose. In order to de-mineralise water, the process would result in approximately 15% of the water required to be wasted as brine. This brine is considered as an effluent and would need to be treated in an appropriate manner. However, based on the results of the air quality study (Annexure G), wet NO_x abatement measures would not be required to stay within prescribed standards.

The effluent associated with blade washing (see Section 3), would also need to be disposed of appropriately. If effluent is not disposed of appropriately, water and soil contamination could occur. In terms of a pending services contract[10] between Eskom and PetroSA, the adjacent PetroSA waste handling site will be used for all the effluent discussed above, as there is available capacity. Provided that the limits set by PetroSA's license from DWAF for the operation of their effluent management system are not exceeded, this impact may be considered to be negligible.

5.6 IMPACTS OF THE PROPOSED DEVELOPMENT ON THE BIOPHYSICAL ENVIRONMENT

The following impacts are addressed in this section and the assessment is summarised in Table 6.1:

- Impact on flora;
- Impact on avifauna;
- Impact on air quality;
- Potential risks from fuel pipeline;
- Impact on water availability;
- Effluent management issues; and

[9] i.e. low-density occupation during working hours.
[10] R Beckmann, pers. comm..

- Impact on geology and drainage.

5.6.1 Impact on flora

(a) OCGT power plant and transmission substation

Potential impacts

While it is known that the site will be located in the northwestern corner of the PetroSA landholding, the exact boundary is not known. This part of PetroSA's property does contain two areas identified as sensitive in the specialist botanical study (see Figure 3). Should the site extend into the identified sensitive areas (see Section 2), the impact would be the loss of remnant Renosterveld lying south of the railway line and northwest of the proposed site. This Renosterveld type has a moderate local and regional conservation value. The sensitive area which lies northeast of the proposed site and is approximately 1 ha in extent could also be lost or negatively impacted on. This area contains remnant Mossel Bay Shale Renosterveld which is considered as an endangered vegetation type and supports a Red Data listed species, *Bobartia robusta,* which is considered as "rare".

Due to the extent of the site, adequate space is available to position the plant and substation in a manner that allows for minimal impact on the natural vegetation.

The remainder of the area is actively used for grazing and is currently leased to a farmer for this purpose. The impact of this aspect would be the loss of grazing land and this is evaluated in Section 5.7.8.

Discussion

The impact of the OCGT power plant and the transmission substation on the identified botanically sensitive areas from a biodiversity perspective is considered to be **high**[11] in significance. However, should the entire extent of the site[12] be located outside of the identified botanically sensitive areas, the significance of the impact is considered as **low**.

Recommendations for mitigation

- When the site is fixed, ensure that the two identified sensitive areas are excluded.
- The OCGT power plant and transmission substation should be positioned in old agricultural land, with at least a 100m buffer of no development.
- Ensure that no Category 1 invasive alien plant species as per the Conservation of Agricultural Resources Act (No 43 of 1983) regulations are used for landscaping.
- All areas of natural vegetation within the area controlled by Eskom should be cleared of alien invasive plant species according to best environmental practice.

[11] Note that the discussion presented for each impact in the text refers to the pre-mitigation status.

[12] "Site" refers to the 28 ha area set aside for the OCGT power plant and the transmission substation and does not only imply the footprint of the structures, which is limited to approximately 14 ha.

(b) Transmission Lines

Potential impacts

Transmission lines consist of electricity conductor cables being supported by tower structures. Each tower structure would have a concrete footprint ranging from 240 m^2 to 260 m^2. These structures could occupy areas supporting natural vegetation. The impact of the footprints in these areas would be the loss of natural vegetation, contributing to the possible decrease in biodiversity of the area. An access track for the maintenance and construction of the transmission lines is required and could also result in the loss of natural vegetation.

While three alternative transmission line corridors have been identified, Alternative 1 and 3 consists of 60% agricultural land and approximately 40% of natural vegetation, whilst Alternative 2 consists of 20% less natural vegetation. See Section 2 for the detailed description of this natural vegetation. All areas of natural vegetation have a high local and regional conservation value.

Discussion

The potential impact on the alternatives would be directly related to the number and location of tower structures used and the length of the maintenance road below the transmission lines. The length of the alternative routes are therefore of importance in this evaluation.

Alternative 1 is approximately 12 km long and cuts across an area which consists of 40% of natural vegetation, equating to 4,8 km. Here the botanical impact is considered as **high** in significance. Alternative 2 is 10 km long and cuts across an area which consists of 20% of natural vegetation, equating to 2 km, and the botanical impact is considered as **medium to high** in significance. Alternative 3 is 14 km long and crosses 40% of natural vegetation, equating to 5,6 km. The botanical impact is considered as **high** in significance.

Recommendations for mitigation

- From a botanical perspective, Alternative 2 is the preferred option as it is shorter and impacts on less natural vegetation.
- Where tower positions within the natural environment cannot be avoided, they must be carefully placed in order to avoid wetlands and rocky outcrops.
- All tower positions should be assessed by a suitably qualified botanist once they have been identified and their final positioning revised if necessary. If repositioning is technically not possible, search and rescue of valuable plants should be undertaken.

(b) Access Road

Potential impacts

Of the three alternative road routes identified, Alternatives 1 and 2 traverse heavily disturbed ground which is considered as very low in botanical significance (see Figure 3). They are, however, in proximity to the sensitive area northwest of the proposed site (see Figure 3). This could result in damage or loss of Renosterveld which is considered as high in conservation value. This impact would occur largely as a result of construction activities and will be assessed in Section 5.7.

Alternative 3 cuts across an area that is mostly ploughed, but it should be noted that scattered Renosterveld Thicket exists within 5 m of the fenceline abutting the western boundary of PetroSA. This alternative will also traverse a section of heavily grazed natural Renosterveld considered as moderate in conservation value. It does include the rare Red Data species *Bobartia robusta.*

Discussion

Should Alternatives 1 and 2 be selected, the impact on natural vegetation is considered as **low** in significance. The impact on natural vegetation should Alternative 3 be selected is considered as **medium** in significance.

Recommendations for mitigation

- For Alternatives 1 and 2, ensure that a 50 m no-development buffer is implemented between the northern road edge and the sensitive area.
- Re-align Alternative 3 in order to ensure that the road reserve lies 50 m south and east of the boundary fence so as to avoid impacting on the patches of remnant Renosterveld vegetation. While it will still cut across a narrow strip of natural vegetation rated as moderate in significance, the impact is considered as low in significance.

(c) Pipeline

Potential impacts

Because the pipeline route alternatives follow the alignment of the access road Alternatives 1 and 2, the same impacts as described in Section 5.5.1b would apply.

Discussion

Because the pipeline route alternatives follow the alignment of the access road Alternatives 1 and 2, the same level of impact would apply. See above section.

Recommendation for mitigation

- For Alternatives 1 and 2, ensure that a 50 m no-development buffer is implemented between the northern road edge and the sensitive area.

Table 5.6 : Impact table summarising the significance, both with and without mitigation, of the impact on sensitive botanical areas

	OCGT Plant and Substation site		Transmission lines						Road access route					
			Alternative 1		Alternative 2		Alternative 3		Alternative 1		Alternative 2		Alternative 3	
	Without mtg	With mtg	Without mtg	With mtg	Without mtg	With mtg	Without mtg	With mtg	Without mtg	With mtg	Without mtg	With mtg	Without mtg	With mtg
Extent	Large	Small	Large	Medium	Large	Small	Large	Medium	Large	Small	Large	Small	Large	Small
Magnitude	Medium	Very Low	High	Low	Medium to low	Very Low	High	Low	Low	Very Low	Low	Very Low	High	Very Low
Duration	Long term	Short term	Long term	Long term	Long tern	Long tern	Long tern	Long tern	Long Term	Long Term	Long Term	Long Term	Long tern	Long tern
Significance	**High**	**Very Low**	**High**	**Medium**	**High to medium**	**Low**	**High**	**Medium**	**Low**	**Very Low**	**Low**	**Very Low**	**High**	**Very Low**
Probability	Definite	Possible	Probable	Possible	Possible	Possible	Probable	Possible	Possible	Unlikely	Possible	Unlikely	Possible	Unlikely
Confidence	Sure	Sure	Sure	Sure	Sure	Sure	Sure	Sure	Sure	Sure	Sure	Sure	Sure	Sure
Reversibility	Irreversible	Partially reversible	Partially reversible	Partially reversible	Partially reversible	Partially reversible	Partially reversible	Partially reversible	Partially reversible	Fully reversible	Partially reversible	Fully reversible	Partially reversible	Fully reversible

	Fuel supply pipeline			
	Alternative 1		**Alternative 2**	
	Without mtg	With mtg	Without mtg	With mtg
Extent	Large	Small	Large	Small
Magnitude	Low	Very Low	Low	Very Low
Duration	Long Term	Long Term	Long Term	Long Term
Significance	**Low**	**Very Low**	**Low**	**Very Low**
Probability	Possible	Unlikely	Possible	Unlikely
Confidence	Sure	Sure	Sure	Sure
Reversibility	N/A	N/A	N/A	N/A

Key:
Alt = Alternatives
Mtg = Mitigation

5.6.2 Impact on avifauna

For the study area as a whole, eight bird species are recognised as having high conservation value. These are the Cape cormorant (near threatened), the secretary bird (near threatened), the Cape vulture (vulnerable), the African marsh harrier (vulnerable), the black harrier (near threatened), the blue crane (vulnerable), the Stanley's bustard (vulnerable) and the white stork (protected under the Bonn Convention on Migratory Species). However, due to the nature of the proposed project as well as the behaviour patterns of the above identified bird species, only the blue crane, secretary bird, Stanley's bustard and white stork may be impacted upon by the transmission lines.

Small birds such as pigeons and starlings could perch or roost on the structures in the substation. They could also roost or perch around the generator transformers, storage tanks, workshops and administrative buildings. These birds are considered more of an impact on the proposed development and not necessarily an impact on biodiversity and conservation. Where possible, the necessary mitigation measures can be implemented to reduce the problems with such birds. The impacts that will be evaluated further only relate to the bird species considered as vulnerable or near threatened. According to the avifauna study, the presence of transmission lines would have the greatest possible impact on the identified bird species and therefore only these impacts will be assessed and evaluated further.

(a) Transmission lines

Potential impacts

As the transmission lines traverse cultivated land - that constitute feeding and nesting areas for the blue cranes, secretary bird, Stanley's bustard and white stork - the potential impact relates to the possibility of collisions with the transmission line conductors and earth wires[13]. However, the large size of the structures envisaged for the transmission lines in question makes them more visible and the likelihood of this occurring is lower than with the smaller transmission and distribution lines in the area.

Discussion

Should the above impact occur, the significance with regard to Alternatives 1 and 3 is considered as **high.** As the length and visibility of the transmission line route will play a role, Alternative 2 is the shortest, has fewer dams along its length and would run adjacent to two existing high voltage transmission lines (allowing the corridor to be more visible), the possible impact would be **medium to high** in significance.

Recommendations for mitigation

- To avoid the impacts on insulators that may result from bird streaming, cross rope suspension towers should be used. However, at the bends, where strain towers are used, bird guards should be installed to avoid this problem.

[13] Note that the smaller earth wires pose the major risk of collision by avifauna.

- Alternative 2 should be considered as the preferred route due to it being the shortest route, having fewer dams in its proximity and because of its proposed location within an existing utility corridor.
- Bird flight diverters should be installed on the earth wires in the sections that cross cultivated lands.
- A management system should be implemented which should formulate measures to prevent small birds roosting on the OCGT and substation equipment.

Table 5.7 : Impact table summarising the significance, both with and without mitigation, of the impact on the blue crane, secretary bird, Stanley's bustard and white stork

	OCGT Plant and Substation site		Transmission lines						Road access route					
			Alternative 1		Alternative 2		Alternative 3		Alternative 1		Alternative 2		Alternative 3	
	Without mtg	With mtg	Without mtg	With mtg	Without mtg	With mtg	Without mtg	With mtg	Without mtg	With mtg	Without mtg	With mtg	Without mtg	With mtg
Extent	N/A	N/A	Large	Large	Large	Large	Large	Large	N/A	N/A	N/A	N/A	N/A	N/A
Magnitude	Zero	Zero	Medium	Low	Medium	Low	Medium	Low	Zero	Zero	Zero	Zero	Zero	Zero
Duration	N/A	N/A	Long term	Long term	Long term	Long term	Long term	Long term	N/A	N/A	N/A	N/A	N/A	N/A
Significance	**Neutral**	**Neutral**	**High**	**Medium**	**Medium to high**	**Medium**	**High**	**Medium**	**Neutral**	**Neutral**	**Neutral**	**Neutral**	**Neutral**	**Neutral**
Probability	N/A	N/A	Possible	Unlikely	Unlikely	Unlikely	Possible	Unlikely	N/A	N/A	N/A	N/A	N/A	N/A
Confidence	N/A	N/A	Sure	Sure	Sure	Sure	Sure	Sure	N/A	N/A	N/A	N/A	N/A	N/A
Reversibility	N/A	N/A	Irreversible	Irreversible	Irreversible	Irreversible	Irreversible	Irreversible	N/A	N/A	N/A	N/A	N/A	N/A

Fuel supply pipeline				
	Alternative 1		Alternative 2	
	Without mtg	With mtg	Without mtg	With mtg
Extent	N/Al	N/Al	N/Al	N/Al
Magnitude	Zero	Zero	Zero	Zero
Duration	N/A	N/A	N/A	N/A
Significance	**Neutral**	**Neutral**	**Neutral**	**Neutral**
Probability	N/A	N/A	N/A	N/A
Confidence	N/A	N/A	N/A	N/A
Reversibility	N/A	N/A	N/A	N/A

Key:
Alt = Alternatives
Mtg = Mitigation

5.6.3 Impact on air quality

Potential impacts

The proposed OCGT power plant produces and releases into the atmosphere a number of gaseous and particulate emissions, such as sulphur dioxide (SO_2), nitrogen oxides (NO_x), carbon monoxide (CO), nitrogen dioxide (NO_2) and inhalable particulates (PM10). In addition, heat is emitted from the OCGT power plant via the hot exhaust gasses.

The impact that the OCGT plant would have on the surrounding air quality was determined by undertaking air dispersion simulations using the following scenarios:

Scenario 1: Plant operating 2 hours per day with NO_x = 165 mg/Nm^3, CO = 31.25 mg/Nm^3, PM10 = 50 mg/Nm^3 and SO_2 = 10.4 g/s;
Scenario 2: Plant operating 2 hours per day with NO_x = 600 mg/Nm^3;
Scenario 3: Plant operating 6 hours per day with NO_x = 165 mg/Nm^3, CO = 31.25 mg/Nm^3, PM10 = 50 mg/Nm^3 and SO_2 = 10.4 g/s;
Scenario 4: Plant operating 6 hours per day with NO_x = 600 mg/Nm^3.

The assessment was undertaken using the assumptions that when the three turbines operate for two hours per day, it would be between 6 am - 7 am and 6 pm - 7 pm; and for six hours per day between 6 am - 9 am and 6 pm - 9 pm. An assumption was also made that all the NOx emitted would be converted to NO_2.

The assessment was undertaken by looking at the average highest daily and hourly as well as the annual average guidelines for each applicable emission. Refer to pages 4-2 and 4-3 of the air quality specialist report in Annexure G for the results of the dispersion simulation for each scenario.

With reference to SO_2, the simulated impacts did not exceed the European Community limits for hourly guideline (350µ/m^3) and the DEAT daily and annual guideline of 125µ/m^3 and 50µ/m^3 respectively. The predicted ground level concentrations for the highest daily and annual averaging period are less than 1% of the DEAT guidelines. The power station is the main contributor of SO_2 as there is little or no sulphur present in the PetroSA fuel gas. The predicted concentrations for the 6 hour scenario are 2.1 (daily) and 2.4 (annual) times higher than for the 2 hour scenario, while the predicted ground level concentration for the highest hourly stays similar for both scenarios.

In terms of the impact of PM10, the predicted results from simulations are very low when compared to the current DEAT guideline as well as the proposed SA limit and target values at both the power station and the cumulative scenario. The impacts did not exceed the South African National Standards (SANS) limits for highest daily (75 µg/m^3), and the annual (40 µg/m^3) averaging periods and were less than 1% of the respective guidelines. The Eskom power station contributes 5% to the predicted cumulative annual average ground level concentrations for operating 2 hours per day, and 13% for operating 6 hours per day. The predicted concentrations for the 6 hour scenario are 2.2 (daily) and 2.5 (annual) times higher than for the 2 hour scenario.

With reference to the impact of NO_2 at 165 mg/Nm^3, the hourly (200 µg/m^3), and annual (40 ug/m^3) SANS standards as well as the daily (150 µg/m^3) World Health Organisation (WHO) guidelines are not exceeded at either the power station or for the cumulative scenario. The highest hourly, daily and annual ground level concentrations for the cumulative scenario were 86%, 21% and 12% of the standards, respectively. The predicted ground level concentrations at the power station for the highest daily and annual averaging periods are less than 1% of the SANS limits, while the predicted concentration for the highest hourly averaging period was 10% of the limit of the WHO guidelines. The Eskom power station contributes 2% for the predicted cumulative annual average ground level concentrations (for the 6 hour scenario). The predicted concentrations for the 6 hour scenario are 2.2 (daily) and 2.3 (annual) times higher than for the 2 hour scenario, while the predicted ground level concentration for the highest hourly stays similar for both scenarios. It should however be noted that with reference to the impact of NO_2 at 600 mg/Nm^3, the hourly (200 µg/m^3), and annual (40 ug/m^3) SANS standards as well as the daily (150 µg/m^3) WHO guidelines are not exceeded at either the power station or for the cumulative scenario. The highest hourly, daily and annual ground level concentrations for the cumulative scenario were 86%, 21% and 12% of the standards, respectively. The predicted ground level concentrations at the power station for the annual averaging periods is less than 1% of the SANS limits, while the predicted concentration for the highest hourly averaging period was 37% of the limit of 200 µg/m³. The Eskom power station contributes 7% for the predicted cumulative annual average ground level concentrations (for the 6 hour scenario). The predicted concentrations for the 6 hour scenario are 2.2 (daily) and 2.3 (annual) times higher than for the 2 hour scenario, while the predicted ground level concentration for the highest hourly stays similar for both scenarios.

In terms of the impact of CO, the highest predicted hourly CO concentration is 3.8 µg/m^3 and 75 µg/m^3 at the power station and the cumulative scenario, respectively which is less than 1% of the SANS limit.

Discussion

The OCGT power plant emits between 1-2% of PM10, SO_2 and CO and approximately 20% of NO_2 at 165mg/Nm^3 and 73 % of NO_2 at 600 mg/Nm^3 for the applicable guidelines. The emissions are therefore well below the applicable South African guidelines. The impact of the OCGT power plants emissions on air quality is therefore considered as **low** in significance.

Recommendations for mitigation

It is recommended that once the power station is operational the emissions concentrations for NO_2 be verified.

Table 5.8 : Impact table summarising the significance, both with and without mitigation, of the impact of the OCGT power plant on the surrounding air quality

	OCGT Plant and Substation site		Transmission lines						Road access route					
			Alternative 1		Alternative 2		Alternative 3		Alternative 1		Alternative 2		Alternative 3	
	Without mtg	With mtg	Without mtg	With mtg	Without mtg	With mtg	Without mtg	With mtg	Without mtg	With mtg	Without mtg	With mtg	Without mtg	With mtg
Extent	Small	Small	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Magnitude	Low	Low	Zero	Zero	Zero	Zero	Zero	Zero	Zero	Zero	Zero	Zero	Zero	Zero
Duration	Long term	Short term	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Significance	**Low**	**Low**	**Neutral**	**Neutral**	**Neutral**	**Neutral**	**Neutral**	**Neutral**	**Neutral**	**Neutral**	**Neutral**	**Neutral**	**Neutral**	**Neutral**
Probability	Definite	Definite	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Confidence	Sure	Sure	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Reversibility	Irreversible	Irreversible	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Fuel supply pipeline				
	Alternative 1		**Alternative 2**	
	Without mtg	With mtg	Without mtg	With mtg
Extent	N/A	N/A	N/A	N/A
Magnitude	Zero	Zero	Zero	Zero
Duration	N/A	N/A	N/A	N/A
Significance	**Neutral**	**Neutral**	**Neutral**	**Neutral**
Probability	N/A	N/A	N/A	N/A
Confidence	N/A	N/A	N/A	N/A
Reversibility	N/A	N/A	N/A	N/A

Key:
Alt = Alternatives
Mtg = Mitigation

5.6.4 Impact on water availability

Potential impacts

The OCGT power plant would require approximately 87 000 litres of water per year should wet NO_x abatement measures (as discussed in Section 3.1.1 (b)) be implemented in order to reduce the level of NO_x being emitted from the plant. This would have an impact on the available water resources. The existing water source within the area - that supplies PetroSA - is the Wolwedans Dam which is located on the Great Brak River. According to the Department of Water Affairs and Forestry (DWAF), the existing water resources in the Wolwedans Dam would not be sufficient to meet the requirements for wet NO_x abatement. See Annexure P for confirmation of this situation. Sourcing water from the Wolwedans Dam for abatement measures is therefore not possible. However, the results of the air quality study indicate that air emission levels within prescribed standards can be achieved without resorting to wet NO_x abatement.

Approximately 30 kl of potable water per month would also be required for turbine blade washing, fire prevention measures and domestic use. However, this volume is minimal and will be provided by Mossel Bay Municipality.

Discussion

The amount of water required is comparable to a middle-income household's monthly usage and consequently, the impact on water availability is considered to be of **low** significance.

Recommendations for mitigation

- Consider water minimisation, reuse and conservation measures where appropriate.

Table 5.9 : Impact table summarising the significance, both with and without mitigation, of the impact on water availability

	OCGT Plant and Substation site		Transmission lines						Road access route					
			Alternative 1		Alternative 2		Alternative 3		Alternative 1		Alternative 2		Alternative 3	
	Without mtg	With mtg	Without mtg	With mtg	Without mtg	With mtg	Without mtg	With mtg	Without mtg	With mtg	Without mtg	With mtg	Without mtg	With mtg
Extent	Small	Small	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Magnitude	Low	Very Low	Zero	Zero	Zero	Zero	Zero	Zero	Zero	Zero	Zero	Zero	Zero	Zero
Duration	Long term	Long term	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Significance	**Low**	**Very Low**	**Neutral**	**Neutral**	**Neutral**	**Neutral**	**Neutral**	**Neutral**	**Neutral**	**Neutral**	**Neutral**	**Neutral**	**Neutral**	**Neutral**
Probability	Definite	Possible	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Confidence	Certain	Certain	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Reversibility	Fully reversible	Fully reversible	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Fuel supply pipeline				
	Alternative 1		Alternative 2	
	Without mtg	With mtg	Without mtg	With mtg
Extent	N/A	N/A	N/A	N/A
Magnitude	Zero	Zero	Zero	Zero
Duration	N/A	N/A	N/A	N/A
Significance	**Neutral**	**Neutral**	**Neutral**	**Neutral**
Probability	N/A	N/A	N/A	N/A
Confidence	N/A	N/A	N/A	N/A

Key:
Alt = Alternatives
Mtg = Mitigation

5.7 IMPACT OF THE PROPOSED DEVELOPMENT ON THE SOCIAL ENVIRONMENT

The following impacts are addressed in this section and the assessment is summarised in Table 6.1:

- Impact on heritage resources;
- Visual impact;
- Impact on traffic flow;
- Impact on ambient noise quality;
- Impact on the existing infrastructure;
- Implications of the constraints imposed on the project by existing activities; and
- Impact on socio-economic conditions.

5.7.1 Impact on heritage resources

Potential impacts

With reference to the heritage impact study, the area likely to be affected by the OCGT power plant and transmission substation do not have any surface evidence of significant archaeological material. The pipeline and access road alternatives cut across land that has been heavily disturbed by earthworks in the past. No significant impacts are therefore envisaged.

There are possible heritage impacts that are associated with the transmission line alternative routes. Alternative 1 could impact on the scenic quality associated with the R327 road and impact on the sense of place and sense of remoteness to users of the road. However, these possible impacts will be addressed in the visual assessment section. None of the transmission line alternatives physically impact on historic buildings. The Patrysfontein Farm which might have historic qualities will not be physically impacted upon.

It must be noted that the general sense of place of the study area is seen as a mix of heavy industrial (the presence of PetroSA and its associated infrastructure) and agricultural activity, with other transmission lines already in existence in the study area. The addition of this project into this landscape is not considered as inserting a completely new set of activities to the study area. With reference to transmission line Alternative 3, the removal of any part of the tree line adjacent to the railway line could potentially impact on the cultural landscape.

The type of archaeological material that could be found in this area would be similar for all the alternative routes identified and the actual material can only be verified when excavations occur during the construction phase.

Discussion

With reference to the possible impact on heritage resources in the area, the significance of the impact is considered as **low.**

Recommendation for mitigation

- A suitable qualified archaeologist should be appointed to inspect the excavated areas at the OCGT plant and substation site as well as at the transmission tower locations.

Table 5.10 : Impact table summarising the significance, both with and without mitigation, of the impact on the possible loss of heritage resources

	OCGT Plant and Substation site		Transmission lines						Road access route					
			Alternative 1		Alternative 2		Alternative 3		Alternative 1		Alternative 2		Alternative 3	
	Without mtg	With mtg	Without mtg	With mtg	Without mtg	With mtg	Without mtg	With mtg	Without mtg	With mtg	Without mtg	With mtg	Without mtg	With mtg
Extent	Small	Small	Small	Small	Small	Small	Small	Small	Small	Small	Small	Small	Small	Small
Magnitude	Low	Very low	Low	Very low	Low	Very low	Low	Very low	Low	Very low	Low	Very low	Low	Very low
Duration	Long term	Short term	Long term	Short term	Long term	Short term	Long term	Short term	Long term	Short term	Long term	Short term	Long term	Short term
Significance	**Low**	**Very low**	**Low**	**Very low**	**Low**	**Very low**	**Low**	**Very low**	**Low**	**Very low**	**Low**	**Very low**	**Low**	**Very low**
Probability	Unlikely	Unlikely	Unlikely	Unlikely	Unlikely	Unlikely	Unlikely	Unlikely	Unlikely	Unlikely	Unlikely	Unlikely	Unlikely	Unlikely
Confidence	Sure	Sure	Sure	Sure	Sure	Sure	Sure	Sure	Sure	Sure	Sure	Sure	Sure	Sure
Reversibility	Irreversible	Partly reversible	Irreversible	Partly reversible	Irreversible	Partly reversible	Irreversible	Partly reversible	Irreversible	Irreversible	Irreversible	Irreversible	Irreversible	Irreversible

Fuel supply pipeline				
	Alternative 1		Alternative 2	
	Without mtg	With mtg	Without mtg	With mtg
Extent	Small	Small	Small	Small
Magnitude	Low	Very low	Low	Very low
Duration	Long term	Short term	Long term	Short term
Significance	**Low**	**Very low**	**Low**	**Very low**
Probability	Unlikely	Unlikely	Unlikely	Unlikely
Confidence	Sure	Sure	Sure	Sure
Reversibility	Irreversible	Irreversible	Irreversible	Irreversible

Key:
Alt = Alternatives
Mtg = Mitigation

5.7.2 Visual impacts

(a) OCGT power plant and transmission substation

Potential impacts

The main visual impact of the OCGT power plant will be from the N2 national road. This would be from the portion of road that commences at the base of Kleinberg and continues for a distance of 8 km to the PetroSA plant. The OCGT power plant would be most visible when travelling from the west towards Mossel Bay. With reference to the R327, the OCGT site can only be seen when the road is at its highest point at Proteus Substation. However, most of the views from this point to the south and southeast are mitigated by vegetation on the sides of the road. Several farms in the area may have views impacted upon by the presence of the plant, but this is considered as negligible in the light of the existing industrial infrastructure in the landscape.

Discussion

The significance of the visual impact of the OCGT power plant and transmission substation is considered as **medium**.

Recommendations for mitigation

Siting and Earthworks

- The structures should be sited as close to the PetroSA plant as possible. The sense of there being a 'gap' between the two developments should be minimised and any shielding capabilities of the landfill site to the south must be utilised.
- The natural vegetation in the northeastern corner of the site and along the railway line should be maintained.
- The natural tree line along the railway line should be retained as it provides a certain amount of shielding from the north.
- If it is geotechnically and financially feasible the platform within the security fencing should be levelled predominantly by means of cut, rather than by balancing both cut and fill. The excess fill should then be used to create large berms thus enclosing much of the site
- Berms should be created on the southeast and southwest boundaries as this is the direction from which the plant will be most visible along the N2. The existing tree line along the railway line must be retained and will provide a certain amount of shielding from the north
- The berms should undulate and meander within the buffer zone creating a natural feel rather than an engineered one.
- The slopes of berms should not exceed 1:4 so that erosion is minimised, the planting can easily take hold, and the appearance of 'natural' slopes be emphasised.
- A landscape architect should be appointed to work with the engineers in creating an affordable but natural looking environment.
- Within the limits of engineering feasibility structures are to be set as low as possible into the platform. The storage tanks should be fully or partially below ground level if at all possible from an engineering and safety perspective.

Finishes and Textures

- To a large extent the finishes and textures used at the plant will be determined by the engineering requirements of the project.
- If painted surfaces are to be used, then muted earth tones or in the case of large surfaces such as roofs, storage tanks and the stacks, medium grey tones should be selected for their ability to blend into the background. Bright colours should not to be used except for the safety markings as required by the industry.
- The fuel and other pipelines are to be painted grey unless set in a trench in which case muted colours can be used.
- The use of face brick should be avoided.
- Glass surfaces should be shielded to avoid glare and reflections.

Visual Screening of the Structures

- The berms are to be planted with indigenous fynbos species and grasses so as to minimise the need for irrigation and maintenance.
- Trees are to be planted where possible, the top and slopes of the berms being ideal for maximum screening capacity.
- Either groups of trees can be used or new tree lines created in imitation of those in the existing landscape.
- Although it would be preferable to use indigenous species, gums and other exotic trees found locally have become part of the cultural landscape and can be considered if they are not invasive.
- Landscaping should be undertaken in a manner that blends in with the surrounding environment.

Lighting

- All lighting should be kept to a minimum within the requirements of safety and efficiency.
- Where such lighting is deemed necessary, low-level lighting, which is shielded to reduce light spillage and pollution, should be used.
- No external up-lighting of any parts of the structures, including the stacks should be allowed.
- Down-lighters should be used as external lighting and shielded in such a way as to minimise light spillage and pollution beyond the extent of the area that needs to be lit.
- Security and perimeter lighting should also be shielded so that no light falls outside the area needing to be lit. Overly tall light poles are to be avoided.

Fencing

- Fencing must be visually permeable and in a medium to dark grey colour. The use of razor wire should be avoided. Electrification and isolators to be in matching colour.
- The fencing should be shielded by the berms, or failing that, by screen planting along, but away from the fence so as not to allow breaches in security.

Signage

- No backlit or neon signage is to be allowed.

- All necessary signage should be limited in size, and its colours and finishes should be chosen for their appropriateness to the colours of the site and its semi-rural nature. The use of corporate colours and logos is excluded from this.

Required Infrastructure

- All infrastructure is to be designed to have as little visual impact as possible.

(b) Transmission Lines

Potential impacts

Alternative 1 follows the R327 Road and has the least visual impact from the N2 National Road. However, how the tower positions could have a high visual impact if it is above the ridgeline. From the R327 Road this alternative will be intrusive to views over the lower lying land to the south over a distance of 14 km.

With reference to Alternative 2, it follows the 132 kV corridor and would be intermittently visible from the N2 National Road, but at a distance. As the R327 is elevated, the surrounding terrain could act as a backdrop and therefore decrease the visibility of the towers.

Alternative 3 will be most visible from the N2 as it runs very close (1.2 km away) for a distance of 4km. The section from Kleinberg to where it turns north will also be partially visible when travelling in both directions along the N2 National Road. Once this route reaches Proteus Substation, the towers would be seen against the skyline from certain points. This alternative has the lowest view impact from the R327 Road.

There could be additional visual impacts from other viewpoints but it is not considered to have a high impact. From Danabaai and the surrounding areas the visibility of all three alternatives is considered as low. Several farms in the area may have a views impacted upon by the presence of the plant.

Discussion

The visual impact of Alternatives 1 and 3 is considered as **high to medium** in significance. The visual impact of Alternative 2 is considered as **medium** in significance. Because Alternative 2 is the shortest route, it would have fewer towers and is of equal visual impact to the N2 and the R327. As the route is straighter it would require fewer visually intrusive strain towers.

Recommendations for mitigation

- The compact cross rope tower would be less visually intrusive as a result of its design and smaller footprint.
- Where possible the cross-rope suspension tower design should be used.
- As many trees as possible should retained.

(c) Access Road

Potential impacts

The main visual impact of the proposed access roads would be from the N2. Alternative 3 would have the most visual impact since it would be a new intersection off the N2 and would lead the eye towards the OCGT power plant.

Discussion

The visual impact of the access roads is considered **low** in significance as they would not be visible from the important viewpoints in the study area.

Recommendations for mitigation

- Access to the site should be by either Alternative 1 or 2, using the existing access off the N2 to the PetroSA landfill site.
- The access road and security gates, and if necessary, the guardhouse, are to be set back from the N2, visually unobtrusive and scaled in such a way as to minimise the visual impact.

(d) Pipeline

Potential impacts

The pipeline would not be visible from the N2 or any other viewpoints in the study area.

Discussion

The visual impact of either pipeline route is considered to be of **very low** significance, as neither would be visible from the important viewpoints in the study area.

Recommendations for mitigation

- The footprint required for the road should be kept to a minimum.
- Any destruction of the surrounding area should be avoided, and if damaged, rehabilitated where necessary.

Table 5.11 : Impact table summarising the significance, both with and without mitigation, of the visual impact of the proposed development alternatives

	OCGT Plant and Substation site		Transmission lines						Road access route					
			Alternative 1		Alternative 2		Alternative 3		Alternative 1		Alternative 2		Alternative 3	
	Without mtg	With mtg	Without mtg	With mtg	Without mtg	With mtg	Without mtg	With mtg	Without mtg	With mtg	Without mtg	With mtg	Without mtg	With mtg
Extent	Large	Large	Large	Large	Large	Large	Large	Large	Small	Small	Small	Small	Small	Small
Magnitude	Medium	Medium to Low	Medium to Low	Medium to Low	Low	Low	Medium to Low	Medium to Low	Very Low	Very low	Very Low	Very low	Low	Low
Duration	Long term	Long term	Long term	Long term	Long term	Long term	Long term	Short term	Long term	Long term	Long term	Long term	Long term	Long term
Significance	**High**	**Medium**	**High to Medium**	**High to Medium**	**Medium**	**Medium**	**High to Medium**	**High to Medium**	**Low**	**Low**	**Low**	**Low**	**Medium**	**Medium**
Probability	Probable	Possible	Probable	Probable	Probable	Probable	Probable	Probable	Possible	Possible	Possible	Possible	Possible	Possible
Confidence	Sure	Sure	Sure	Sure	Sure	Sure	Sure	Sure	Sure	Sure	Sure	Sure	Sure	Sure
Reversibility	Reversible	Reversible	Reversible	Reversible	Reversible	Reversible	Reversible	Reversible	Reversible	Reversible	Reversible	Reversible	Reversible	Reversible

Fuel supply pipeline				
	Alternative 1		**Alternative 2**	
	Without mtg	With mtg	Without mtg	With mtg
Extent	Small	Small	Small	Small
Magnitude	Very Low	Very Low	Very Low	Very Low
Duration	Long term	Long term	Long term	Long term
Significance	**Very Low**	**Very Low**	**Very Low**	**Very Low**
Probability	Possible	Possible	Possible	Possible
Confidence	Sure	Sure	Sure	Sure
Reversibility	Reversible	Reversible	Reversible	Reversible

Key:
Alt = Alternatives
Mtg = Mitigation

5.7.3 Impact on vehicle traffic

Potential impacts

An access road from the N2 to the plant needs to be identified. The site has no formal access at present, but two access points off the N2 were identified.

The N2 in the vicinity of the access options is a single carriageway with two lanes approximately 3,7m in width, and 3,0m wide shoulders / emergency lanes. It is used by heavy vehicles and superloads on a daily basis, as well as recreational traffic over weekends and holidays.

The surfaced road to the PetroSA security gate located between the two PetroSA landholdings, takes access off the N2. Road-markings, a left-off deceleration taper and a right-turn slot facilitates traffic safety at this access. Sight distances are good at this location and more than adequate for 120km/h. With the exception of the PetroSA access and the turn-off to Vleesbaai, there are no major intersections in the area.

Traffic flows were analysed from 2001 and 2003 data. With reference to the 2003 data, typical flow patterns did not vary much from 2001; the heaviest flows on the N2 occurred on Mondays and Friday, peaking around 11:00. Fridays and Mondays recorded the highest volumes. On other days of the week the flows appeared to be spread more evenly throughout the day.

When the OCGT plant is completed, it is anticipated that the daily workforce accessing the plant will not exceed more than 12 persons. Accordingly, the magnitude of the generated traffic will be minor with the additional traffic estimated at not more than 5 vehicle trips in peak hour.

The proposed development will therefore have a minimal impact on the operation of the N2, and would neither change the level of service nor measurably increase traffic volumes on the immediate road network.

However, during the construction of the OCGT power plant, heavy duty and superload vehicles will transport equipment to the site. It is anticipated that 9 heavy superload transports will be required for the Mossel Bay site; these loads will be significantly larger and wider than the general traffic. Other loads are estimated as being ‘general cargo’ as well as ‘over-dimensioned cargo’. This is a short-term situation and will not substantially impact on the national road or traffic flows. However, it will be necessary to have special traffic accommodation arrangements in place when the superloads are in transit.

With reference to the intersection with the N2, two alternatives have been identified. The one option would take access from the N2 at the existing intersection for the PetroSA Solid Waste Disposal Facility and Landfill Site. The other option is the use of an old farm road that will require upgrading. Nevertheless, they are both considered as suitable options.

Discussion

The impact of the OCGT plant on the N2 is considered as **low** in significance. The traffic study indicates that Alternatives 1 or 2 are preferable as there are technical constraints associated with Alternative 3.

Recommendations for mitigation

- During the construction of the plant and transmission substation, warning signs notifying road-users of trucks should be erected in advance of the access. Superloads will require escort vehicles while in transit, and these should assist in facilitating traffic management at the intersection while vehicles enter or exit the access.
- The existing access to PetroSA is currently constructed to adequate standards. However, it would need to be shared with Eskom and therefore there needs to be the assurance that neither PetroSA or Eskom's access rights are being compromised.
- The access using the current farm road would require widening of the N2 to accommodate the required turning lanes. In addition, the roads authority (SANRAL) has stated that the Vleesbaai road, would have to be relocated in order to achieve a four-way stop at the access to the OCGT plant.

Table 5.12 : Impact table summarising the significance, both with and without mitigation, of the traffic impact of the OCGT power plant on the N2 freeway

	OCGT Plant and Substation site		Transmission lines						Road access route					
			Alternative 1		Alternative 2		Alternative 3		Alternative 1		Alternative 2		Alternative 3	
	Without mtg	With mtg	Without mtg	With mtg	Without mtg	With mtg	Without mtg	With mtg	Without mtg	With mtg	Without mtg	With mtg	Without mtg	With mtg
Extent	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Small	Small	Small	Small	Small	Small
Magnitude	Zero	Zero	Zero	Zero	Zero	Zero	Zero	Zero	Very Low	Very Low	Very Low	Very Low	Low	Low
Duration	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Long term	Long term	Long term	Long term	Long term	Long term
Significance	**Neutral**	**Neutral**	**Neutral**	**Neutral**	**Neutral**	**Neutral**	**Neutral**	**Neutral**	**Very Low**	**Very Low**	**Very Low**	**Very Low**	**Low**	**Low**
Probability	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Possible	Possible	Possible	Possible	Possible	Possible
Confidence	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Sure	Sure	Sure	Sure	Sure	Sure
Reversibility	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Fully reversible	Fully reversible	Fully reversible	Fully reversible	Fully reversible	Fully reversible

Fuel supply pipeline				
	Alternative 1		Alternative 2	
	Without mtg	With mtg	Without mtg	With mtg
Extent	N/A	N/A	N/A	N/A
Magnitude	Zero	Zero	Zero	Zero
Duration	N/A	N/A	N/A	N/A
Significance	**Neutral**	**Neutral**	**Neutral**	**Neutral**
Probability	N/A	N/A	N/A	N/A
Confidence	N/A	N/A	N/A	N/A
Reversibility	N/A	N/A	N/A	N/A

Key:
Alt = Alternatives
Mtg = Mitigation

5.7.4 Impact on ambient noise quality

Potential impacts

According to the provincial Noise Control Regulations promulgated in terms of the ECA and the associated Provincial Gazette Number 5309 of 20 November 1998, rural environments are considered as sensitive from a noise impact perspective. Under the regulations a "disturbing noise" is any noise that persists for more than 10 minutes and exceeds ambient noise levels by 7dBA. An operation that results in a "disturbing noise" may be permitted at the discretion of the Provincial noise control officer. The specialist noise study has measured the ambient noise level at the western boundary of the proposed site to be 43dBA. This relatively high level of noise is due principally to the PetroSA facility located a kilometer to the east. Based on the operating hours of the proposed plant and the associated weather conditions, the study calculates that a noise level of 50dBA would be experienced approximately 1 270 m from the center of the plant. This means that all the areas within a radius of 1 270 m from the center of the plant would experience a "disturbing noise" in terms of the Western Cape's Noise Control Regulations. Although the existing regulations are vague and do not conform to more recent thinking and international standards, these regulations are the current applicable legislation in the Western Cape.

South Africa is a signatory member of the World Health Organisation and is therefore obliged to uphold that organisation's principles regarding noise. Accordingly, new noise control legislation will be promulgated shortly. This pending legislation is based on the South African National Standards (SANS) documentation. Accordingly, the specialist noise impact assessment was undertaken using the methodology described in SANS 10328 and uses the rating tables in SANS 10103 to evaluate the impacts. According to SANS, noise assessments are based on an equivalent continuous rating that averages noise over a daytime period of 16 hours and a night time period of eight hours. For rural areas, an equivalent continuous rating of 45dBA is acceptable during the day and 35dBA during the night. The results of the noise study indicate that, on average, the equivalent continuous daytime rating level of 65dBA would be experienced at the rural boundary of the proposed site. It should be noted that the noise assessment assumes only two hours of operation per day, and any increase in operation will affect the noise impacts accordingly. The instantaneous noise levels, i.e. those likely to be experienced during the actual operation of the plant, may result in a noise level of 43 dBA being experienced up to 2 400 m from the centre of the plant. Refer to Figure 12. While this is noteworthy, SANS require the assessment to be averaged over a 16 hour daytime or eight hour night time period, which reduces the radius of the 43dBA circle to 1 040 m, as illustrated in Figure 12. Noise assessments and levels of acceptability, as defined by SANS, are at present guidelines, although they are likely to be incorporated into legislation in the near future.

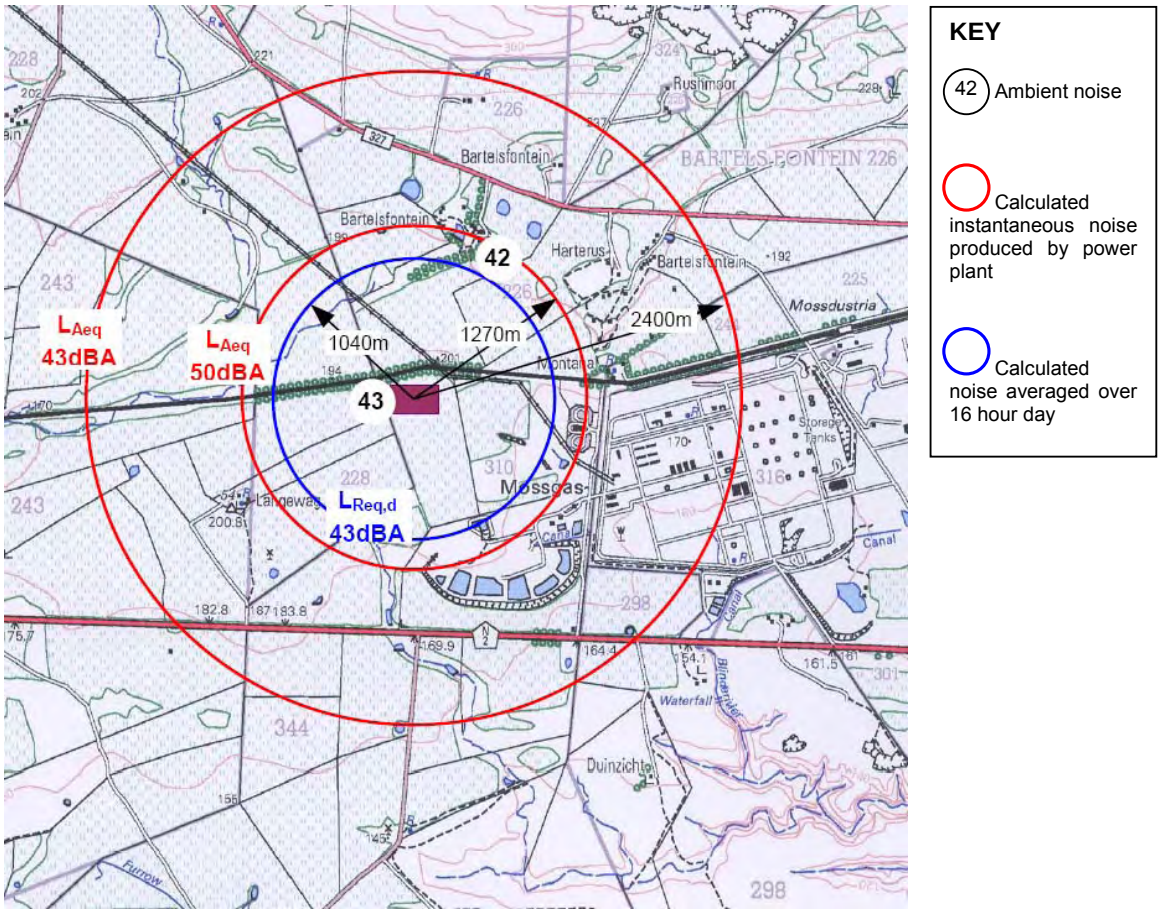


Figure 12 : Calculated noise contours

It should be noted that the supplier of the gas turbine equipment, Siemens, has provided a guarantee that noise levels will be kept within specified limits. See Annexure T for a copy of the Siemens report, including guarantees and calculations. Their stated guarantees are:

- At a distance of ≥ 1 m from the outdoor installations and their attenuation devices, and at a height of 1.5 m above ground, sound levels will not exceed 85dBA[14];
- At a distance of 1 100 m from the outermost point of the plant installations, continuous sound levels will not exceed 55dBA during the daytime and 45dBA during the night time; and
- When infrequent noise sources are activated, such noise will not exceed the daytime and night time guaranteed levels by more than 4dBA. Such infrequent noise sources would be activated on < 20 occasions per year and for a period not exceeding 30 minutes for each event.

The figures given above are continuous sound levels. According to the Siemens guarantee, the 55dBA and 45dBA sound levels would, when averaged over a 16 hour daytime and 8 hour night

[14] According to Occupational Health and Safety Act (No. 85 of 1993) regulations, protective ear equipment must be worn when working in areas with sound levels above 85dBA

time period respectively, be met at a distance of less than 1 100 m from the outermost point of the plant installations. The Siemens guarantee suggests that the plant would have a lower noise impact than that indicated by the specialist noise study.

Discussion

In considering noise impacts, both the provincial Noise Control Regulations, SANS and the geographical context were taken cognisance of. While it is accepted that SANS guidelines and the provincial Noise Control Regulations would not be satisfied at the rural boundaries of the proposed site, it must be noted that the fact that there are no people living within +/- 1 km from the center of the plant, mitigates the significance of the impact. The adjacent properties to the north and west of the proposed site are zoned as rural and no further development can take place without subdividing and rezoning the properties. Taking all these factors into account, a **medium** significance impact, without mitigation, is anticipated as a result of the proposed power plant.

Mitigation

By locating the proposed power plant as far away as possible from the northern and western rural boundaries of the site, the significance of this impact can be reduced. Alternatively, the adjoining farmland to the west and north could be purchased or compensation considered. Lastly, noise attenuation measures to could be adopted.

Table 5.13 : Impact table summarising the significance, both with and without mitigation, of the noise impacts of the OCGT power plant

	OCGT Plant and Substation site		Transmission lines						Road access route					
			Alternative 1		Alternative 2		Alternative 3		Alternative 1		Alternative 2		Alternative 3	
	Without mtg	With mtg	Without mtg	With mtg	Without mtg	With mtg	Without mtg	With mtg	Without mtg	With mtg	Without mtg	With mtg	Without mtg	With mtg
Extent	Small	Small	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Magnitude	Medium	Low	Zero	Zero	Zero	Zero	Zero	Zero	Zero	Zero	Zero	Zero	Zero	Zero
Duration	Long	Long	Long term	Long term	Long term	Long term	Long term	Long term	Long term	Long term	Long term	Long term	Long term	Long term
Significance	**Medium**	**Low**	**Neutral**	**Neutral**	**Neutral**	**Neutral**	**Neutral**	**Neutral**	**Neutral**	**Neutral**	**Neutral**	**Neutral**	**Neutral**	**Neutral**
Probability	Definite	Definite	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Confidence	Sure	Sure	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Reversibility	Fully reversible	Fully reversible	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

	Fuel supply pipeline			
	Alternative 1		**Alternative 2**	
	Without mtg	With mtg	Without mtg	With mtg
Extent	N/Al	N/Al	N/Al	N/Al
Magnitude	Zero	Zero	Zero	Zero
Duration	N/A	N/A	N/A	N/A
Significance	**Neutral**	**Neutral**	**Neutral**	**Neutral**
Probability	N/A	N/A	N/A	N/A
Confidence	N/A	N/A	N/A	N/A
Reversibility	N/A	N/A	N/A	N/A

Key:
Alt = Alternatives
Mtg = Mitigation

5.7.5 Potential risks from fuel pipeline

It is acknowledged that possible risks to human health from the fuel pipeline do exist. However, the matter was dealt with in Section 5.5.4 above and since the route selection evaluation offered there regarding the biophysical environment differs little in implication for human health, it is not repeated here.

5.7.6 Impact on existing infrastructure

(a) OCGT power plant and transmission substation site

Potential impacts
There is no known existing infrastructure on the site envisaged for the OCGT power plant and substation and therefore this potential impact will not be assessed any further.

Recommendation for mitigation
- In the unlikely event of infrastructure being found on the site, DEA&DP will be notified and appropriate measures will be implemented to mitigate any environmental impacts.

(b) Transmission lines

Potential impacts
The transmission lines route alternatives would have to cross the following existing infrastructure:

- Railway line;
- Farm fences;
- Kleinberg silos;
- Public roads, including the R327 and Patrysfontein, Kleinberg, Rooikoppies and Vrede gravel roads;
- Farmsteads and related buildings, including Bartelsfontein, Patrysfontein, Kleinberg, Vrede Rooikoppies and Rooidrif;
- Telephone lines; and
- Transmission and distribution lines, including 132 kV PetroSA-Proteus[15], 11/22 kV lines along R327[9], 66 kV woodpole line to Proteus from Albertinia[16], and the variety of 400 kV and 132 kV lines entering and leaving the Proteus substation.

Alternative 1 route alignment would need to cross the 132 kV PetroSA-Proteus transmission line, the R327, the railway line, the 11/22 kV distribution lines along the R327, Telkom lines, numerous farm boundary fences as well as a number of 132 kV and 400 kV lines when entering the Proteus substation. Alternative 2 would need to cross the rail line, the 132 kV PetroSA-Proteus transmission line, numerous farm boundary fences as well as a number of 132kV and

[15] Only in the case of Alternative 1.
[16] Only in the case of Alternative 3.

400 kV lines when entering the Proteus substation. Alternative 3 crosses the railway line, the 66 kV woodpole line to Proteus from Albertinia, numerous farm boundary fences as well as a number of 132 kV and 400 kV lines when entering the Proteus substation.

The impact relates to the safety distances required with transmission lines and the potential relocation of infrastructure in order to obtain the necessary safety restrictions. This would need to be in line with legal parameters which specify a particular servitude width for different conductor sizes. The latter directly relates to the voltage of that conductor.

Discussion
The impact of existing infrastructure on the transmission line alternatives is considered as **low** in significance as while it could be onerous to successfully and safely cross the existing infrastructure, it is possible and is successfully undertaken on most projects of a similar nature.

Recommendations for mitigation
- All existing road servitudes and height restrictions need to be respected.
- Gates are to be installed on all boundary fences along the transmission line servitude.
- Negotiate approvals from Telkom where necessary.
- Ensure that all Eskom proceduralised safety measures are implemented whilst working below or above electrified transmission and distribution lines.

(c) Access routes

Potential impacts
No infrastructure would be impacted on by any of the proposed access route alternatives.

Discussion
The impact of existing infrastructure on the access routes is considered as **neutral** in significance.

(d) Fuel pipeline

Potential impacts
No infrastructure would be impacted on by any of the proposed fuel pipeline alternatives.

Discussion
The impact of existing infrastructure on the fuel pipeline route alternatives is considered as **neutral** in significance.

Table 5.14 : Impact table summarising the significance, both with and without mitigation, of the proposed development on the existing infrastructure

	OCGT Plant and Substation site		Transmission lines						Road access route					
			Alternative 1		Alternative 2		Alternative 3		Alternative 1		Alternative 2		Alternative 3	
	Without mtg	With mtg	Without mtg	With mtg	Without mtg	With mtg	Without mtg	With mtg	Without mtg	With mtg	Without mtg	With mtg	Without mtg	With mtg
Extent	N/A	N/A	Small	Small	Small	Small	Small	Small	N/A	N/A	N/A	N/A	N/A	N/A
Magnitude	Zero	Zero	Low	Very low	Low	Very low	Low	Very low	Zero	Zero	Zero	Zero	Zero	Zero
Duration	N/A	N/A	Long term	Long term	Long term	Long term	Long term	Long term	N/A	N/A	N/A	N/A	N/A	N/A
Significance	**Neutral**	**Neutral**	**Low**	**Very low**	**Low**	**Very low**	**Low**	**Very low**	**Neutral**	**Neutral**	**Neutral**	**Neutral**	**Neutral**	**Neutral**
Probability	N/A	N/A	Possible	Possible	Possible	Possible	Possible	Possible	N/A	N/A	N/A	N/A	N/A	N/A
Confidence	N/A	N/A	Sure	Sure	Sure	Sure	Sure	Sure	N/A	N/A	N/A	N/A	N/A	N/A
Reversibility	N/A	N/A	Fully Reversible	Fully Reversible	Fully Reversible	Fully Reversible	Fully Reversible	Fully Reversible	N/A	N/A	N/A	N/A	N/A	N/A

Fuel supply pipeline				
	Alternative 1		Alternative 2	
	Without mtg	With mtg	Without mtg	With mtg
Extent	N/A	N/A	N/A	N/A
Magnitude	Zero	Zero	Zero	Zero
Duration	N/A	N/A	N/A	N/A
Significance	**Neutral**	**Neutral**	**Neutral**	**Neutral**
Probability	N/A	N/A	N/A	N/A
Confidence	N/A	N/A	N/A	N/A
Reversibility	N/A	N/A	N/A	N/A

Key:
Alt = Alternatives
Mtg = Mitigation

5.7.7 Impact of the proposed development on the existing landuse

Only the impact of the transmission lines on existing landuse is considered in this section as it is the area which is most likely to have an impact. The proposed OCGT power plant and associated infrastructure is unlikely to impact on the operation, or possible expansion, of the PetroSA plant or waste disposal site.

(a) Transmission lines

Potential impacts

With respect to the transmission lines, the tower configuration selected would not only impact on the area required to erect the tower, but would also limit the type of activities that would be permitted within the servitude. Pivot irrigation of crops within transmission line servitudes would not be possible. In addition, towers with supporting stays could pose a safety hazard for livestock grazing near to the structures due to them colliding with the stays. This impact is somewhat mitigated by the fact that Eskom would acquire a servitude in discussion with the relevant landowners and that compensation would be negotiated.

Discussion

The impact of transmission line alternatives on the existing landuse is considered as **low** in significance for Alternatives 1 and 3. Alternative 2 is considered as **medium** in significance as it will cross a greater proportion of cropland and pasturage.

Recommendations for mitigation

- Provide protective measures on the stays, to avoid the risk of livestock colliding with them.

Table 5.15 : Impact table summarising the significance of transmission line alternatives on existing landuse

	OCGT Plant and Substation site		Transmission lines						Road access route					
			Alternative 1		Alternative 2		Alternative 3		Alternative 1		Alternative 2		Alternative 3	
	Without mtg	With mtg	Without mtg	With mtg	Without mtg	With mtg	Without mtg	With mtg	Without mtg	With mtg	Without mtg	With mtg	Without mtg	With mtg
Extent	N/A	N/A	Small	Small	Small	Small	Small	Small	N/A	N/A	N/A	N/A	N/A	N/A
Magnitude	Zero	Zero	Low	Low	Low	Low	Low	Low	Zero	Zero	Zero	Zero	Zero	Zero
Duration	N/A	N/A	Long term	Long term	Long term	Long term	Long term	Long term	N/A	N/A	N/A	N/A	N/A	N/A
Significance	**Neutral**	**Neutral**	**Low**	**Low**	**Medium**	**Low**	**Low**	**Low**	**Neutral**	**Neutral**	**Neutral**	**Neutral**	**Neutral**	**Neutral**
Probability	N/A	N/A	Probable	Probable	Probable	Probable	Probable	Probable	N/A	N/A	N/A	N/A	N/A	N/A
Confidence	N/A	N/A	Sure	Sure	Sure	Sure	Sure	Sure	N/A	N/A	N/A	N/A	N/A	N/A
Reversibility	N/A	N/A	Fully Reversible	Fully Reversible	Fully Reversible	Fully Reversible	Fully Reversible	Fully Reversible	N/A	N/A	N/A	N/A	N/A	N/A

Fuel supply pipeline				
	Alternative 1		**Alternative 2**	
	Without mtg	With mtg	Without mtg	With mtg
Extent	N/A	N/A	N/A	N/A
Magnitude	Zero	Zero	Zero	Zero
Duration	N/A	N/A	N/A	N/A
Significance	**Neutral**	**Neutral**	**Neutral**	**Neutral**
Probability	N/A	N/A	N/A	N/A
Confidence	N/A	N/A	N/A	N/A
Reversibility	N/A	N/A	N/A	N/A

Key:
Alt = Alternatives
Mtg = Mitigation

5.7.8 Impact on socio-economic conditions

Potential impacts

Approximately 20 employment opportunities would be created during the operational phase of the OCGT and transmission substation (Urban-Econ, 2005). However, the proposed OCGT power plant and substation site would result in the loss of 28 ha of agricultural land, thereby impacting on the availability of agricultural land resources. In terms of employment levels, the loss of 28 ha of agricultural land roughly equates to the loss of 4 employment opportunities within the agricultural sector.

The potential impact on the alternatives would be directly related to the length of the powerline and the area of agricultural land affected. The length of the alternative routes are therefore of importance in this evaluation. Alternative 1 is approximately 12 km long and cuts across an area which consists of 60% of cultivated land. Alternative 2 is 10 km long and cuts across an area which consists of 80% of cultivated vegetation. Alternative 3 is 14 km long and crosses 60% of cultivated vegetation. It is important to note that farming activity can still occur within the servitude and therefore it is not a total loss to the farmer. There are conditions attached to the registering of a servitude which the farmer will be required to adhere to.

During the operational phase of the access road and fuel pipeline, the employment opportunities would be negligible and considered as neutral in significance.

Discussion

The socio-economic aspect of the proposed development, with specific emphasis on the OCGT plant, substation and transmission lines, on the local economy is considered to have a **medium positive** impact. Transmission line Alternatives 1 and 3 are preferred in this regard.

Potential Mitigation

No mitigation is necessary as the impact is a positive one.

Table 5.16: Impact table summarising the significance, both with and without mitigation, of the socio-economic impact of the proposed development alternatives

	OCGT Plant and Substation site		Transmission lines						Road access route					
			Alternative 1		Alternative 2		Alternative 3		Alternative 1		Alternative 2		Alternative 3	
	Without mtg	With mtg	Without mtg	With mtg	Without mtg	With mtg	Without mtg	With mtg	Without mtg	With mtg	Without mtg	With mtg	Without mtg	With mtg
Extent	Large +	N/A	N/AI	N/AI	N/AI	N/AI	N/AI	N/AI	N/AI	N/AI	N/AI	N/AI	N/AI	N/AI
Magnitude	Low +	N/A	Zero	Zero	Zero	Zero	Zero	Zero	Zero	Zero	Zero	Zero	Zero	Zero
Duration	Long term	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Significance	**Medium +**	**N/A**	**Medium +**	**N/A**	**Medium +**	**N/A**	**Medium +**	**N/A**	**Neutral**	**Neutral**	**Neutral**	**Neutral**	**Neutral**	**Neutral**
Probability	Definite	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Confidence	Sure	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Reversibility	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Fuel supply pipeline				
	Alternative 1		**Alternative 2**	
	Without mtg	With mtg	Without mtg	With mtg
Extent	N/AI	N/AI	N/AI	N/AI
Magnitude	Zero	Zero	Zero	Zero
Duration	N/AI	N/A	N/A	N/A
Significance	**Neutral**	**Neutral**	**Neutral**	**Neutral**
Probability	N/AI	N/A	N/A	N/A
Confidence	N/AI	N/A	N/A	N/A
Reversibility	N/AI	N/A	N/A	N/A

Key:
Alt = Alternatives
Mtg = Mitigation

5.8 CONSTRUCTION PHASE IMPACTS ON THE BIOPHYSICAL AND SOCIAL ENVIRONMENTS

The following impacts are of importance to the construction phase of the proposed development and the assessment is summarised in Table 6.1:

- Impact on flora;
- Impact on heritage resources;
- Visual impact;
- Impact on noise levels;
- Water and soil pollution;
- Impact on socio-economic conditions; and
- Traffic and access.

The possible impacts on flora, heritage resources, and visual aesthetics, are not assessed below as they have been addressed in detail in Section 5.6 and 5.7.

5.9 CONSTRUCTION PHASE IMPACTS ASSESSED

5.9.1 Impact on ambient noise levels during construction

Potential impacts
Construction activities are generally associated with an increase in the ambient noise levels. Noise sources during the construction phase emanate from activities related to drilling, compacting of soil, loading and unloading of equipment, noise from construction vehicles and personnel.

Discussion
The impact of noise during the construction phase would be considered **low** in significance due to the distance to the nearest noise sensitive sites, i.e. farm dwellings. However, with the mitigation measures as described below are implemented, the significance of the impact would be reduced to **very low**.

Potential mitigation measures
- Ensure that standardised operating hours are adhered to during the construction phase.
- Implement the framework Environmental Management Plan (fEMP) presented in Annexure Q.

Table 5.17 : Impact table summarising the significance, both with and without mitigation, of the impact on ambient noise levels during the construction phase

	OCGT Plant and Substation site		Transmission lines						Road access route					
			Alternative 1		Alternative 1		Alternative 3		Alternative 1		Alternative 1		Alternative 3	
	Without mtg	With mtg	Without mtg	With mtg	Without mtg	With mtg	Without mtg	With mtg	Without mtg	With mtg	Without mtg	With mtg	Without mtg	With mtg
Extent	Small	Small	Small	Small	Small	Small	Small	Small	Small	Small	Small	Small	Small	Small
Magnitude	Medium	Low	Low	Very Low	Low	Very Low	Low	Very Low	Low	Very Low	Low	Very low	Low	Very Low
Duration	Short term	Short term	Short tern	Short term	Short tern	Short term	Short term	Short term	Short tern	Short term	Short tern	Short term	Short tern	Short term
Significance	Low	**Low**	**Low**	**Very Low**	**Low**	**Very Low**	**Low**	**Very Low**	**Low**	**Very Low**	**Low**	**Very Low**	**Low**	**Very Low**
Probability	Probable	Probable	Probable	Probable	Probable	Probable	Probable	Probable	Probable	Probable	Probable	Probable	Probable	Probable
Confidence	Sure	Sure	Sure	Sure	Sure	Sure	Sure	Sure	Sure	Sure	Sure	Sure	Sure	Sure
Reversibility	Fully Reversible	Fully Reversible	Fully Reversible	Fully Reversible	Fully Reversible	Fully Reversible	Fully Reversible	Fully Reversible	Fully Reversible	Fully Reversible	Fully Reversible	Fully Reversible	Fully Reversible	Fully Reversible

	Fuel supply pipeline			
	Alternative 1		Alternative 2	
	Without mtg	With mtg	Without mtg	With mtg
Extent	Small	Small	Small	Small
Magnitude	Low	Very Low	Low	Very Low
Duration	Short tern	Short term	Short tern	Short term
Significance	**Low**	**Very Low**	**Low**	**Very Low**
Probability	Probable	Probable	Probable	Probable
Confidence	Sure	Sure	Sure	Sure
Reversibility	Fully Reversible	Fully Reversible	Fully Reversible	Fully Reversible

Key:
Alt = Alternatives
Mtg = Mitigation

5.9.2 Water and soil pollution during construction

Potential impacts

The contamination of water and soil during the construction phase is of particular concern as a number of hazardous materials will be brought onto the site. The impact of diesel and oil spillages on water bodies and soil in the study area is also of particular concern.

Discussion

The impact of soil and water pollution during the construction phase would be considered as **low** in significance. However, the significance of the impact would be reduced to **very low** with the implementation of mitigation measures.

Recommended mitigation measures

- Ensure that procedures are put in place in order to mitigate any soil and water pollution.
- These procedures are to be written into the construction phase EMP that will result from the framework EMP presented in Annexure Q.

Table 5.18 Impact table summarising the significance, both with and without mitigation, of the impact on water and soil during the construction phase

	OCGT Plant and Substation site		Transmission lines						Road Access Routes					
			Alternative 1		Alternative 1		Alternative 3		Alternative 1		Alternative 1		Alternative 3	
	Without mtg	With mtg	Without mtg	With mtg	Without mtg	With mtg	Without mtg	With mtg	Without mtg	With mtg	Without mtg	With mtg	Without mtg	With mtg
Extent	Small	Small	Small	Small	Small	Small	Small	Small	Small	Small	Small	Small	Small	Small
Magnitude	Medium	Low	Low	Very Low	Low	Very Low	Low	Very Low	Low	Very Low	Low	Very low	Low	Very Low
Duration	Short term	Short term	Short term	Short term	Short term	Short term	Short tern	Short term	Short tern	Short term	Short tern	Short term	Short tern	Short term
Significance	**Low**	**Very low**	**Low**	**Very Low**	**Low**	**Very Low**	**Low**	**Very Low**	**Low**	**Very Low**	**Low**	**Very Low**	**Low**	**Very Low**
Probability	Probable	Probable	Probable	Probable	Probable	Probable	Probable	Probable	Probable	Probable	Probable	Probable	Probable	Probable
Confidence	Sure	Sure	Sure	Sure	Sure	Sure	Sure	Sure	Sure	Sure	Sure	Sure	Sure	Sure
Reversibility	Fully Reversible	Fully Reversible	Fully Reversible	Fully Reversible	Fully Reversible	Fully Reversible	Fully Reversible	Fully Reversible	Fully Reversible	Fully Reversible	Fully Reversible	Fully Reversible	Fully Reversible	Fully Reversible

	Fuel Supply Pipeline			
	Alternative 1		Alternative 2	
	Without mtg	With mtg	Without mtg	With mtg
Extent	Small	Small	Small	Small
Magnitude	Low	Very Low	Low	Very Low
Duration	Short tern	Short term	Short tern	Short term
Significance	**Low**	**Very Low**	**Low**	**Very Low**
Probability	Probable	Probable	Probable	Probable
Confidence	Sure	Sure	Sure	Sure
Reversibility	Fully Reversible	Fully Reversible	Fully Reversible	Fully Reversible

Key:
Alt = Alternatives
Mtg = Mitigation

5.9.3 Impact on socio-economic conditions during construction

Potential impacts

During the construction phase approximately 75 employment opportunities would be created during the construction of the transmission lines and approximately 358 employment opportunities during the construction of the OCGT power plant and transmission substation. The construction phase would also impact positively on the local economy as the proposed development could source building material from local suppliers. It should, however, be noted that the employment figures associated with the construction of the access road and fuel supply pipeline were not available whilst the socio-economic assessment was being undertaken. We do not, however, believe that this lack of information would change the impact on the socio-economic conditions significantly.

Businesses in and around the Mossel Bay area would be positively impacted on due to the knock on effects such as the increase in demand for goods and services, particularly during the construction phase of the development. Statistics were not available for the access road alternatives and fuel pipeline alternatives, but the impact it would have is not considered as significant enough to change the impact evaluation which is shown for the OCGT plant, transmission substation and transmission line alternatives.

Discussion

The impact of the proposed development on the socio-economic conditions of the study area during the construction phase is considered to be **low** in significance. See Table 5.19

Recommended mitigation measure

- A comprehensive labour plan should be formulated and implemented to maximise employment opportunities and skills transfer to local communities.

Table 5.19 : Impact table summarising the significance, both with and without mitigation, of the impact on the socio-economic conditions of the study area during the construction phase

	OCGT Plant and Substation site		Transmission lines						Road access route					
			Alternative 1		Alternative 1		Alternative 3		Alternative 1		Alternative 1		Alternative 3	
	Without mtg	With mtg	Without mtg	With mtg	Without mtg	With mtg	Without mtg	With mtg	Without mtg	With mtg	Without mtg	With mtg	Without mtg	With mtg
Extent	Medium	N/A	Medium	N/A	Medium	N/A	Medium	N/A	Medium	N/A	Medium	N/A	Medium	N/A
Magnitude	Low	N/A	Low	N/A	Low	N/A	Low	N/A	Low	N/A	Low	N/A	Low	N/A
Duration	Short term	N/A	Short term	N/A	Short term	N/A	Short term	N/A	Short term	N/A	Short term	N/A	Short term	N/A
Significance	**Low**	**N/A**	**Low**	**N/A**	**Low**	**N/A**	**Low**	**N/A**	**Low**	**N/A**	**Low**	**N/A**	**Low**	**N/A**
Probability	Probable	N/A	Probable	N/A	Probable	N/A	Probable	N/A	Probable	N/A	Probable	N/A	Probable	N/A
Confidence	Sure	N/A	Sure	N/A	Sure	N/A	Sure	N/A	Sure	N/A	Sure	N/A	Sure	N/A
Reversibility	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

	Fuel supply pipeline			
	Alternative 1		Alternative 2	
	Without mtg	With mtg	Without mtg	With mtg
Extent	Medium	N/A	Medium	N/A
Magnitude	Low	N/A	Low	N/A
Duration	Short term	N/A	Short term	N/A
Significance	**Low**	**N/A**	**Low**	**N/A**
Probability	Probable	N/A	Probable	N/A
Confidence	Sure	N/A	Sure	N/A
Reversibility	N/A	N/A	N/A	N/A

Key:
Alt = Alternatives
Mtg = Mitigation

6 CONCLUSIONS AND RECOMMENDATIONS

6.1 CONCLUSIONS

We submit that this draft EIR provides a relatively comprehensive assessment of the environmental issues raised in the Scoping phase by I&APs, Eskom and the EIA project team. The significance of the environmental impacts associated with the proposed project are summarised in Table 6.1 and illustrated by way of shading. Dark orange and light orange indicate **high** and **medium** significance impacts respectively. Dark and light blue indicate **low** and **very low** significance impacts respectively. Light green indicates that a **medium positive** impact is predicted. Neutral and "not applicable" impacts are not shaded. Please note that the alternative routes assessed in Table 6.1 are illustrated on Figure 7 of this report.

In summary, the proposed project consists of the following components:

- An OCGT power plant (made up of three gas turbines each with an output of 150 MW) adjacent to the existing PetroSA facility;
- A fuel supply pipeline to transport liquid distillate fuel (kerosene-based or diesel) from the PetroSA facility to the OCGT power plant;
- A substation adjacent to the OCGT power plant;
- Two 400 kV transmission lines from the OCGT substation to Proteus substation;
- The upgrade of the Proteus substation within the boundaries of the substation; and
- An access route from the N2 National Road to the proposed OCGT power plant and substation site.

Table 6.1: Summary of the significance of the potential impacts associated with the proposed development

Impact	OCGT power plant & transmission substation		Transmission lines						Access road						Fuel supply pipeline			
			Alt 1		Alt 2		Alt 3		Alt 1		Alt 2		Alt 3		Alt 1		Alt 2	
	No mtg	With mtg	No mtg	With mtg	No mtg	With mtg	No mtg	With mtg	No mtg	With mtg	No mtg	With mtg	No mtg	With mtg	No mtg	With mtg	No mtg	With mtg
IMPACT OF THE PROPOSED DEVELOPMENT ON THE BIO-PHYSICAL ENVIRONMENT																		
Impact on flora	H	VL	H	M	H	M	L	H	M	L	VL	L	VL	H	VL	L	VL	L	VL
Impact on avifauna	N	N	H	M	H	M	M	H	M	N	N	N	N	N	N	N	N	N	N
Impact on air quality	L	L	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Impact on water availability	L	VL	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
IMPACT OF THE PROPOSED DEVELOPMENT ON THE SOCIO-ECONOMIC ENVIRONMENT																		
Impact on heritage resources	L	VL	L	VL	L	VL	L	VL	L	VL	L	VL	L	VL	L	VL	L	VL
Visual impacts	H	M	H	M	H	M	M	M	H	M	H	M	L	L	L	L	M	M	VL	VL	VL	VL
Impact on traffic	L	L	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Impact on noise levels	M	L	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Impact on existing infrastructure	N	N	L	VL	L	VL	L	VL	N	N	N	N	N	N	N	N	N	N	N
Impact on existing landuse	N	N	L	L	M	L	L	L	N	N	N	N	N	N	N	N	N	N	N
Impact on socio-economic conditions	M+	N/A	M+	N/A	M+	N/A	M+	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
CONSTRUCTION PHASE IMPACTS OF THE PROPOSED DEVELOPMENT																		
Impact on noise levels	L	L	L	VL	L	VL	L	VL	L	VL	L	VL	L	VL	L	VL	L	VL
Water and soil pollution	L	VL	L	VL	L	VL	L	VL	L	VL	L	VL	L	VL	L	VL	L	VL
Impact on socio-economic conditions	L	N/A	L	N/A	L	N/A	L	N/A	L	N/A	L	N/A	L	N/A	L	N/A	L	N/A

6.1.1 Level of confidence in assessment

With reference to the information available at this planning and approval stage in the project cycle, the confidence in the environmental assessment undertaken is regarded as acceptable.

It is acknowledged that the project description may evolve during detailed design and construction and any significant deviation from that assessed in this EIR should be subject to further review.

6.1.2 Operational phase impacts on the biophysical and socio-economic environment

Table 6.1 shows the impact of the operation of the proposed development on the biophysical and socio-economic environment. The most significant impacts *without mitigation* are as follows:

- Impact on flora of the OCGT power plant and transmission substation site, transmission line Alternatives 1, 2 and 3 and access route Alternative 3.
- Impact on avifauna of the transmission line Alternatives 1,2 and 3.
- Visual impact of the OCGT and transmission lines.
- Noise impact of the OCGT power plant.

6.1.3 Construction phase impacts

With reference to construction phase impacts of the proposed development, the areas of concern, without mitigation, are as follows:

- Soil and water contamination
- Visual impact and dust control
- Noise impacts

6.1.4 Framework EMP

A framework EMP has been developed to guide construction and operational phases of the proposed project. See Annexure Q. The implementation of the fEMP would minimise the possible negative impacts of construction and operation and assigns responsibility for environmental controls.

6.2 RECOMMENDATIONS

With reference to the assessment described in Section 5 above, it can be noted that the significance levels of the identified impacts could generally be reduced by implementing the

recommended mitigatory measures. Based on this assessment, the following section describes the various project alternatives in terms of their biophysical and socio-economic impacts.

It is important to note that the following recommendations are based on the assumption that the relevant mitigatory measures described in Section 5 are implemented. In addition, only those factors that contributed to preferred alternatives being identified are listed.

6.2.1 OCGT power plant and transmission substation site

As far as visual and botanical impacts are concerned, it is recommended that the site should be located as close to the PetroSA facility as possible, while remaining outside of the identified botanically sensitive areas. Although the impact of noise appears not to be significantly greater than the ambient, by situating the plant as distant as possible from the adjacent rural boundaries to the north and west, the noise regulations can be complied with. Accordingly, the site should be located as far to the south east as possible, without impinging on PetroSA's current and possible future options.

6.2.2 Fuel supply pipeline

As far as risks to human health are concerned, neither of the two alternative routes offer significant constraints and there are no measurable difference between the two alternatives. However, the botanical study recommends that a 50 m buffer is maintained between the route and any sensitive botanical areas and this would suggest a marginal preference for Alternative 2 as it would avoid the sensitive botanical area northeast of the proposed site.

6.2.3 Transmission lines route alternatives

In terms of floral, avifaunal and visual impacts, the central route option (Alternative 2) is likely to have the least environmental impact. While it may not be the preferred route from a landowner perspective and has implications for agricultural activity, adequate compensation and sensitive route alignment and tower placement would do much to alleviate landowner concerns.

6.2.4 Road access route alternatives

In order to avoid an additional intersection on the N2 National Road, the traffic study suggests that either Alternatives 1 or 2 are preferable to Alternative 3. The visual impact study also refers to either Alternative 1 or 2 being preferred. From a botanical perspective there is a marginal preference for Alternative 2 as it avoids the sensitive area northeast of the proposed site. Accordingly, Alternative 2 would result in the least environmental impact.

6.3 THE WAY FORWARD

The opportunities for public involvement during the EIR phase of the proposed project comprised the following:

- Commenting on the Draft EIR, which was lodged at Mossel Bay and D' Almeida Public Libraries and the Eskom Website (www.eskom.co.za/eia) on 7 September 2005. A commenting period was provided, which terminated on the 28 September 2005.
- All registered I&APs were notified of the availability of the draft EIR by means of a letter which included a copy of the draft EIR Summary.
- Media notices were placed in the Mossel Bay Advertiser on 2 September 2005 in order to notify I&APs of the availability of the draft EIR and included an invitation to the third public forum.
- Attending the third pubic forum, which comprised a formal presentation and an Open House at the Mossel Bay Library in Mossel Bay on 15 September 2005 between 15h00 and 20h00. The findings of the Draft EIR were presented and an opportunity to raise concerns and comments was provided.

This finalised EIR has been submitted to DEA&DP for their review and decision.

Once they have considered the document and are satisfied that it provides sufficient information to make an informed decision, DEA&DP will determine the environmental acceptability of the preferred options. Thereafter, DEA&DP will issue an RoD and any conditions of approval attached to the authorisation, should the proposed activity be approved.

Following the issuing of the RoD, DEA&DP's decision will be communicated by means of letters to all identified I&APs. A 30-day appeal period follows, during which I&APs will have an opportunity to appeal against the decision to the Minister of Environmental Affairs and Development Planning in terms of the Environment Conservation Act.

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