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MOSSEL BAY OPEN CYCLE GAS TURBINE POWER PLANT, FUEL SUPPLY PIPELINE, SUBSTATION AND TRANSMISSION LINES

Plan of Study for EIR

MAY 2005

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CONTENTS

1 BACKGROUND TO THE STUDY 1

2 PURPOSE OF THIS PLAN OF STUDY FOR EIR 2

3 THE PLAN OF STUDY FOR EIR 2

3.1 Description of the activity 2
3.2 Description of tasks to be performed 2
3.2.1 Potential Environmental Impacts Identified during Scoping 2
3.2.2 Method for Assessing the Significance of Potential Environmental Impacts 3
3.2.3 Need for Additional Information: Specialist Studies 5
3.2.4 Reasonable Project Alternatives Identified during Scoping 12
3.2.5 Public Participation Process 13
3.2.6 The Environmental Impact Report 14
3.3 Proposed programme 14

4 PERSONNEL 15

4.1 ninham shand 15
4.2 The Environmental Partnership 16
4.3 Mark Wood Consultants 16
4.4 AirShed Planning Professionals 16
4.5 Jongens Keet Associates 17
4.6 Chittenden Nicks de Villiers 17
4.7 Nick Helme Botanical Surveys 17
4.8 Archaeology Contracts Office 17
4.9 Urban-Econ Development Economists 17

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1 BACKGROUND TO THE STUDY[1]

An annual growth of approximately 3% in electricity demand has prompted Eskom to assess various electricity supply options. Open Cycle Gas Turbines (OCGTs) have been identified as a mean of providing peaking capacity to meet projected electricity shortfalls by 2007. The reason for this is that they can be constructed within the required time frame and that they can begin generating electricity within 30 minutes of start-up, making it the ideal technology to supply increased electricity demand in the mornings and evenings (peaking capacity).

Mossel Bay has been identified as one of two sites in the Western Cape where it is proposed to construct an OCGT power plant. The OCGT power plant comprises a fuel supply pipeline from the PetroSA facility to the power plant, a substation at the OCGT power plant and two transmission lines to transfer electricity from the OCGT substation to the Proteus substation (and hence the national grid).

The proposed activities trigger the Environment Conservation Act (ECA) (No. 73 of 1989) and accordingly authorisation is required from the competent environmental authority. Consequently, Ninham Shand and the environmental team were appointed by Eskom to undertake the legislated Environmental Impact Assessment (EIA) process outlined in Regulation R 1183 of the ECA.

The EIA process commenced in February 2003 and the Plan of Study for Scoping was submitted on 8 April 2005. Due to the fact that the proponent is a national body and the proposed project would have effects that cross provincial boundaries, the competent authority is the national Department of Environmental Affairs and Tourism (DEAT). However DEAT is presently attending to the delegation of authority to the provincial department of Environmental Affairs and Development Planning (DEA&DP), George office. For the remainder of this EIA process, DEA&DP will be the competent environmental authority.

The first phase of the EIA process, the Scoping Phase, culminates in the production of a Draft Scoping Report which identifies the array of potential environmental impacts and project alternatives which require more detailed investigation. This draft report also contains the draft Plan of Study for EIR (PoSEIR), allowing the public to comment on the scope of work envisaged for the second phase of the EIA process,

[1] Detailed background information is provided in the Scoping Report and accordingly only the essential elements are reiterated here.

i.e. the EIR Phase. In reviewing the Final Scoping Report, DEA&DP will also review the final PoSEIR.

2 PURPOSE OF THIS PLAN OF STUDY FOR EIR

This PoSEIR has been compiled in terms of the DEAT "*Guideline Document for the Implementation of Sections 21, 22 and 26 of the Environment Conservation Act*" (April 1998) and its purpose is to ensure that the next phase of this EIA process satisfies the requirements of DEAT and the provincial DEA&DP.

At this point, it may be pertinent to clarify the terminology used in the current EIA process:

- The overall process is referred to as the Environmental Impact Assessment or EIA process;
- This process is composed of three phases:
    - The Initial Application Phase;
    - The Scoping Report Phase; and
    - The Environmental Impact Report or EIR Phase

This PoSEIR outlines the anticipated process and products for the EIR Phase of the EIA process.

3 THE PLAN OF STUDY FOR EIR

3.1 DESCRIPTION OF THE ACTIVITY

The nature of the activity is described in detail in the Scoping Report, but in brief it includes the following:

- An OCGT power plant;
- Fuel supply pipeline;
- Substation; and
- Two transmission lines.

3.2 DESCRIPTION OF TASKS TO BE PERFORMED

3.2.1 Potential Environmental Impacts Identified during Scoping

The Scoping investigation has reviewed the full range potential environmental impacts associated with the proposed activities. Based on the Scoping investigation, input from the authorities and Interested and Affected Parties (I&APs), an array of potentially significant environmental impacts were identified for further and more detailed investigation during the EIR phase. Specifically the following potential environmental impacts have been identified:

- Impacts on flora;
- Impacts on avifauna;
- Impacts on air quality;
- Impacts of water consumption;
- Effluent impacts;
- Impact on traffic and access;
- Noise impacts;
- Socio-econoic impacts;
- The impacts of existing infrastructure
- Visual impacts; and
- Impacts on heritage resources.

3.2.2 Method for Assessing the Significance of Potential Environmental Impacts

This section outlines the proposed method for assessing the significance of the potential environmental impacts outlined above. As indicated, these include both operational and construction phase impacts.

For each impact, the EXTENT (spatial scale), MAGNITUDE and DURATION (time scale) would be described. These criteria would be used to ascertain the SIGNIFICANCE of the impact, firstly in the case of no mitigation and then with the most effective mitigation measure(s) in place. The mitigation described in the EIR would represent the full range of plausible and pragmatic measures but does not necessarily imply that they would be implemented.[2]

The tables on the following pages show the scale used to assess these variables, and defines each of the rating categories.

[2] The proponent will be requested to indicate at the Draft EIR stage which mitigation measures they are prepared to implement.

Table 1: Assessment criteria for the evaluation of impacts

CRITERIA	CATEGORY	DESCRIPTION
Extent or spatial influence of impact	**Regional**	Beyond a 7 km radius of the OCGT power plant and associated infrastructure
	Local	Within a 7 km radius of the OCGT power plant and associated infrastructure
	Site specific	On site or within 100 m of the OCGT power plant and associated infrastructure
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	**Construction period**	Up to 18 months
	Medium Term	0-10 years (after construction)
	Long Term	More than 10 years (after construction)

The SIGNIFICANCE of an impact is derived by taking into account the temporal and spatial scales and magnitude. The means of arriving at the different significance ratings is explained in Table 2.

Table 2: Definition of significance ratings

SIGNIFICANCE RATINGS	LEVEL OF CRITERIA REQUIRED
High	• High magnitude with a regional extent and long term duration • High magnitude with either a regional extent and medium term duration or a local extent and long term duration • Medium magnitude with a regional extent and long term duration
Medium	• High magnitude with a local extent and medium term duration • High magnitude with a regional extent and construction period or a site specific extent and long term duration • High magnitude with either a local extent and construction period duration or a site specific extent and medium term duration • Medium magnitude with any combination of extent and duration except site specific and construction period or regional and long term • Low magnitude with a regional extent and long term duration
Low	• High magnitude with a site specific extent and construction period duration • Medium magnitude with a site specific extent and construction period duration • Low magnitude with any combination of extent and duration except site specific and construction period or regional and long term • Very low magnitude with a regional extent and long term duration
Very low	• Low magnitude with a site specific extent and construction period duration • Very low magnitude with any combination of extent and duration except regional and long term
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 would be determined, using the rating systems outlined in Tables 3 and 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.

Table 3: Definition of probability ratings

PROBABILITY RATINGS	CRITERIA
Definite	Estimated greater than 95 % chance of the impact occurring.
Highly probable	Estimated 80 to 95 % chance of the impact occurring.
Probable	Estimated 20 to 80 % 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 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.

3.2.3 Need for Additional Information: Specialist Studies

In discussion with the proponent, authorities and I&APs, several impacts have been identified as being of particular concern. Accordingly, specialists have been appointed to undertake the following studies:

- Botanical impact assessment;
- Avifaunal impact assessment;
- Noise impact assessment;
- Air quality, water use and effluent impact assessment;
- Visual impact assessment;
- Socio-economic impact assessment; and
- Heritage impact assessment.

The Terms of Reference (TOR) for these specialist investigations are detailed below. As a consequence, I&APs have the opportunity to comment on the various TORs.

3.2.3.1 Specialist Botanical impact assessment

The specialist botanical investigation will assess the relative impact of the various alternatives being considered on the floral communities. The ToR for this specialist botanical investigation would be as follows:

- Attend a one-day site inspection on Wednesday 23 February 2005 (completed).
- Source and review baseline information and participate in the finalisation of the ToR.
- Undertake a second site visit and compile a report which reflects the following[3]:
    - Broad description of the ecological characteristics of the site and surrounds;
    - Identification and description of biodiversity pattern at community and ecosystem level (main vegetation type, plant communities in vicinity and threatened/vulnerable ecosystems), species level (Red Data Book species) and in terms of significant landscape features (e.g. wetlands) and presence of alien species;
    - General comment on whether biodiversity processes would be affected;
    - Significance of potential impacts and recommendations to prevent or mitigate these;
    - Ranking in terms of flora impact severity of the transmission line route alternatives in particular; and
    - Indicating the salient elements of the report on a map to be provided by Ninham Shand.

Nick Helme of Nick Helme Botanical Surveys has been appointed to undertake the botanical impact assessment.

3.2.3.2 Avifaunal impact assessment

The avifaunal impact study will assess the potential impacts on birds in the area, to determine whether the proposed alternative transmission line routes will pose particular risks.The study would entail attending to the following:

- General description of the occurrence and status of birdlife in the study area;
- Description of avifaunal habitats likely to be affected;

[3] Derived from the Botanical Society of SA Conservation Unit's *Recommended Terms of Reference for the Consideration of Biodiversity in Environmental Assessment and Decision-making*. March2005.

- Identification of rare or endangered species occurring in the study area;
- Assessment of potential interactions between identified bird species per transmission line alternative and affected habitat; and
- Provide a report capturing the above and including recommendation to mitigate possible impacts on birdlife.

Brett Lawson of Ninham Shand will undertake the specialist avifaunal study.

3.2.3.3 Noise impact assessment

The purpose of this study is to assess the noise impacts of the proposed activities. The study is to be conducted in accordance with Section 7 of the South African National Standard (SANS) 10328 "Methods for environmental noise impact assessments". The noise impacts will be assessed in terms of:

- South African Noise Control Regulations of the Environment Conservation Act, No. 73 of 1989.
- World Health Organisation - Guidelines for Community Noise.
- World Bank - Environmental Guidelines.
- Environmental Protection Agency, United States of America.

The specialist noise investigation would entail the following tasks:

- Determination of the land use zoning and identification of all potential noise sensitive sites that could be impacted upon by activities relating to operation of the proposed OCGT power plants at Atlantis and Mossel Bay;
- Identification of all noise sources relating to the activities of the OCGT power plants during construction and operation, and that could potentially result in a noise impact at the identified noise sensitive sites;
- Determination of the sound emission, operating cycle and nature of the sound emission from each of the identified noise sources. Representative sound measurements are required to be recorded in the vicinity of the proposed sites during different times of day and night. It is estimated that at least two and possibly three days will be needed – assuming acceptable weather conditions. Weather conditions play a deciding factor in the measurement of sound at outdoor sites since sound measurements can only be conducted when wind speeds do not exceed 5m/sec;
- Calculation of the combined sound power level due to the sound emissions of the individual noise sources;
- Calculation of the expected rating level of sound at the identified noise sensitive sites from the combined sound power level emanating from identified noise sources;

- Determination of the existing ambient levels of noise at identified noise sensitive sites by conducting representative sound measurements;
- Determination of the acceptable rating level for noise at the identified noise sensitive sites;
- Calculation of the noise impact at identified noise sensitive sites;
- Assessment of the noise impact at identified noise sensitive sites in terms of SANS 10328; the South African Noise Control Regulations; the World Health Organisation; the World Bank and the Environmental Protection Agency, United States of America;
- Investigation of alternative noise mitigation procedures, if required, in collaboration with the design engineers of the OCGT plants and estimation of the impact of noise upon implementation of such procedures;
- Preparation and submission of a noise assessment report containing the procedures and findings of the investigation; and
- Preparation and submission of recommended noise mitigation procedures as part of a separate environmental noise management and monitoring plan.

Adriaan Jongens of Jongens Keet Associates has been appointed to undertake the noise impact assessment.

3.2.3.4 Air quality assessment

The purpose of the air quality assessment is to provide input regarding the implications of air pollution impacts that may result from the proposed OCGT power plant and associated infrastructure at Mossel Bay.

The proposed methodology should follow the general requirements typically associated with an EIA. These tasks include the following:

- <u>The Establishment of the Baseline</u>:
    - Description of the atmospheric dispersion potential of the area based on available meteorological data.
    - Characterisation of the existing status of air quality based on any available air quality monitoring data.
    - Provide an overview of legislative and regulatory requirements pertaining to atmospheric emissions and ambient air quality, including local and international air quality guidelines and standards.

- Predicted Impacts Arising from the Proposed Plant:

    - The compilation of a comprehensive emissions inventory including process and fugitive emissions. The impact assessment would consider, as a minimum, airborne particulates (inhalable and total suspended particles), oxides of nitrogen, carbon monoxide, sulphur dioxide, unburnt organic compounds, carbon dioxide (greenhouse gas) and any odorous compounds. Where possible, engineering estimates would be used (based on similar installations). Alternatively, international emission factors would be employed which are based on gas (distillate) firing rates. Fugitive emissions include both gaseous (diffuse sources) and particulate compounds. Although only expected to be significant during the construction phase, fugitive dust emission sources include vehicle-entrained dust, earthworks, stockpiles, material transfer and general exposed areas.
    - Preparation of meteorological parameters suitable for the theoretical construction of a wind field and atmospheric dispersion. Hourly average wind speed, wind direction and ambient air temperatures for five years would be prepared for this purpose.
    - Atmospheric dispersion modelling of estimated emissions to determine resultant highest hourly, highest daily and annual average air pollutant concentrations in the vicinity of the proposed plant. The impact would be based on ground level predictions, including both air concentrations and deposition. Gas deposition would include both wet (fog) and dry. The following scenarios would be included:

        - Construction emissions;
        - Routine and upset emissions during normal operation;
        - Emissions during shutdowns; and
        - Effects of mitigation measures e.g. optimum stack height and other engineering options.

    - Impact assessment (incremental and cumulative) of the predicted air concentrations including:

        - Compliance checks with local ambient air requirements, including local authorities, DEAT and South African Standards.
        - Health risk assessment using internationally peer-reviewed risk criteria (typically, the World Health Organisation, US Environmental Protection Agency [IRIS], Agency for Toxic Substances and Disease Registry [ATSDR] and Health Canada).

- Emission compliance check with local and international requirements (e.g. World Bank).

    - Impact Assessment Rating in terms of Magnitude, Significance, Frequency of Occurrence, Duration and Probability.
    - Preparation of emission and ambient air monitoring programme.
    - Compilation of a comprehensive report in which the methodological approach and assumptions and uncertainties used are documented and the findings of the study presented.

Key deliverables from this specialist study would include recommendations regarding mitigation measures to reduce/ control emissions, as input into the technical design process, and guidance with respect to the development of an air monitoring protocol for inclusion in the EMP. The following general procedure would used to develop the EMP:

- Focus on Sources and Pollutants identified as significant in the EIA.
- Using emission limits and air quality guidelines, criteria and targets contained in the EIA, develop Key Performance Indicators for both air quality and emissions.
- All mitigation measures and good housekeeping measures to be associated with each source and pollutant.
- Develop a pro-forma monitoring programme, including procedures, responsibilities and reporting formats (both internal and external).
- Incorporate preliminary cost estimates

The air quality impact assessment will be undertaken by Lucian Burger of AirShed Planning Professionals/ Ilitha Riscom

3.2.3.5 Visual impact assessment

The study is intended to assess the visual impact of the proposed OCGT units to be constructed on the PetroSA site in Mossel Bay and the transmission lines to connect the turbine units to the national grid at Proteus substation. The ToR for the specialist is as follows:

- Describe the existing visual characteristics of the site and its surroundings including any geology/landform features that influence them.

- Describe the visual significance of the area in terms of its history and present utilisation.
- Fully describe the proposed development.
- Determine the potential visual risks and opportunities presented by the proposed development.
- Determine the entire area from which the various elements of the proposed development will be visible (i.e. the viewshed.)
- Determine the important viewpoints from which the development will be visible and determine the nature of the visual impacts at these points.
- Prepare graphics that will aid the process of the assessment, (e.g. simulations of the development superimposed, to scale, on photographs taken from important viewpoints.)
- Assess the significance of the visual impact of the proposed development in terms of its scale, type, and character, including services and any ancillary structures pertaining to the development etc.
- Propose possible mitigation measures to minimise visual impact including changes to the design, alternative finishes and visual screening.
- Propose monitoring and review measures that will ensure long-term maintenance of visual standards.

The visual impact assessment will be undertaken by Tanya de Villiers of Chittenden Nicks de Villiers.

3.2.3.6 Socio-economic assessment

The socio-economic specialist will comment on the proposed site location in terms of the potential economic impacts and its suitability in terms of identified economic criteria.

The input will also involve a baseline study, which will comprise of a comparative analysis of the different identified routes for the transmission lines.

As part of this task, the specialist will develop a checklist of possible economic criteria. Examples of such criteria include the following:

- Supply of electricity to the community
- Creation of job opportunities
- The sterilization of agricultural land
- The impact of tourism activities
- Potential loss in income
- Potential socio-economic impacts

The specialist will develop an economic score card, which will rate the different routes according to the economic criteria determined as part of this task. The findings from the economic score card will provide a preferred route along which to develop the transmission lines based on economic principals.

The socio-economic assessment will be undertaken by Alex Kempthorne of Urban-Econ.

3.2.3.7 Heritage impact assessment

The specialist will assess the potential impacts of the proposed activities on heritage resources. The heritage impact assessment will entail the following:

- Attend a one-day site inspection on Wednesday 23 February 2005 (completed).
- Review information and participate in the finalisation of the ToR.
- Undertake a heritage study that is reflected in a Heritage Statement.

The Heritage Statement will comprise the following:

  - A problem statement, in terms of where, why and how heritage resources may be impacted on;
  - A description of the affected environment;
  - Expected impacts related to the site and route selection in general; and
  - A ranking in terms of heritage impact severity of the transmission line route alternatives in particular.

Tim Hart of the Archaeological Contracts Office at UCT will undertake the heritage impact assessment.

3.2.4 Reasonable Project Alternatives Identified during Scoping

The Scoping investigation has reviewed the full range of project alternatives associated with the proposed activities. Based on input from authorities and I&APs, an array of reasonable project alternatives has been identified for further, more detail investigation during the EIR phase, namely:

- Alternative alignments of the transmission lines from the proposed OCGT site to the Proteus substation:
  - A straight-line route;
  - A route that follows the R327; or
  - A route that follows the railway line and an existing 66kV powerline alignment through a valley (Myn se Kloof) leading to Proteus substation.

- Alternative tower designs;
- Alternative fuel supply pipeline alignments from the PetroSA facility to the proposed OCGT power plant:
    - Along the existing railway line; or
    - A route that runs between the existing PetroSA construction camp and landfill site along the existing 132Kv transmissionline to the proposed OCGT power plant.
- Alternative access road routes:
    - A route that runs from the N2, between the landfill site and PetroSA facility, then westward (passing immediately north of the landfill site) toward the proposed OCGT power plant along the alignment of the existing 132kV transmission line; or
    - A route that runs from the N2, between the land fill site and PetroSA facility, northward to the existing railway line. Thereafter the access road would run westward along the railway line to the proposed OCGT power plant.
- Alternative processes:
    - Using water for abatement of NOx emissions; or
    - NOx abatement without the use of water.
- The exact orientation on the OCGT power plant and substation within the identified site.

3.2.5 Public Participation Process

The purpose of the Public Participation Process would be to provide the I&APs (key stakeholders and the public) with adequate opportunity to have input into the environmental process. The public participation process would include the following:

3.2.5.1 Public Comment on the Draft EIR

Following the completion of the Draft EIR (refer to Section 3.2.6 below), it will be lodged at the Mossel Bay public library and on the Eskom website (www.eskom.co.za/eia). Registered I&APs will be notified of the lodging by means of letters, and given a three-week period in which to comment on the report. During the comment period, a public meeting would be held to enable I&APs to provide feedback on the draft report. The public meeting would be advertised in the local media and in the same letters used to inform the I&APs of the release of the Draft Report.

The public comments would be consolidated into an Annexure of the EIR. This would take the form of an issues trail, which would summarise the issues raised and provide responses thereto. The draft report would also be revised in light of feedback from the public.

3.2.5.2 Opportunity for Appeal

All registered I&APs would be notified in writing of the release of the Record of Decision by DEA&DP. They would be reminded of their right to appeal against DEA&DP's decision to the provincial Minister, in terms of the Environment Conservation Act.

3.2.6 The Environmental Impact Report

The purpose of the EIR would be to undertake a comparative assessment of the significance of the potential environmental impacts of the project alternatives. The EIR would thus include the following:

- A brief overview of the potential environmental impacts and reasonable alternatives identified during the Scoping investigation.
- A summary of the key findings of the various specialist studies as they pertain to the affect environment.
- An overview of the public participation process conducted during the compilation of the EIR.
- A detailed assessment of the significance of the potential environmental impacts for the various project alternatives. This assessment, which would use the methodology outlined in Section 3.2.2, would be informed by the findings of the specialist studies, professional judgement and comment from the various I&APs.
- An overview of the full range of mitigation measures including an indication of how these would influence the significance of any potential environmental impacts. These mitigation measures would be informed by the specialist studies, professional experience and comment received from the I&APs.
- A construction phase Environmental Management Plan (EMP) to minimise the impacts of the construction phase.
- A generic operational phase EMP, which would set environmental guidelines for the operation phase of the proposed OCGT power plant and associated infrastructure.

3.3 PROPOSED PROGRAMME

The Scoping Report is due to be submitted to DEA&DP on 30 June 2005, after a public forum to be held on 13 June 2005. The Scoping Report will include this plan of study.

The Draft EIR will be released at the end of August 2005 and the final public forum is due on 14 September 2005. Submission of the finalised EIR is due on 10 October 2005.

4 PERSONNEL

4.1 NINHAM SHAND

Mike Luger, a Director and the Environmental Discipline Head based at the Cape Town Office, has over eleven years of experience in the field of Integrated Environmental Management, both on a project and management level. Mike will act as Project Director and provide input and review at strategic intervals.

Brett Lawson has an MA in Environmental and Geographical Science, as well as diplomas in wildlife management, business management, environmental management and environmental auditing. He thus has considerable multi-disciplinary experience across the range of environmental sciences. Brett will act as Project Manager and be responsible for the day-to-day running of the project.

Andrew Spinks, a Associate in the Cape Town Office, has a Doctorate in Zoology and undergraduate training in Botany. He has compiled and managed numerous environmental investigations, including Environmental Impact Assessments, Environmental Management Programme Reports and environmental constraints and opportunities reports. Andrew will play a key role in compiling the construction phase EMP.

Barend Smit, an Associate of Ninham Shand and Head of Environmental Section in the Centurion Office, has over 15 years experience in the environmental field, including Environmental Impact Assessments, compilation and implementation of management plans and ISO 14000 Environmental Management Systems as well as environmental auditing, landscape design, tendering and construction supervision and rehabilitation of landscapes. Barend will assist Andrew in compiling the EMP.

Kamal Govender*,* is an Environmentalist Practitioner in the Cape Town Office. He completed an MSc degree in Environmental and Geographical Science at the University of Cape Town in 2004. Since joining Ninham Shand in 2000, he has been involved in the development of various Environmental Impact Assessments, the development and monitoring of Environmental Management Plans, and several Public Participation Processes. Kamal will assist Brett in the day-to-day running of the project.

Nicole Zimmermann, a Senior Environmental Scientist in the Cape Town Office, has a BSc (Honours) degree in Environmental and Geographical Science from the University of Cape Town. She has compiled and been involved in the management of numerous environmental investigations including Environmental Impact Assessments, Environmental Management Plans (EMP) and Environmental Management Systems (EMS). Nicole will provide assistance as and when necessary.

4.2 THE ENVIRONMENTAL PARTNERSHIP

Carmen du Toit has a MPhil in Environmental Management from Stellenbosch University and a BA Honours degree in Environmental and Geographical Science, and a Higher Diploma in Education, from the University of Cape Town, as well as diplomas in Risk Assessment, Environmental Management Systems and Environmental Law. She is registered as a Professional Natural Scientist with SACNASP. She spent two and a half years at Eskom where she was instrumental in initiating and implementing regional and national environmental management systems in accordance with SABS ISO 14001. These included Environmental Impact Assessments, Environmental Management Plans, Environmental Risk Assessments and running Environmental Management Programmes. Carmen will be undertaking the EIA process.

Karen-Dawn Koen is an environmental practitioner with a BA Honours degree in Geography from the University of the Western Cape. She also holds a certificate in Environmental Auditing. Karen has five years experience in environmental research and management, having previously been employed by Eskom's Western Distribution Region, by Arcus Gibb consulting engineers in Cape Town and by the Western Cape Investment and Trade Promotion Agency (WESGRO). Karen will assist Carmen in undertaking the EIA process.

4.3 MARK WOOD CONSULTANTS

Mark Wood has spent most of the past 18 years leading EIAs for major development projects. Of these projects, many have involved installations that are hazardous and controversial in the absence of careful and effective environmental planning. He is currently a review consultant for the three largest transportation infrastructure project proposals in South Africa, and project auditor for the Bakwena Platinum Highway Project. He has extensive experience in both urban and rural environmental and social evaluation. Mark will provide internal review function for the EIA process.

4.4 AIRSHED PLANNING PROFESSIONALS

Lucian Burger is currently the Managing Director of Airshed Planning Professionals (Pty) Ltd and Director of Ilitha Riscom (Pty) Ltd. He completed his bachelor's degree (cum laude) in chemical engineering in 1982. His postgraduate studies (MSc Eng and PhD) were specifically focussed on the development of dispersion modelling theory and related software applications. Lucian has been involved in numerous atmospheric dispersion studies locally and internationally, ranging from environmental impact assessments, risk and hazard assessments, meteorological studies, process designs, to the development of toxic gas evacuation response systems, and other related software. Lucian will undertake the air quality impact assessmnet.

4.5 JONGENS KEET ASSOCIATES

Adriaan Jongens an acoustical engineering consultant since 1971 and senior lecturer at the University of Cape Town, has undertaken environmental noise impact assessments for mining and industry throughout South Africa, Namibia and in the Netherlands. Furthermore, he is a member of the SABS technical committee for Acoustics and Noise Abatement and the International Standards Organisation, TC43 Working Group 38. Adriaan will undertake the noise impact assessment.

4.6 CHITTENDEN NICKS DE VILLIERS

Tanya De Villiers has more than 12 years experience as a landscape architect, has thorough knowledge of working as part of an interdisciplinary team, and is able to take responsibility for the design and coordination of a large variety of projects. Tanya will undertake the visual impact assessment.

4.7 NICK HELME BOTANICAL SURVEYS

Nick Helme is based in Cape Town and since mid 1997 has been working as a specialist botanical consultant, specialising in the diverse flora of the south-western Cape. He has undertaken over 450 botanical assessments of proposed development sites, many of these for electricity distribution projects. Nick will undertake the botanical impact assessment.

4.8 ARCHAEOLOGY CONTRACTS OFFICE

Tim Hart has been involved in a wide rage of archaeological projects ranging from excavation of fossil sites to the conservation of historic buildings, places and industrial structures. Together with team members, he has also been involved in heritage policy development and development of the profession. He has teaching experience within a university setting and has given many public lectures on archaeology related matters. Tim will undertake the heritage/cultural impact assessment.

4.9 URBAN-ECON DEVELOPMENT ECONOMISTS

Ms Alex Kempthorne joined the firm six months after the completion of her Masters Degree in City and Regional Planning. In the period before this she contracted for Jonathon Holtmann and Associates. Ms Kempthorne has gained considerable experience in development economics with high profile property projects in the Western Cape, such as Youngsfield, Milnerton, Bellville and Voortrekkerweg. Alex will undertake the socio-economic impact assessment.

Copies of the relevant CVs are available on request.