Report No: [4793A/402719]

ENVIRONMENTAL IMPACT ASSESSMENT PROCESS: PROPOSED COAL-FIRED POWER STATIONS AND ASSOCIATED INFRASTRUCTURE IN THE WATERBERG, LIMPOPO

FINAL SCOPING REPORT

March 2009

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GLOSSARY OF TERMS

Airshed	An airshed is a part of the atmosphere that behaves in a coherent way with respect to the dispersion of emissions. It typically forms an analytical or management unit and is also a geographic boundary for air quality standards
Base Load	Base load refers to the electricity generated to meet the continuous need for electricity at any hour of the day or night at all times and during all seasons
Environment	The surroundings (biophysical, social and economic) within which humans exist and that are made up of i. the land, water and atmosphere of the earth; ii. micro organisms, plant and animal life; iii. any part or combination of (i) and (ii) and the interrelationships among and between them; and iv. the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and wellbeing
Environmental Impact Assessment (EIA)	A study of the environmental consequences of a proposed course of action.
Environmental Impact Report (EIR)	A report assessing the potential significant impacts as identified during the Scoping phase.
Environmental impact	An environmental change caused by some human act
Peaking or Peak Load	Peaking refers to the periods between approximately 06:00 and 09:00 in the mornings and 18:00 and 21:00 in the evenings when electricity usage “peaks”
Public Participation Process	A process of involving the public in order to identify needs, address concerns, in order to contribute to more informed decision making relating to a proposed project, programme or development
Mothballed	A power station withdrawn from service for an indefinite period.
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 in detail
Scoping Report	A report describing the issues identified

ABBREVIATIONS

AHP	Analytical Hierarchy Process
AsgiSA	Accelerated and Shared Growth Initiative for South Africa
APPA	Atmospheric Pollution Prevention Act (No. 45 of 1965)
BID	Background Information Document
DEAT	Department of Environmental Affairs and Tourism
DEDET	Limpopo Department of Economic Development Environment and Tourism
DME	Department of Minerals and Energy
DSR	Draft Scoping Report
DR	District road
DWAF	Department of Water Affairs and Forestry
EAP	Environmental Assessment Practitioner
EAPSA	Environmental Assessment Practitioner of South Africa
ECA	Environment Conservation Act (No. 73 of 1989)
EIA	Environmental Impact Assessment
EIR	Environmental Impact Report
EMP	Environmental Management Plan
EWT	Endangered Wildlife Trust
FBC	Fluidised bed combustion
FGD	Flue gas desulphurisation
FSR	Final Scoping Report
GA	General Authorisation in terms of the National Water Act
GCS	Groundwater Consulting Services
GGP	Gross Geographic Product

GN	Government Notice
ha	Hectare
HIA	Heritage Impact Assessment
HV	High Voltage
I&AP	Interested and Affected Party
IDP	Integrated Development Plan
IEP	Integrated Energy Plan
IGCC	Integrated coal gasification combined cycle
ISEP	Integrated Strategic Electricity Planning
km	Kilometre
kV	Kilovolt
kWh	Kilowatt hour
l	Litres
LM	Local Municipality
m	Metre
m^3	Cubic metre
mamsl	Metres above mean sea level
MCDA	Multi-criteria Decision Analysis
MPa	megapascals
MPRDA	Mineral and Petroleum Resources Development Act (No. 28 of 2002)
Mt	Million tons
MW	Megawatt
NEMA	National Environmental Management Act (No. 107 of 1998)
NERSA	National Energy Regulator of South Africa
NHRA	National Heritage Resources Act (No. 25 of 1999)

NIRP	National Integrated Resource Plan
NO_x	Oxides of nitrogen
NWA	National Water Act (No 36 of 1998)
NWRS	National Water Resources Strategy
OEM	Original Equipment Manufacturer
OCGT	Open Cycle Gas Turbines
PM_{10}	Particulates with a diameter of 10 µm or more
ppm	Parts per Million
pf	Pulverised fuel
PPP	Public Participation Process
ROM	Run-of-mine
SAHRA	South African Heritage Resources Agency
SANS	South African National Standards
SAM	Social Accounting Matrix
SIA	Social Impact Assessment
SCI	Sasol Chemical Industries
SDF	Spatial Development Framework
SO_2	Sulphur dioxide
SO_x	Oxides of sulphur
SoE	State-owned Enterprises
SSF	Sasol Synthetic Fuels
ToR	Terms of Reference
UCG	Underground Coal Gasification
UNFCCC	United Nations Framework Convention on Climate Change
VIA	Visual Impact Assessment

WMA	Water Management Area
WWTW	Wastewater treatment works
WTW	Water treatment works

Chapter 1

1 INTRODUCTION

The purpose of this Chapter is to introduce the project and describe the relevant legal framework within which the project takes place. Other applicable policies and guidelines are also discussed. The Terms of Reference, scope of and approach to the Environmental Impact Assessment are described and assumptions and limitations are stated.

1.1 INTRODUCTION

Over the last decade, South Africa has experienced a steady growth in the demand for electricity on the back of healthy economic growth. The continued growth in the economy has exhausted the surplus electricity generation capacity of the national electricity utility, Eskom Holdings (Pty) Ltd (Eskom) and has progressively reduced the electricity reserves.

It is expected that the reserve margin will continue on a downward trend for the next couple of years until new base-load power plants are built. In spite of capacity coming on line, which includes the bringing back to service of mothballed power stations such as Camden, Grootvlei and Komati, and building Open Cycle Gas Turbines (OCGT) in Mossel Bay and Atlantis, Western Cape, the electricity demand within the country is still higher than available capacity. Eskom is stepping up the implementation of its capacity expansion programme and is in the process of constructing two coal-fired power stations, Kusile near Witbank and Medupi near Lephalale, Ingula pumped storage scheme near Ladysmith and extending the Atlantis and Mossel bay Open Cycle Gas Turbines (OCGT's). Additional base load and peaking options are required to meet the growing demand, Eskom is therefore investigating nuclear and coal-fired power stations and intend to start construction on peaking plant and wind in the near future.

This Environmental Impact Assessment is for the proposed construction of two new coal-fired power stations and associated infrastructure in the Waterberg (refer to **Figure 1.1**). The power station precincts would include the power station buildings, administration buildings (administrative, medical, maintenance, services) and the high voltage yards, amongst others. The likely associated infrastructure[1] includes a water treatment works, a wastewater treatment works, sewage transportation pipelines, access roads, transmission lines to Delta substation (including MV and HV lines), railway line, water supply pipelines, a coal stockyard, an ash disposal facility, a gypsum storage facility, a coal and ash conveyor system, substation, power and water supply for construction, construction village, telecommunications towers/masts and facilities, a blackstart facility, aircraft landing strip, helipad, a waste storage and disposal facility, and water storage facilities. The two power stations are unlikely to be able to share infrastructure, due to distances between any two stations and project phasing, and therefore there is little opportunity to reduce infrastructural requirements.

[1] A separate Environmental Impact Assessment process will be undertaken for the development of a coal mine to supply coal to the power station.

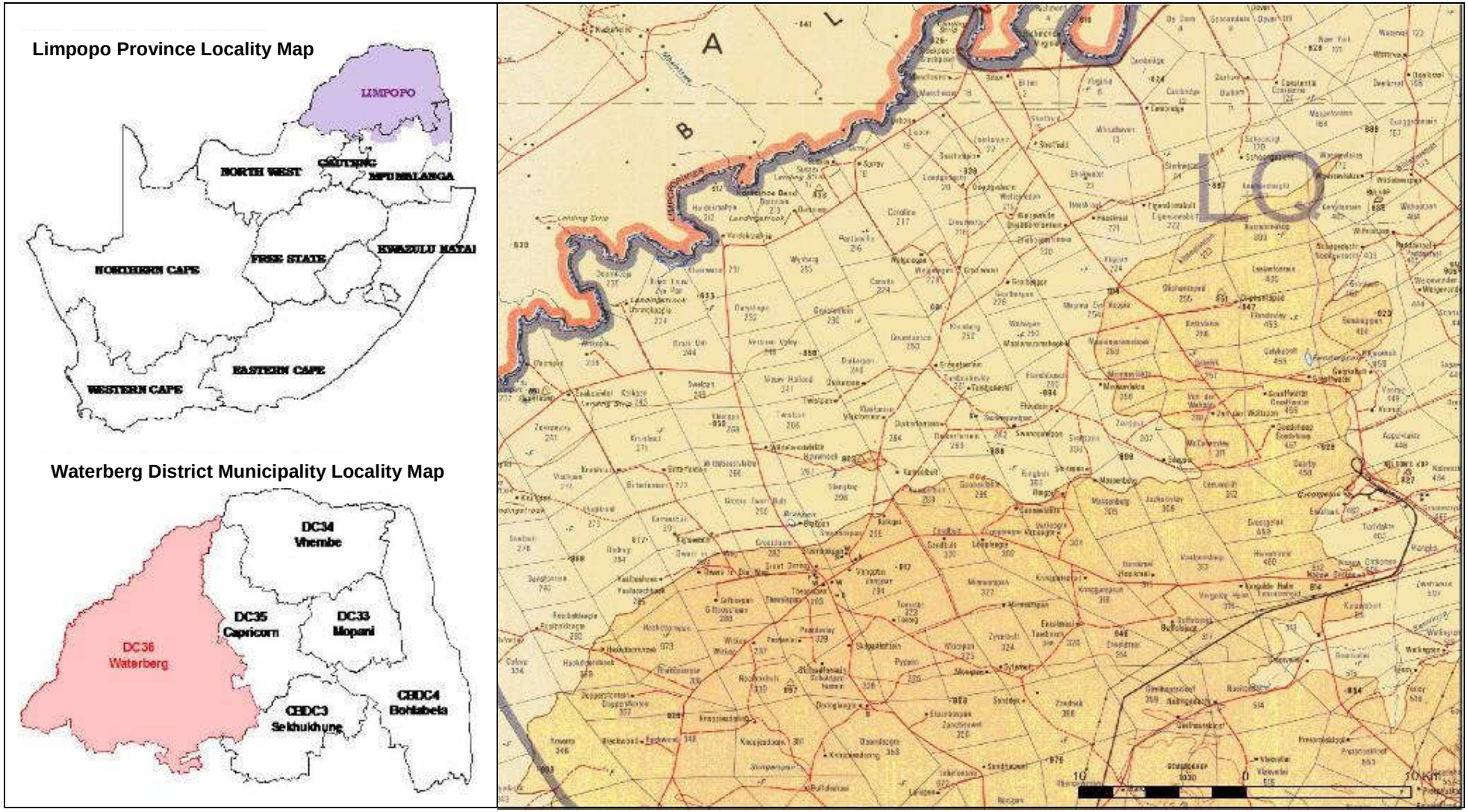

Figure 1.1 Location of the broad study area

In terms of the National Environmental Management Act (No. 107 of 1998) (as amended), the proposed development triggers a suite of activities, which require authorisation from the competent environmental authority before it can be undertaken. Since Eskom is a state-owned enterprise, the competent authority is the national Department of Environmental Affairs and Tourism (DEAT). DEAT's decision will be based on the outcome of this Environmental Impact Assessment (EIA) process. This report serves to document the Scoping Phase of the EIA process (the EIA process and sequence of documents produced as a result of the process is illustrated in **Figure 1.2**).

The purpose of this Scoping Report[2] is to provide the background and outline the scope of work proposed to be undertaken in the EIA Report phase. Accordingly, the Scoping Report:

- Outlines the legal and policy framework;
- Outlines Eskom's envisaged electricity infrastructure plan in the Waterberg Region;
- Describes the site selection process;
- Describes the proposed project and its alternatives;
- Describes the biophysical and socio-economic context;
- Describes the Public Participation Process undertaken to date;
- Identifies potential impacts, including cumulative impacts, that will be assessed in the EIA Phase, inclusive of specialist studies that will be undertaken;
- Details the assessment methodology that will be adopted; and
- Describes the range of alternatives that require further investigation in the EIA Phase.

1.2 LEGAL REQUIREMENTS

1.2.1 NATIONAL ENVIRONMENTAL MANAGEMENT ACT

The National Environmental Management Act (No. 107 of 1998) (NEMA), as amended, establishes the principles for decision-making on matters affecting the environment. Section 2 sets out the National Environmental Management Principles which apply to the actions of organs of state that may significantly affect the environment. Furthermore, Section 28(1) states that "every person who causes or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring". If such pollution cannot be prevented then appropriate measures must be taken to minimise or rectify such pollution.

Eskom has the responsibility to ensure that the proposed activity as well as the EIA process conforms to the principles of NEMA. In developing the EIA process Ninham Shand has been cognisant of this need, and accordingly the EIA process has been undertaken in terms of NEMA and the EIA Regulations promulgated on 21 April 2006[3].

[2] Section 29 of Regulation 385 of NEMA lists the content required in a Scoping Report.
[3] Government Notice No. R 385, R 386 and R 387 in Government Gazette No 28753 of 21 April 2006.

In terms of the EIA regulations certain activities are identified, which require authorisation from the competent environmental authority, in this case the DEAT, before commencing. Listed activities in Government Notice (GN) No. 387 require Scoping and EIA whilst those in GN No. 386 require Basic Assessment (unless they are being assessed under an EIA process). The activities being applied for in this EIA process are listed in **Table 1.1**.

Table 1.1 Listed activities to be authorised for the proposed power station

NO.	LISTED ACTIVITY
	GN No. R387, July 2006
1	The construction of facilities or infrastructure, including associated structures or infrastructure, for- a) The generation of electricity where- i. The electricity output Is 20 megawatts of more; or ii. The elements of the facility cover a combined area in excess of 1 hectare;
	c) the above ground storage of a dangerous goods, including petrol, diesel, liquid petroleum gas or paraffin, in containers with a combined capacity of 1 000 cubic metres or more at any one location or site including the storage of one or more dangerous goods, in a tank farm;
	e) any process or activity which requires a permit of license in terms of legislation governing the release of emissions, pollution, effluent or waste and which is not identified in Government Notice No. R386 of 2006;
	f) the recycling, re-use, handling, temporary storage or treatment of general waste with a throughput capacity of 50 tons or more daily average measured over a period of 30 days;
	g) the use, recycling, handling, treatment, storage or final disposal of hazardous waste;
	k) the landing, parking and maintenance of aircraft, excluding unpaved landing strips shorter than 1.4 kilometres in length, but including – (i) airports; (ii) runways; (iii) waterways; or (iv) structures for engine testing.
	l) the transmission and distribution of above ground electricity with a capacity of 120 kilovolts or more;
	o) the final disposal of general waste covering an area of 100 square metres or more or 200 cubic metres or more of airspace;
	p) the treatment of effluent, wastewater or sewage with an annual throughput capacity of 15 000 cubic metres or more;
	r) the microbial deactivation, chemical sterilisation or non-thermal treatment of waste or effluent;
	s) rail transportation, excluding railway lines and sidings in industrial areas and underground railway lines in mines, but including –

	(i) railway lines; (ii) stations; or (iii) shunting yards;
2	Any development activity, including associated structures and infrastructure, where the total area of the developed area is, or is intended to be, 20 hectares or more;
7[4]	Reconnaisance, exploration, production and mining as provided for in the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002), as amended in respect of such permits and rights;
10	Any process or activity identified in terms of section 53(1) of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004).
GN No, R386, July 2006	
1	The construction of facilities or infrastructure, including associated structures or infrastructure, for- c) the storage of 250 tons or more but less than 100 000 tons of coal;
	k) the bulk transportation of sewage and water, including storm water, in pipelines with – (i) an internal diameter of 0.36 metres or more; or (ii) a peak throughput of 120 litres per second or more;
	l) the transmission and distribution of electricity above ground with a capacity of more than 33 kilovolts and less than 120 kilovolts;
	n) the off-stream storage of water, including dams and reservoirs, with a capacity of 50 000 cubic metres or more, unless such storage falls within the ambit of the activity listed in item 6 of Government Notice No. R387 of 2006;
	o) the recycling, re-use, handling, temporary storage or treatment of general waste with a throughput capacity of 20 cubic metres or more daily average measured over a period of 30 days, but less than 50 tons daily average measured over a period of 30 days;
	p) the temporary storage of hazardous waste;
	q) the landing, parking and maintenance of aircraft including – (i) helicopter landing pads excluding helicopter landing facilities and stops used exclusively by emergency services; (ii) unpaved aircraft landing strips shorter than 1.4 km; (iii) structures for equipment and aircraft storage; (iv) structures for maintenance and repair; (v) structures for fueling and fuel storage; and (vi) structures for air cargo handling;
12	The transformation or removal of any indigenous vegetation of 3 hectares or more or of any size where the transformation or removal would occur within a critically

[4] Note that authorization for Listed Activity 7 is required from Department of Minerals and Energy, not DEAT. As such separate authorization for this activity will be sought from DME at a later date.

	endangered of an endangered ecosystem listed in terms of Section 52 of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004)
~~13~~	~~The abstraction of groundwater at a volume where any general authorization issued in terms of the National Water Act, 1998 (Act No. 36 of 1998) will be exceeded;~~
14	The construction of masts of any material or type and of any height, including those used for telecommunication broadcasting and radio transmission, but excluding – (a) Masts of 15 metres and lower exclusively used (i) By radio amateurs; or (ii) For lighting purposes (b) Flag poles; and (c) Lightning conductor poles;
15	The construction of a road that is wider than 4 metres or that has a reserve wider than 6 metres, excluding roads that fall within the ambit of another listed activity or which are access roads of less than 30 metres long;
16	The transformation of undeveloped, vacant of derelict land to – (a) establish infill development covering an area of 5 hectares or more, but less than 20 hectares; or (b) residential, mixed, retail, commercial, industrial or institutional use where such development does not constitutes infill and where the total area to be transformed is bigger than 1 hectare;
20	The transformation of an area zoned for use as public open space or for a conservation purpose to another use;
25	The expansion of or changes to existing facilities for any process or activity, which requires an amendment of an existing permit or license or a new permit or license in terms of legislation governing the release of emissions, pollution, effluent.

Since the proposed project is based in Limpopo province, DEAT will work closely with the provincial Department of Economic Development Environment and Tourism (DEDET), to ensure that the provincial environmental concerns are specifically identified and addressed.

Further information on the EIA approach is provided in **Section1.4**.

1.2.2 THE ATMOSPHERIC POLLUTION PREVENTION ACT

In terms of the Atmospheric Pollution Prevention Act (No. 45 of 1965) (APPA), power generation processes, including the combustion of fuel for the generation of electricity for distribution to the public, are classified as Scheduled Processes, requiring a registration certificate or permit from DEAT: Chief Air Pollution Control Officer. This Act is however scheduled to be repealed shortly, and will be replaced by the National Environmental Management: Air Quality Act (No. 39 of 2004).

1.2.3 NATIONAL ENVIRONMENTAL MANAGEMENT: AIR QUALITY ACT

The National Environmental Management: Air Quality Act (No. 39 of 2004) (NEMAQA) was promulgated in February 2005, but to date has not come into full effect. This Act aims to reform current air quality legislation and provide national standards regulating the monitoring, management and control of air quality, while at the same time promoting justifiable economic and social development.

The South African standards for ambient air quality are included as Schedule 2 of NEMAQA. These are however considered to be incomplete when compared to legal limits issued by other countries. Air quality standards typically comprise: thresholds, averaging periods, monitoring protocols, timeframes for achieving compliance and typically also permissible frequencies of exceedance. Subsequently, updated ambient air quality standards were proposed on 24 October 2007, and these will be replaced by the official ambient air quality standards, implemented under NEMAQA, by approximately September 2009.

In terms of NEMAQA, an electricity generation process is classified as a listed activity and as such requires an atmospheric emissions license in order to operate. During the transitional period while the new legislation becomes ratified, an application for a registration certificate under the APPA will be taken as an application for an atmospheric emission license under NEMAQA. Holders of registration certificates are responsible for proving compliance with the requirements of such permits and for applying for Atmospheric Emissions Licenses. As the proposed power stations are listed activities they will be required to apply for Atmospheric Emissions Licenses and comply with the new standards when they are promulgated.

1.2.4 NATIONAL HERITAGE RESOURCES ACT

In terms of the National Heritage Resources Act (No. 25 of 1999) (NHRA), any person who intends to undertake "*any development … which will change the character of a site exceeding 5000 m^2 in extent*", *"the construction of a road…powerline, pipeline…exceeding 300m in length"* or *"the rezoning of site larger than 10 000 m^2 in extent…"* must at the very earliest stages of initiating the development notify the responsible heritage resources authority, namely the South African Heritage Resources Agency (SAHRA) or the relevant provincial heritage agency. These agencies would in turn indicate whether or not a full Heritage Impact Assessment (HIA) would need to be undertaken.

Section 38(8) of the NHRA specifically excludes the need for a separate HIA where the evaluation of the impact of a development on heritage resources is required in terms of NEMA. Accordingly, since the impact on heritage resources would be considered as part of the EIA process outlined here, no separate HIA would be required. SAHRA or the relevant provincial heritage agency would review the EIA reports and provide comments to DEAT, who would include these in their final Environmental Authorisation. However, should a permit be required for the damaging or removal of specific heritage resources, a separate application would have to be submitted to SAHRA or the relevant provincial heritage agency for the approval of such an

activity, if Eskom obtain authorisation and make the decision to pursue the proposed project further.

1.2.5 OTHER APPLICABLE LEGISLATION AND POLICIES

a) National Water Act

In terms of Section 21 of the National Water Act (No. 36 of 1998) (NWA), the taking of water from a water resource, storing of water, impounding or diverting the flow of water in a water course, and the disposal of water which contains waste or has been heated through a power generation process are all considered water uses, which in general must be licensed, unless permitted as a Schedule 1 activity, or permissible in terms of a General Authorisation (GA) under Section 39 of the Act.

Schedule 1 activities relate mostly to small scale domestic usage of water and would therefore not be applicable to the proposed project. The disturbance to the bed or banks of a river, which could possibly take place during the construction of some of the linear infrastructure, could also be undertaken in terms of the above-mentioned GA, provided that Eskom meets the conditions of the GA.

Eskom would obtain the requisite licenses, registrations or GA from the Department of Water Affairs and Forestry (DWAF) directly and these do not form part of the scope of the current EIA process. Comment will however be sought from the DWAF, which will then be forwarded to DEAT to consider during its decision-making process.

Part 3 of the NWA deals with the Reserve, which is divided into the basic human needs Reserve and the ecological Reserve. The basic human needs Reserve provides for the essential needs of individuals served by the water resource in question and includes water for drinking, for food preparation and for personal hygiene. The ecological Reserve relates to the water required to protect the aquatic ecosystems of the water resource. The Reserve refers to both the quantity and quality of the water in the resource, and will vary depending on the class of the resource. In terms of Section 16 of the Act, as soon as reasonably practicable after the class of all or part of a water resource has been determined, the Minister must, by notice in the *Gazette*, determine the Reserve for all or part of that water resource. The Reserve would have to be determined, before DWAF could issue a licence for a new water use, in terms of the NWA. It must however be noted that the power stations may not undertake their own abstraction of water from a water resource, but would be supplied via a larger water supply scheme.

b) Mineral and Petroleum Resources Development Act

In terms of the provisions on the Minerals and Petroleum Resources Development Act (No. 28 of 2002) (MPRDA), the sourcing of material for road construction purposes (i.e. the use of borrow pits[5]) is regarded as mining and accordingly is subject to the requirements of the Act. In terms of the current project, two sections of the Act are most relevant:

- In terms of Section 106(3), "*Any landowner or lawful occupier of land who lawfully, takes sand, stone, rock, gravel or clay for farming or for effecting improvements in connection with such land or community development purposes, is exempted from the provisions of subsection (1) as long as the sand, stone, rock, gravel or clay is not sold or disposed of.*" Accordingly, if the requisite materials can be sourced from the property upon which the power station would be constructed, and if Eskom are the owners of this property, no authorisation would be required in terms of the MPRDA. Eskom would merely be required to notify the Regional Manager of the Department of Minerals and Energy (DME) regarding the proposed activities.

- If material is to be sourced on a property that would not form part of the power station development, and/ or is not owned by Eskom, authorisation would be required from DME. In terms of Section 27 of the Act, if the proposed borrow pits would be mined in less than two years and would each be less than 1.5 ha in extent, a Mining Permit would be required.

c) Expropriation Act

Should Eskom decide to construct the proposed power station and associated infrastructure, Eskom would need to negotiate with the landowners to obtain the requisite land. Eskom has a policy of applying the "willing buyer, willing seller" concept, and therefore endeavours to purchase land wherever possible in consultation and negotiation with the relevant landowners. However, the State and State-owned-enterprises (SoE) can acquire the rights to use or possess the requisite land through the Expropriation Act (No. 63 of 1975). The Act requires the determination of compensation based on the principle of market value (i.e. what would the value be in the event of both a willing buyer and a willing seller trading the land). There is a suite of additional legislation, which, in conjunction with the Expropriation Act would be used to determine the compensation value.

[5] Gravel for construction purposes such as roads and foundations is obtained from a borrow pit, which consists of a shallow depression generally 1.5-2.5 m deep and 2-4 ha in area.

In the event of Eskom requiring rights to pieces of land, the State acquires the land through the Department of Public Works, and the Department of Land Affairs. Persons living on the affected land, but not relatives of the owner, are considered to have land rights and are entitled to some form of compensation. Similarly, tenants may be entitled to compensation, dependent on the lease agreement stipulations. Land not in private ownership is either state owned or land held in trust by the Minister of Land Affairs. Occupants of the latter are considered to be possessors of land rights and are entitled to compensation.

d) Additional legislation that will be examined in the EIA

- The Constitution of the Republic of South Africa (Act 108 of 1996) (the Constitution)
- Promotion of Administrative Justice Act (Act 3 of 2000) (PAJA)
- Promotion of Access to Information Act (Act 2 of 2000) (PAIA)
- National Environmental Management: Protected Areas Act, 2003 (Act 57 of 2003)
- Water Services Act (Act 108 of 1997)
- The National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004)
- The Conservation of Agricultural Resources Act (Act 43 of 1983)
- Hazardous Substances Act (Act 115 of 1973)
- Transportation of Dangerous Goods and Substances (GNR 103 of 12 October 2001)
- Disaster Management Act, 2002 (Act 57 of 2002)
- Electricity Act, 1987 (Act 41 of 1987)
- National Building Regulations and Building Standards Act, 1977 (Act 103 of 1977)
- National Road Traffic Act, 1996 (Act 94 of 1996)
- Occupational Health and Safety Act, 1993 (Act 85 of 1993)
- Physical Planning Act, 1991 (Act 135 of 1991)
- Development Facilitation Act (Act 67 of 1995)
- Minerals Act (Act 50 of 1991)
- National Health Act, 2003 (Act 61 of 2003)
- National Environmental Management: Waste Management Bill (B39 – 2007)

e) The Kyoto Protocol

The United Nations Framework Convention on Climate Change (UNFCCC) attempted to initiate a process to develop a more specific and binding agreement on the reduction of greenhouse gas emissions. This led to negotiations with a particular focus on the commitments of developed countries, and culminated in the adoption of the Kyoto Protocol in 1997, which came into force in February 2005. The Kyoto Protocol

elaborates the FCCC by placing more specific obligations on developed countries and Countries with Economies in Transition. Parties to Annex 1 of the FCCC (developed countries) are obliged to reduce their overall emissions of six greenhouse gases by at least 5 % below the 1990 levels between 2008 and 2012. Non-annex 1 Parties, i.e. developing countries, of which South Africa is one, do not have to make any comparable cuts unless they choose to (Glazewski, 2005).

In developing the Kyoto Protocol, the need to promote sustainable development was recognised. This means implementing policies and measures to, among others, enhance energy efficiency, protect and enhance sinks and reservoirs of greenhouse gases, promote sustainable forms of agriculture, increase the usage of new and renewable forms of energy and of advanced and innovative environmentally sound technologies. The Kyoto Protocol is a legally binding instrument. In response, South African policies are starting to place emphasis on cleaner technology and production, and a shift to sustainable development.

Eskom is working with DEAT to realise the strategic objectives, principles and proposals of the National Climate Change Response Strategy. In this regard, Eskom created and rolled out a plan in line with Government's response strategy during 2005 and 2006 respectively. Priority areas include climate change criteria as part of decision-making, continual improvement in reporting, commitment to national and international government and business processes and participation in Clean Development Mechanisms (Eskom Holdings Ltd, 2006).

Eskom's climate change strategy is summarized in the six-point plan:

(i) Adaptation to the negative impacts of climate change;
(ii) Diversification of the energy mix to lower carbon emitting technologies;
(iii) Energy efficiency measures to reduce demand and greenhouse gas and other emissions;
(iv) Innovation through research, demonstration and development;
(v) Investment through carbon market mechanisms; and
(vi) Progress through advocacy, partnerships and collaboration.

By the end of the first commitment period of the Kyoto Protocol in 2012, a new international framework needs to have been negotiated and ratified that can deliver the stringent emission reductions the Intergovernmental Panel on Climate Change has clearly indicated are needed.

f) Additional policies, plans and regulations that will be examined in the EIA

- The White Paper on the Energy Policy of the Republic of South Africa
- Energy Efficiency Strategy of the Republic of South Africa
- Energy Security Master Plan – Electricity (2007-2025)
- National Response to South Africa's Electricity Shortage

- National Spatial Biodiversity Assessment (NSBA)
- National Biodiversity Strategy Action Plan (NBSAP)
- Provincial Growth and Development Strategy Green Paper
- Integrated Development Plans (IDP) of relevant municipalities

g) Guidelines

This EIA process is informed by the series of national Environmental Guidelines[6] where applicable and relevant:

- Guideline for determining the scope of specialist involvement in EIA Processes (June 2005)
- Guideline for involving biodiversity specialists in EIA processes (June 2005)
- Guideline for involving heritage specialists in EIA processes (June 2005)
- Guideline for involving visual and aesthetic specialists in EIA processes (June 2005)
- Guideline for Environmental Management Plans (June 2005)
- Guideline for the review of specialist input into the EIA Process (June 2005)
- Draft Guideline on Public Participation (November 2006)
- Draft Guideline on Alternatives (November 2006) and
- Draft Guideline on the interpretation of the listed activities (November 2006)

A desktop review of relevant literature, including a review of previous environmental studies in the area was also undertaken. These included, *inter alia*, the following:

- Lephalale Local Municipality Integrated Development Plan (IDP)(2007);
- Waterberg District Municipality Spatial Development Framework (SDF)(2006);
- Vegetation Map of South Africa (Mucina & Rutherford, 2006);
- Environmental Scoping Report for the Proposed Establishment of a New Coal-Fired Power Station in the Lephalale area, Limpopo Province (Bohlweki, 2005);
- EIA for the Proposed Establishment of a New Coal-Fired Power station in the Lephalale Area, Limpopo Province (Bohlweki, 2006);
- EIA for the Delta-Epsilon 765 kV Transmission Integration Project (PBA International (SA) Engineering and Environmental Consulting Services and Margen Industrial Services, 2008);
- EIA for the Mmamabula-Delta 400 kV Transmission Integration Project (PBA International (SA) Engineering and Environmental Consulting Services and Margen Industrial Services, 2007); and
- World Bank Group: Pollution Prevention and Abatement Handbook, 1998, Thermal Power: Guidelines for New Plants

[6] Note that these Guidelines have not yet been subjected to the requisite public consultation process as required by Section 74 of R385 of NEMA.

1.3 TERMS OF REFERENCE AND SCOPE OF THE EIA

In June 2008, Eskom appointed a team led by Ninham Shand to undertake an EIA process for the proposed construction of a new coal-fired power station and the associated infrastructure in the Waterberg, Limpopo. After lengthy consideration and planning Eskom amended the EIA application to include an additional 5 400 MW coal-fired power station in the Waterberg.
Eskom's Integrated Strategic Electricity Plan identified that new power stations are required in the short and medium term to meet future demand. Although other forms of energy, such as wind, solar, hydro and gas, are being pursued, coal-fired and nuclear power stations are, and will remain for some time, the two primary electricity supply options available in South Africa.

As significant quantities of coal are found in the Waterberg area a number of coal-fired power stations could be supported. As more power is required to ensure the reliability of electricity supply into the future it is very likely that, in addition to the original proposed power station, a second coal-fired power station would be located in this area. It was felt by Eskom that it was best to combine the EIA processes for the proposed two power stations. A single EIA process will best assess the additive and cumulative impacts and the proposed siting (location) of the two power stations. This approach would also encourage a more transparent process and allow key stakeholders and I&APs to comment on all information available, including Eskom's forward planning.

As the rationale for the siting of both of these stations is the same, it was proposed that each station be located on one of the three potential sites under study.

Therefore the scope of the environmental work was amended to include a second power station and is as follows:

- Facilitate a site selection process, to assist Eskom in the identification of feasible sites for the proposed power station;
- Undertake an EIA process for the proposed construction of two new coal-fired power stations and associated infrastructure including *inter alia* wastewater treatment works (WWTW), water treatment works (WTW), demineralisation plants, water pipelines, access roads, a high-voltage yards, clean and dirty water dams, coal and other material stockpiles , ash management facilities and all associated infrastructure and equipment;
- Develop an Environmental Management Plan (EMP) for the construction and operational phases of the proposed projects, and a framework EMP for the decommissioning phase of the proposed projects.

Eskom's Terms of Reference (ToR) for the EIA is included as **Annexure A** of this report.

In terms of Eskom planning processes it was established that at least two new coal fired power stations may be required within the next 10 – 15 years, the scope of the work was therefore changed. Hence, authorisation is being sought for the construction of two new coal-fired power stations and the directly associated infrastructure as mentioned above. The consideration of the transportation and supply of sorbent and coal from commercial sources will also be considered in the EIA process as well as the transmission lines required to convey the electricity generated

from the power stations to the proposed Delta substation only. The transmission integration projects to evacuate the power from the Delta substation to other parts of the country will be dealt with by a separate EIA process.

This EIA process specifically excludes the requisite coal mine to supply coal to the proposed power station. This aspect constitutes an activity requiring environmental authorisation in its own right, and would be subjected to its own independent EIA processes in due course, once the coal supplier(s) have been identified, potential contracts negotiated and supply agreements signed.

1.4 APPROACH TO THE PROJECT

There are three distinct phases in the EIA process, as required in terms of NEMA, namely the Initial Application, the Scoping and EIA Phases. The EIA process is described below and diagrammatically represented in **Figure 1.2**.

To date, the EIA process has unfolded as follows:

- Submission of an Application Form to notify DEAT of the project, submitted on 23 July 2008. This represents the Initial Application Phase of the EIA process. An acknowledgement of receipt of the Application Form was received from DEAT dated 29 July 2008. Both the Application Form and DEAT's letter of acknowledgement are included in **Annexure B**;
- Distribution of the Background Information Document (BID) (included in **Annexure C**) on 15 September 2008 to inform Interested and Affected Parties (I&APs) of the project and to invite I&APs to register on the database;
- Advertisements were placed in a suite of national, regional and local newspapers notifying the broader public of the initiation of the EIA and inviting them to register as I&APs from 15 September 2008 (the advertisements are included in **Annexure C**);
- Broad authority consultation, via an Authority Meeting on 3 October 2008 (attendance register and notes of the meeting are included in **Annexure C**); and
- A focus group meeting was held with key stakeholders (directly affected landowners and their neighbours) on 4 October 2008 (attendance register and notes of the meetings are included in **Annexure C**).

This Report covers the second phase, namely the Scoping Phase. The Scoping Phase will be followed by the EIA Phase, which will culminate in a comprehensive document, the Environmental Impact Report (EIR).

Scoping is defined as a procedure for determining the extent of and approach to the EIA phase and involves the following key tasks:

- Involvement of relevant authorities and I&APs;

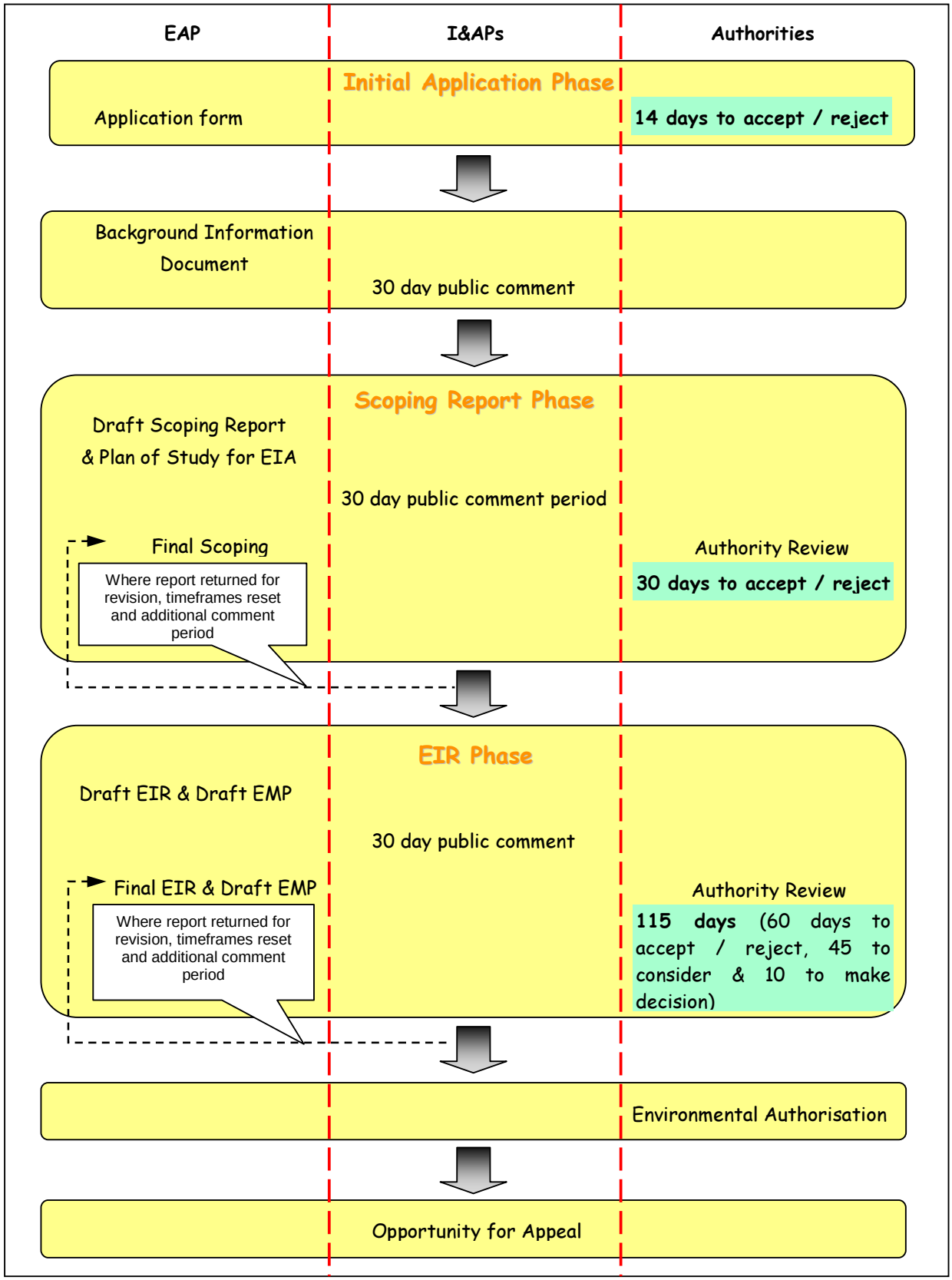

Figure 1.2 The EIA process in terms of NEMA

- Identification and selection of feasible alternatives to be taken through to the EIA phase;
- Identification of significant issues/ impacts associated with each alternative to be examined in the EIR; and
- Determination of specific ToR for the specialist studies required in the EIR (Plan of Study for EIR).

As the precursor to the formal EIA process, Ninham Shand, assisted by Eskom, undertook a site selection process in order to focus the subsequent investigations of the Scoping and EIR phases. This process and the results thereof are presented and discussed in **Chapter 3** of this report.

1.4.1 THE SCOPING REPORT PHASE

An inception field trip was held on 6 October 2008 with all specialists (except the air quality and noise impact assessment specialists) of the EIA team and the client body. The purpose of the field trip was to facilitate an understanding of the key aspects such as:

- Biophysical issues:
  - Terrestrial and aquatic fauna and flora;
  - Local ambient air quality;
  - Groundwater resources;
  - Visual aspects
- Social issues:
  - Heritage issues
  - Location of local communities;
  - Land use issues and planning;
- Construction phase issues.

The information gathered from the site visit was used in refining the ToR for the EIA process and the specialist studies to be undertaken during the EIR phase.

Consultation with the public forms an integral component of this investigation and enables I&APs, e.g. directly affected landowners, national, provincial and local authorities, environmental groups, civic associations and communities, to identify their issues and concerns, relating to the proposed activities, which they feel should be addressed in the Scoping Report. A detailed summary of the public participation process, and the issues and concerns raised by the various I&APs is provided in **Chapter 5**.

1.4.2 AUTHORITY INVOLVEMENT

The Application Form was submitted to DEAT on 23 July 2008 (refer to **Annexure B**). A broad authority meeting was held with relevant authorities on 3 October 2008 at Machauka Lodge, in Lephalale.

Authorities that were invited to participate include:

- Lephalale Local Municipality;
- Limpopo Department of Health and Welfare;
- National Department of Agriculture;
- Department of Minerals and Energy;
- South African Heritage Resources Agency;
- DEAT: Air Quality and Climate Change and Environmental Manager;
- Waterberg District Municipality;
- DEDET;
- DWAF;
- Department of Transport; and
- Road Agency: Limpopo.

Authorities that participated in the meeting included:

- DWAF;
- DEAT;
- Department of Public Works
- Lephalale Local Municipality;
- Waterberg District Municipality; and
- DEDET.

DEAT accepted the Application Form on 29 July 2008 (refer to **Annexure B** for a copy of the letter of acceptance).

1.4.3 DECISION MAKING

Once the Final Scoping Report has been completed with all I&AP comments incorporated into the Issues Trail, it will be submitted to DEAT for its review. The competent authority must, within 30 days of receipt of the Scoping Report, in writing –

(a) Accept the report and Plan of Study for EIA contained in the report and advise the Environmental Assessment Practitioner (EAP) to proceed with the tasks contemplated in the Plan of Study for EIA, or

(b) Request the EAP to make such amendments to the report or the Plan of Study for EIA as the component authority may require, or

(c) Reject the Scoping Report or Plan of Study for EIA if it

  (i) Does not contain material information required in terms of these regulations, or

  (ii) Has not taken into account guidelines applicable in respect of Scoping Reports and Plans of Study for EIA.

1.5 ASSUMPTIONS AND LIMITATIONS

1.5.1 ASSUMPTIONS

In undertaking this investigation and compiling the Scoping Report, the following has been assumed:

- The strategic level investigations undertaken by Eskom prior to the commencement of the EIA process are technologically acceptable and robust.
- This project level EIA deals with two coal-fired power stations in the Waterberg, and is unable to assess the policy level and strategic decision-making which led to this project.
- The EIA process for the power stations is distinct from the EIA process~~es~~ for the requisite coal mine~~ and the transmission integration (if required).~~ However, cumulative impacts will be taken into consideration where applicable. It is assumed that this separation does not constitute a procedural flaw in terms of the EIA process.
- The information provided by the applicant and specialists is accurate and unbiased.
- The scope of this investigation is limited to assessing the environmental impacts associated with the proposed power stations and their associated infrastructure.
- The site selection process utilised to identify and screen potential sites is acceptable to DEAT and the results therefore are considered a defendable starting point for the EIA process.

1.5.2 GAPS IN KNOWLEDGE

This Scoping Report has identified the potential environmental impacts associated with the proposed activities. However, the scope of impacts presented in this report could change, should new information become available during the EIR phase. The purpose of this section is therefore to highlight gaps in knowledge when the Scoping Report phase of the project was undertaken.

- The planning for the proposed power stations is at a feasibility level for the first of these two stations, and a pre-feasibility level for the second one, and therefore many of the specific details are not available at this stage of the EIA process. This EIA process forms a part of the suite of feasibility studies, and as these studies progress, more information will become available to inform the EIA process. This will require the various authorities, and especially DEAT, to issue their comments and ultimately their Environmental Authorisation to allow for the type of refinements that typically occur during these feasibility studies and detailed design phase of complex projects. Undertaking the EIA process in parallel with the feasibility study does however have a number of benefits, such as facilitating environmental aspects into the site selection, layout, and design and therefore ultimately encouraging a more environmentally sensitive and sustainable development.
- The environmental impacts associated with a new coal mine to feed the proposed power station are not considered, due to, *inter alia*, uncertainties with respect to the coal supplier and the location of the coal source.

- Similarly, environmental impacts associated with the borrow pits cannot be commented on due to the lack of technical information and locations of the borrow pits at this stage. Approval of the borrow pits would be required from DME and hence the impacts of the borrow pits would be assessed under a separate process. Studies investigating sources of borrow materials indicate that borrow material may be sourced from both within and outside of the sites. An appropriate process will be undertaken once the results of these studies are known and accepted by Eskom, and stakeholders will be engaged as necessary.
- The cumulative impacts associated with future developments exploiting the large scale coal resource in the Waterberg may not all be commented on as potential future projects are not all known.

1.6 INDEPENDENCE

The requirement for independence of the environmental consultant is aimed at reducing the potential for bias in the environmental process. Neither Ninham Shand nor any of its sub-consultants are subsidiaries of Eskom. Furthermore, Ninham Shand does not have any interests in secondary or downstream developments that may arise out of the authorisation of the proposed project.

The Project Director, Mr Brett Lawson and the Project Manager, Mr Ashwin West, are appropriately qualified and registered with the relevant professional bodies. Mr Lawson is a certified Environmental Assessment Practitioner of South Africa (EAPSA), and is registered as a Professional Natural Scientist with the South African Council for Natural Scientific Professions. Mr West is registered as a Professional Natural Scientist with the South African Council for Natural Scientific Professions. Consequently Ninham Shand is bound by the codes of conduct for EAPSA and the South African Council for Natural Scientific Professions. The CV summaries of the key Ninham Shand staff as well as the key public participation consultants are included in the Plan of Study for EIA contained in **Chapter 7**.

1.7 STRUCTURE OF THE SCOPING REPORT

Table 1.2 presents the structure of the Scoping report as well as the applicable sections that address the required information in terms of NEMA. Specifically, Section 29 (I) A of the EIA Regulations requires that the following information is provided:

Table 1.2 NEMA requirements for Scoping Reports

(a)	Details of: (i) the EAP who prepared the report; (ii) the expertise of the EAP to carry out Scoping procedures;
(b)	a description of the proposed activity and of any feasible reasonable alternatives that have been identified;
(c)	a description of the property on which the activity is to be undertaken and the location

	of the activity on the property, or if it is: (i) a linear activity, a description of the route of the activity; or (ii) an ocean-based activity, the coordinates where the activity is to be undertaken;
(d)	a description of the environment that may be affected where the activity and the manner in which the physical, biological, social, economic and cultural aspects of the environment may be affected by the proposed activity;
(e)	an identification of all legislation and guidelines that have been considered in the preparation of the Scoping Report;
(f)	a description of environmental issues and potential impacts, including cumulative impacts, that have been identified;
(g)	information on the methodology that will be adopted in assessing the potential impacts that have been identified, including any specialist studies or specialised processes that will be undertaken;
(h)	details of the public participation processes conducted in terms of Regulation 28(a), including; (i) the steps that were taken to notify potentially I&APs of the application; (ii) proof that notice boards, advertisements and notices notifying potentially interested and affected parties of the application have been displayed, placed or given; (iii) a list of all persons or organisations that were identified and registered in terms of Regulation 57 as I&APs in relation to the application; and (iv) a summary of the issues raised by interested and affected parties, the date of receipt and response of the EAP to these issues;
(i)	a Plan of Study for EIA which sets out the proposed approach to the environmental impact assessment of the application, which must include: (i) a description of the tasks that will be undertaken as part of the EIA process, including any specialist reports or specialised processes, and the manner in which such tasks will be undertaken; (ii) an indication of the stages at which the competent authority will be consulted; (iii) a description of the proposed method of assessing the environmental issues and alternatives, including the option of not processing with the activity; and (iv) particulars of the public participation process that will be conducted during the EIA process; and (j) any specific information required by the competent authority.

Section 29 of NEMA regulations explicitly requires specific content to be addressed in the Scoping Report. **Table 1.3** assists the reader to find the relevant section in the report.

Table 1.3 Location of content prescribed by NEMA for Scoping Reports

REGULATION	CONTENT AS REQUIRED BY NEMA	CHAPTER/ANNEXURE	PAGE
29 (1) (a)	EAP and expertise of the EAP	Chapter 7	113
29 (1) (b)	Description of the proposed activity	Chapter 4	47
29 (1) (c)	Description of the property	Chapter 6	67

REGULATION	CONTENT AS REQUIRED BY NEMA	CHAPTER/ANNEXURE	PAGE
29 (1) (d)	Description of the environment	Chapter 6	67
29 (1) (e)	Identification of all legislation	Chapter 1	3
29 (1) (f)	Description of all environmental issues and potential impacts	Chapter 6	67
29 (1) (g)	Information on the methodology	Chapter 7	105
29 (1) (h)	Details of the Public Participation Process	Chapter 5	61
29 (1) (i)	Plan of study for EIA	Chapter 7	103
29 (1) (j)	Additional information		

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2 STRATEGIC OVERVIEW OF ELECTRICITY DEMAND AND SUPPLY IN SOUTH AFRICA

The purpose of this Chapter is to provide a strategic overview of the electricity demand in South Africa and of to provide a rationale for the selection of the Waterberg region for further coal-driven development. An overview of the potential future electricity related development in the Waterberg region is also given.

2.1 SOUTH AFRICA'S ELECTRICITY REQUIREMENTS

Electricity demand in South Africa has been growing steadily, and there is currently some 40 000 MW of installed capacity (base load and peaking power) available. South Africa's economic growth target has been set by the Government as six percent per annum via the Accelerated and Shared Growth Initiative for South Africa (AsgiSA). Based on this proposed growth, South Africa would require an additional approximately 40 000 MW of generating capacity by 2025. This equates to growth in the generating capacity of four percent per annum. However, based on a more moderate economic growth rate of four percent per annum, South Africa would require an additional 20 000 MW by 2025, which equates to growth in the generating capacity of some two to three percent per annum. Refer to **Figure 2.1** below for the long term forecast of electricity demand.

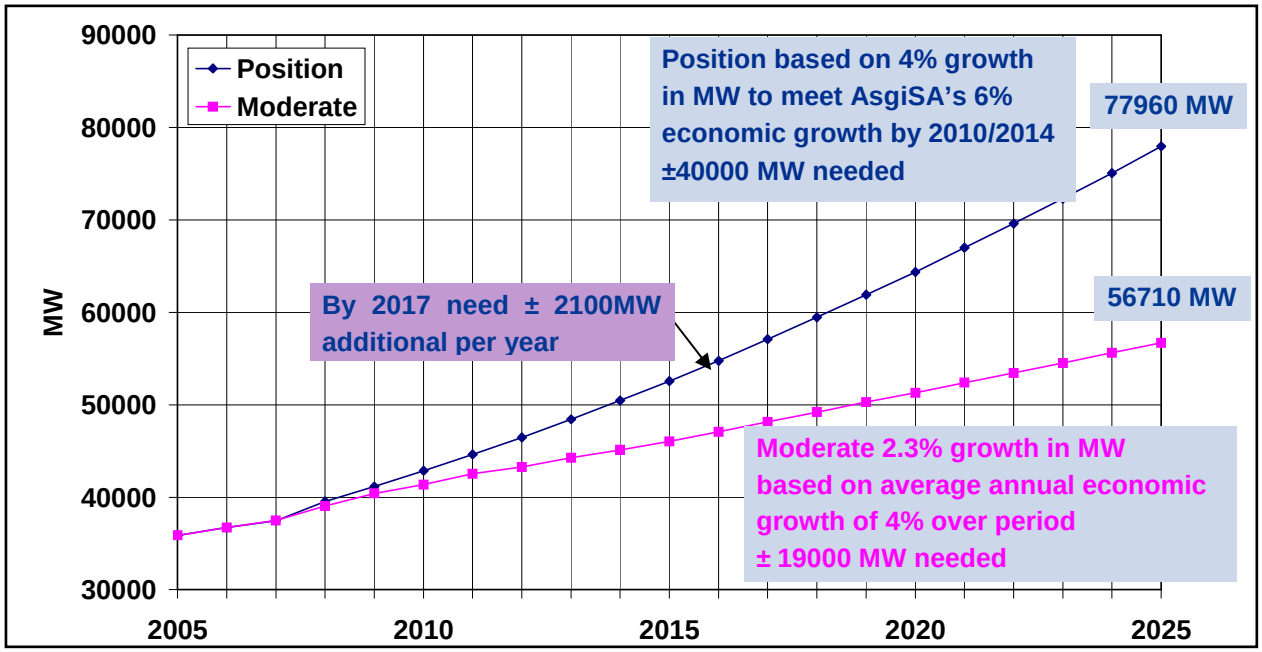

Figure 2.1 Long term electricity demand forecast (national and foreign)

Further to the above demands, the existing power stations have a limited life span, of some 50 years. Once these power stations start reaching the end of their commercial lives, South Africa will have to replace the existing capacity and add additional capacity to the grid as demand grows. **Figure 2.2** below illustrates the life span of the installed generation capacity, and how the capacity starts to decrease by 2025, as the existing power stations start to become decommissioned.

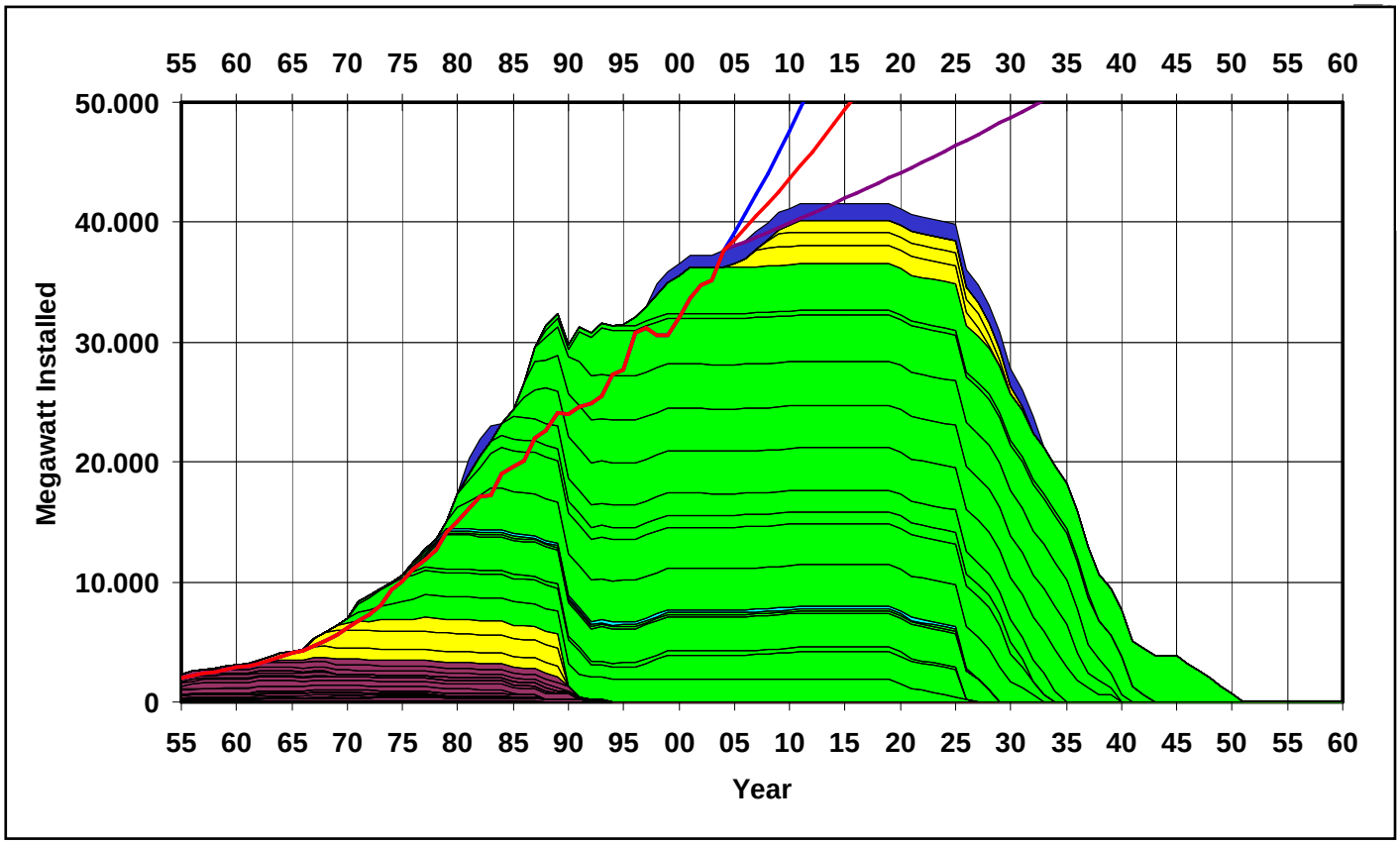

Figure 2.2 Installed generation capacity

Demand for electricity is further complicated due to its spatial and temporal scale. The majority of South Africa's electricity generation currently takes place in the eastern part of the country, where the majority of the coal resources are located. However, electricity is required throughout the country with Gauteng being a major demand centre. From a temporal perspective, electricity demand varies throughout the day, with demand peaking approximately between 06:00 and 09:00 and between 18:00 and 21:00, when the majority of people are at home. This makes the supply of electricity more complex and requires a suite of supply options, to cater for the base load requirements as well as the peak requirements. This is illustrated in **Figure 2.3** below.

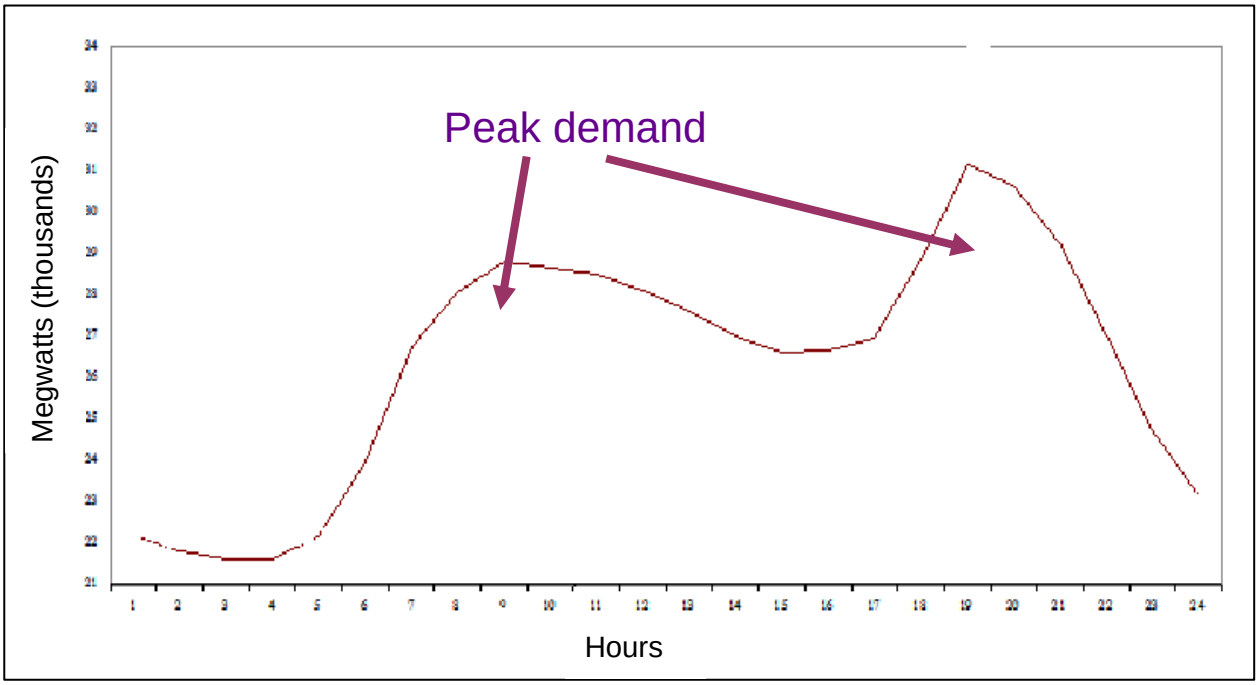

Figure 2.3 Graph indicating average electricity demand over a 24 hour period

There are two key challenges for Eskom with respect to the supply of electricity to South Africa. Firstly, Eskom has to manage the balance and mismatch between demand and supply, to avoid building too many power stations which would result in over-capacity and 'stranded' resources, but also to avoid constraining economic development because of capacity limitations. Furthermore, Eskom must choose the right mix of generating options, to meet the challenges of cost, lead time, environmental constraints and operating characteristics of the supply options. The process for choosing the best electricity generation options is outlined in **Section 2.2** below.

2.2 POLICY FRAMEWORK FOR THE SUPPLY OF ELECTRICITY

Eskom is the primary supplier of electricity in South Africa, providing approximately 95 % of the electricity consumed. The decision to expand Eskom's electricity generation capacity was based on national policy and informed by on-going strategic planning undertaken by the national DME, the National Energy Regulator of South Africa (NERSA) and Eskom. The hierarchy of policy and planning documentation that reflects this state of affairs is illustrated in **Figure 2.4** and described below.

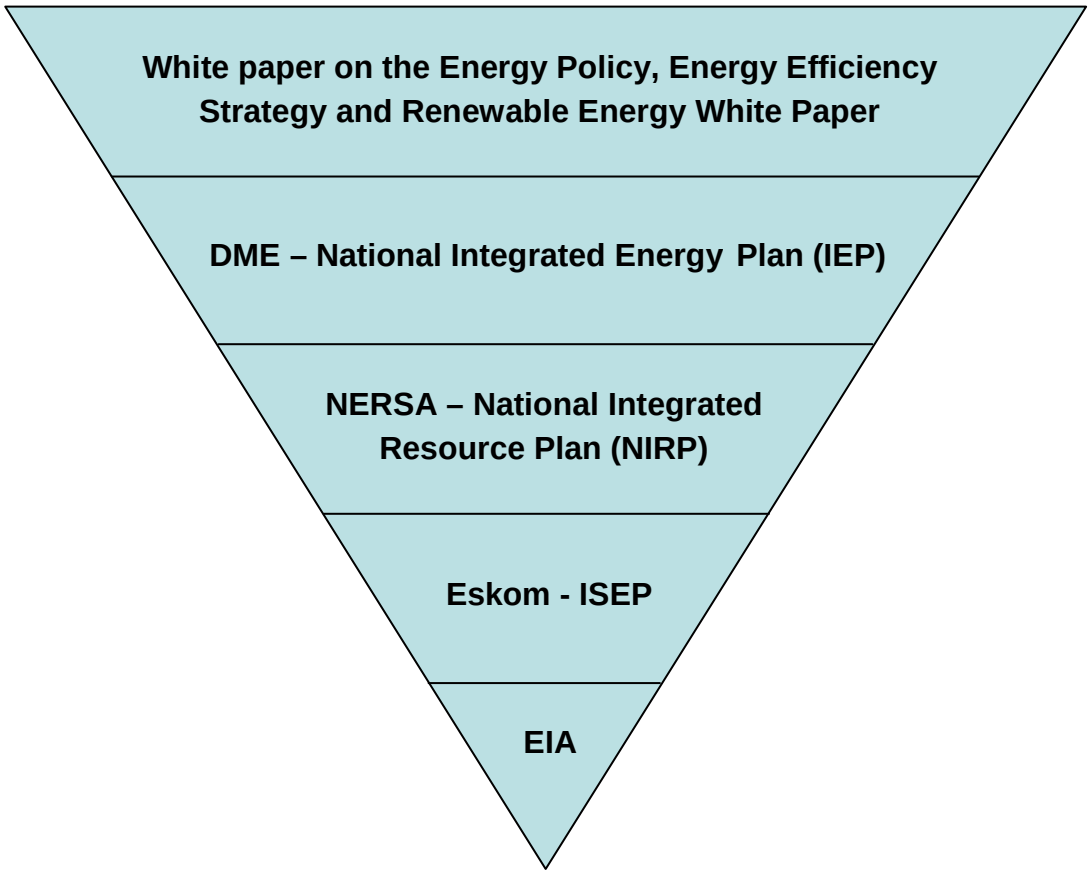

Figure 2.4 Hierarchy of policy and planning documents

2.2.1 WHITE PAPER ON THE ENERGY POLICY OF THE REPUBLIC OF SOUTH AFRICA

Development within the energy sector in South Africa is governed by the White Paper on the Energy Policy of the Republic of South Africa, published by DME in 1998. This White Paper sets out five objectives for the further development of the energy sector. The five objectives are as follows:

- Increased access to affordable energy services;
- Improved energy governance;
- Stimulating economic development;
- Managing energy-related environmental and health impacts; and
- Securing supply through diversity.

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[7] parameters. In addition, the policy identified the need for the adoption of a National Integrated Resource Planning (NIRP) approach to provide a long-term cost-effective resource plan for meeting electricity demand, which is consistent with reliable electricity supply and environmental, social and economic policies.

The Energy Efficiency Strategy of the Republic of South Africa is a document geared towards the development and implementation of energy efficiency practices in South Africa. It receives its mandate from the White Paper, and links energy sector development with national socio-economic development plans. The White Paper on Renewable Energy sets out Government's vision, policy principles, strategic goals and objectives for promoting and implementing renewable energy in South Africa.

2.2.2 INTEGRATED ENERGY PLAN

DME commissioned the IEP, 2003 to provide a framework in which specific energy policies, development decisions and energy supply trade-offs can be made on a project-by-project basis. The framework is intended to create a balance in providing low cost electricity for social and economic development, ensuring security of supply and minimising the associated environmental impacts.

The IEP projected that the additional demand in electricity would necessitate an increase in electricity generation capacity in South Africa by 2007. Furthermore, the IEP concluded that, based on energy resources available in South Africa, coal would be the primary fuel source in the planning horizon, which was specified as the years 2000 to 2020 i.e. a 20 year planning horizon.

2.2.3 NATIONAL INTEGRATED RESOURCE PLAN

In response to the White Paper's objective relating to affordable energy services, the National Electricity Regulator (now NERSA) commissioned a NIRP. The objective of the NIRP is to determine the least-cost supply option for the country, provide information on the opportunities for investment into new power stations and evaluate the security of supply.

The national electricity demand forecast took a number of factors into account. They were:

- A 2.8 % average annual economic growth;
- The development and expansion of a number of large energy-intensive industrial projects;

[7] Environmental parameters include economic and social aspects.

- Electrification needs;
- A reduction in electricity-intensive industries over the 20 year planning horizon;
- A reduction in electricity consumers – NIRP anticipates people switching to the direct use of natural gas;
- The supply of electricity to large mining and industrial projects in Namibia and Mozambique; and
- Typical demand profiles.

The outcome of the NIRP (2003/2004 version) determined that while coal would remain the major fuel for generating electricity over the next 20 years, additional energy generation facilities would be required from 2007 onwards.

2.2.4 INTEGRATED STRATEGIC ELECTRICITY PLANNING

Integrated Strategic Electricity Planning (ISEP) is the process by which Eskom forecasts the scenarios for growth in electricity demand over the next 20 years and evaluates the alternative means (supply-side and demand-side) to meet and manage that demand. The planning process provides economically and environmentally acceptable options for flexible and timely decision-making, considering Eskom and its shareholder's objectives and taking into account available energy reserves and renewable energy potential.

The criteria for assessing the quality of the plan include:

- *Cost:* defined as the lowest Net Present Value cost of the plan where the value of reliability is assessed by assigning a "cost of unserved energy" to all energy requirements that are not met by the proposed plan. The cost versus reliability trade-off is at the heart of the optimisation algorithms employed in the ISEP process.
- *Flexibility:* refers to the ability of the plan to adapt to changing circumstances with minimum penalty. A key objective is to maximise the amount of flexibility that is available to enable the accommodation of uncertainties without compromising reliability.
- *Robustness:* defines how well committed investments perform under all relevant scenarios.
- *Sustainability:* refers to the contemporary (people, planet, prosperity) understanding of sustainability and includes environmental and climate change considerations.
- *Implementation:* the ability of the organisation to implement the solution. This includes the ability to raise the required funds, access the necessary skills and source the required fuel and equipment.

While the major energy source will remain coal, Eskom plans to reduce coal's current 84 % share of the national primary energy to below 70 % by 2026. To achieve this, a much higher proportion of nuclear generation (currently 4 %) is envisaged by 2026, while additional renewable energy options (in excess of 2 % by 2026) will also be pursued. Pumped storage and

gas fired stations will be established to the extent required for peak supply considerations, while electricity imports from neighbouring countries (to a maximum of the reserve margin) will also be negotiated.

The most recently approved ISEP plan by Eskom's board (February 2008) identifies the need for increased base load[8] by approximately 2014. **Figure 2.5** below illustrates Eskom's "project funnel" which shows the range of supply options being considered by Eskom to meet the increasing demand for electricity in the country[9].

An increase in peaking supply has been achieved through the commissioning of the OCGT facilities in Atlantis and Mossel Bay. Research projects include a demonstration solar power project, demonstration wind energy project, underground coal gasification and the pebble bed modular reactor.

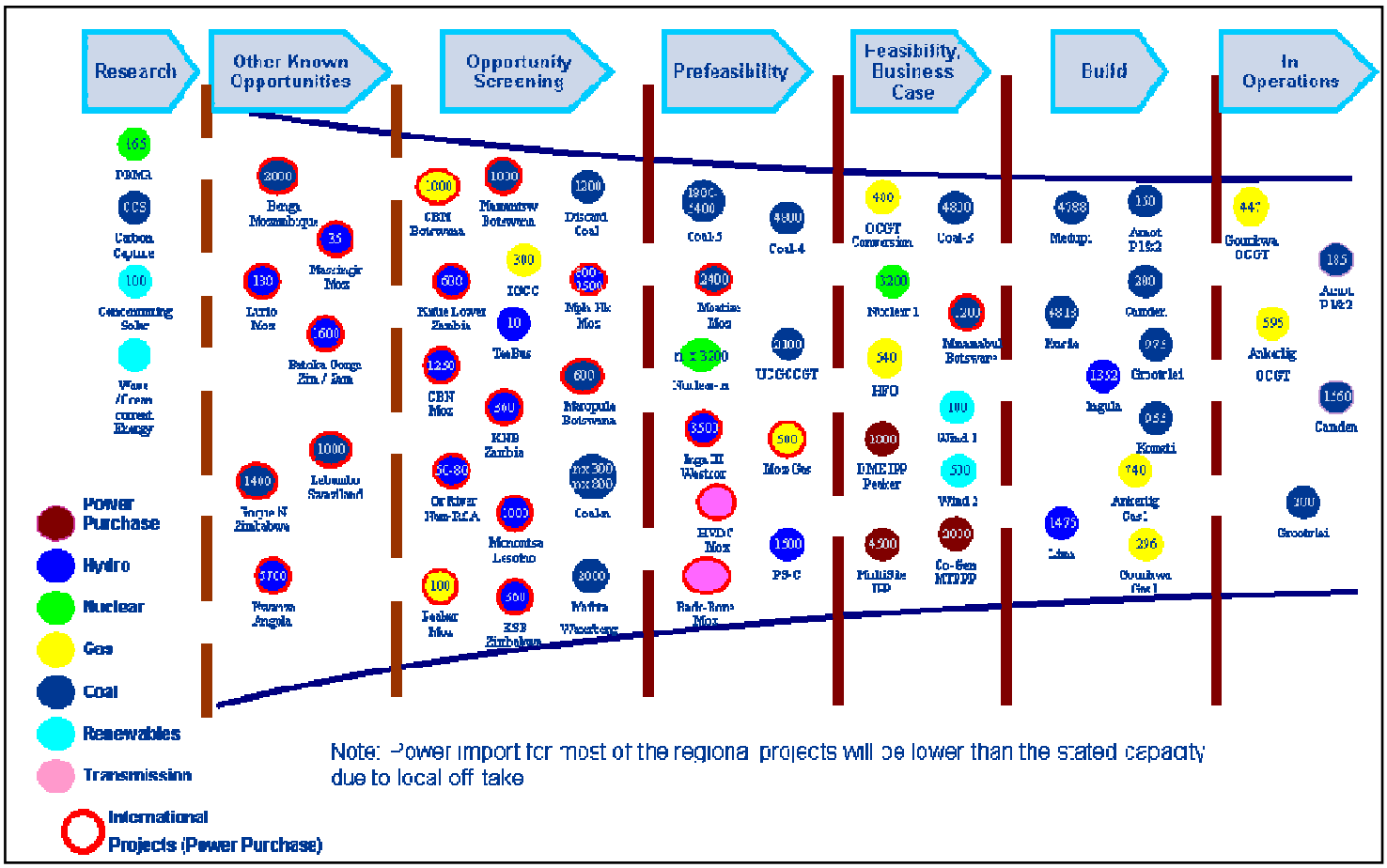

Figure 2.5 Eskom's 'projects funnel' indicating the stage of capacity generation projects

[8] Base load refers to the electricity generated to meet the continuous need for electricity at any hour of the day or night.

[9] Please note that within each category (e.g. the "prefeasibility" category) of the funnel, the position of a project relative to other projects within that category is not an indication of its state of relative progress.

A range of projects are currently under investigation, which include *inter alia* new coal power stations in the Vaal and Waterberg, nuclear power stations, combined cycle gas turbine plant, converting the OCGT facilities to combined cycle gas turbine facilities, wind energy facilities and pumped-storage schemes.

Lastly, three mothballed power stations, viz. the Camden, Komati and Grootvlei stations, are currently being returned-to-service, a pumped storage scheme is being constructed on the border of KwaZulu-Natal and the Free State, and the Medupi and Kusile coal-fired power stations are under construction, and are all consequently reflected in the 'build' portion of the funnel diagram.

The current EIA process is for the proposed two new coal-fired power stations located southwest of the existing Matimba and Medupi Power Stations in the Waterberg area.

The selection of the Waterberg area for the location of new coal-fired power stations was largely informed at a strategic level by the availability of coal to supply such power stations. From a technical and economic perspective, it is optimal to place the coal-fired power station as close to the coal source as possible. At this point it is unknown from which supplier the coal will be obtained. However the coal resource is located to the north of the Eenzaamheid fault line which follows the DR1675 road for the most part into Botswana. This is discussed in **Section 2.3** below.

2.3 SELECTION OF THE WATERBERG REGION FOR FURTHER COAL-DRIVEN DEVELOPMENT

Coal is found in South Africa in 19 coalfields (see **Figure 2.6** located mainly in the provinces of KwaZulu-Natal, Mpumalanga, Limpopo and the Free State, with lesser amounts in Gauteng, North West and the Eastern Cape. The Waterberg, Highveld and the Witbank coalfields contain more than 70 % of the total reserves. The latest Minerals Bureau estimate sets the reserves at 33.8 billion tons, considered to last until around 2050 (Jeffrey, 2005).

When identifying potential coal regions that would have sufficient volume to supply a power station, it is important to secure coal of the desired quality and quantity (i.e. coal for power generation, at volumes of approximately 19 million tons (Mt)[10] per annum per 5 400 MW power station) at a reasonable cost to sustain a new power stations throughout its life span, i.e. at least 50 years. Therefore some 950 Mt[11] of steam coal would be required to operate a 5 400 MW power station.

[10] A recent study has indicated that this has increased to 21 Mt.
[11] A recent study has indicated that this has increased to 1 050 Mt.

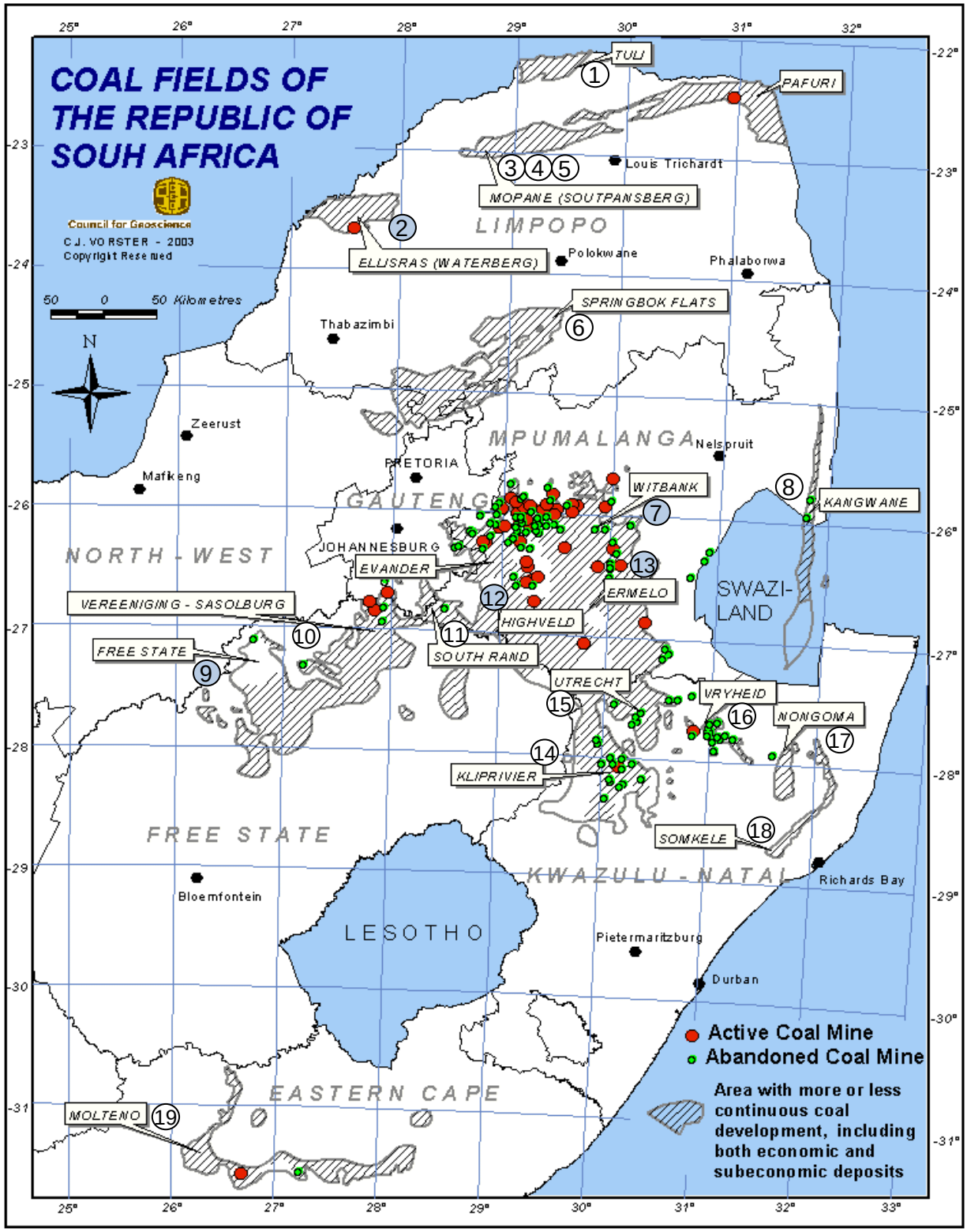

Figure 2.6 Location of coalfields in South Africa (after Jeffrey, 2005)
(numbers correspond to the table below)

Table 2.1 summarises the production and utilization of the coal reserves in South Africa and also indicates the remaining volume of coal. Blocks with grey shading below indicate resources that could potentially supply the requisite coal, due to the volume of remaining recoverable reserves.

Table 2.1 Production and utilisation of coalfields and remaining reserves

No.	Coalfield	Production and Utilisation	Remaining recoverable[12] reserves (2000) in Millions of tons (Mt)
1	Limpopo (Tuli)	No current exploitation.	107.00
2	Waterberg (Ellisras)	The Waterberg coals are used for steelmaking (coal for the Corex process at Saldanha Steel and coking coal for Iscor's Vanderbyl steelworks) and **power generation** (**Eskom's Matimba power station**). Some coal is exported via the Matola terminal in Mozambique for steam generation in order to make the extraction of the steelmaking coals viable.	15 103.00
3,4&5	Soutpansberg	Due to the limited exploration data available in public domain publications, one must assume that the entire Soutpansberg Coalfield contains coals that are suitable, after beneficiation, as coking coals for the metallurgical and steelmaking industries.	260.89
6	Springbok Flats	No current exploitation.	1 700.00
7	Witbank	Of the 71 operating collieries in South Africa at the end of 2001, 39 (55 %) of these were located in the Witbank Coalfield. In 2001, the coalfield accounted for 155.13 Mt (about 52.5 %) of the total 295.55 Mt run-of-mine (ROM) production. The Witbank Coalfield seams have diverse characteristics, resulting in a range of potential markets/utilization in the **power generation**, export, domestic, metallurgical, liquefaction and chemical sectors. The No. 2 seam is a critical source of high-yield export quality steam coal while the No. 5 seam is the source of metallurgical coal for the local steel industry. The lower grade coals are consumed domestically by Eskom for **power generation**.	10 139.77
8	Kangwane		146.04
9	Free State	New Vaal Colliery is the only operating mine. There are however other coal related developments	4 918.78

[12] The coal reserve is defined as "only…that portion of the total coal resources of which the nature and distribution have been fairly well established and which is at present economically recoverable or borders on economic recoverability". (Jeffrey, 2005)

No.	Coalfield	Production and Utilisation	Remaining recoverable[12] reserves (2000) in Millions of tons (Mt)
		planned for the area.	
10	Vereeniging-Sasolburg	The operating collieries within the Sasolburg-Vereeniging Coalfield are the Sigma Colliery, incorporating the Wonderwater Strip Mine, in the Sigma Basin and the New Vaal Colliery situated in the northern portion of the Cornelia Basin. Only the No. 2B and No. 3 coal-seams are mined at Wonderwater Strip Mine with the soft overburden material removed by truck and shovel operations one cut ahead of mining and battered back to within the natural angle of repose. The increasing difficulty in underground mining conditions and increasing production costs have resulted in investigations to open a new strip mine section (Sigma North-West) to supplement and to later replace the production from the underground section of the Sigma Colliery. The winding down of operations at Sigma Colliery was planned to begin in 2004 and to coincide with the build-up of natural gas supplies to SCI from Mozambique. As with all the coal produced by Sasol Mining, **the coal from Sigma Colliery is supplied to Sasol Synthetic Fuels (SSF) and Sasol Chemical Industries (SCI)**. New Vaal Colliery is a dedicated supplier of coal to **Eskom's Lethabo Power Station**.	1 898.09
11	South Rand	No operating mines.	707.97
12	Highveld	The Highveld Coalfield is the next most productive coalfield with ten operating collieries. In 2001, it accounted for about 73.65 million tons (24.9 %) of the total ROM production. Mining was largely initiated by the development of the coal-fired **Kriel and Matla power stations** with collieries established to feed these power stations. Since then, the five Sasol mines around the Secunda area were developed. **All the Sasol mines are dedicated coal suppliers to the SSF and SCI** where the coal is used as a feedstock in the production of liquid fuels and chemicals. The coal produced at Forzando and Dorstfontein Collieries is exported, whereas New Denmark Colliery is a dedicated supplier of coal to **Eskom's Tutuka power station**.	10 006.51
13	Ermelo	In 2002 there were ten operating collieries in the Ermelo Coalfield, most of which are small to	4 596.89

No.	Coalfield	Production and Utilisation	Remaining recoverable[12] reserves (2000) in Millions of tons (Mt)
		medium sized. Mining in this coalfield has been dormant for some time with most mines closed with reserves. Of the total saleable production of 222.55 Mt in 2001, the Ermelo Coalfield contributed about 7.2 million tons. Most of the high-grade steam coal produced by Xstrata Coal SA in the Ermelo Coalfield is destined for **export**. In the past, the now closed Ermelo Mines and Usutu Colliery supplied **Eskom's Camden power station**, with defunct Majuba Colliery supplying the **Majuba power station**. Camden is being brought back on-stream and will be supplied by a black empowerment consortium operating Golang Colliery, incorporating Golfview Colliery and the former Usutu Colliery.	
14	Klip River	There has been a substantial decline in coal-mining in KwaZulu-Natal over recent years, with the closing of major collieries within the coalfields. Ten collieries are currently operational—four each in the Klip River and Vryheid coalfields, and a single operation in each of the Utrecht and Nongoma coalfields. The KwaZulu-Natal coalfields are the major producers of high quality anthracite in the country. The Welgedacht Colliery produces only bituminous coal with some collieries in the Vryheid Coalfield producing coking coal. The total saleable anthracite production for 2001 amounted to 2.56 Mt; around 80 % of it came from the KwaZulu-Natal coalfields while 4 % came from Nkomati Anthracite in the Kangwane Coalfield and 8 % from small ad-hoc exporters. Before the opening of Grootegeluk and Tshikondeni Coal Mines, the KwaZulu-Natal coalfields were the only source of high-grade coking coal for Iscor. The coalfields are still set to remain the country's major source of anthracite,	569.74
15	Utrecht		584.53
16	Vryheid		122.20

No.	Coalfield	Production and Utilisation	Remaining recoverable[12] reserves (2000) in Millions of tons (Mt)
17	Nongoma	bituminous and high quality metallurgical coal for local industry. Other major coal users in the area are the pulp, paper and textile industry. Gus Seam mined in all major collieries within the Vryheid Coalfield. The Alfred Seam has not been extensively mined but has been worked in opencast operation.	82.82 (Somkhele & Nongoma)
18	Somkhele	Main seam is economic, has been exploited in the past. Further development probable in near future.	
19	Molteno-Indwe	No current exploitation; minor exploitation in the past; plans for future development.	

(taken from Jeffrey, 2005)

Based on the amount available indicated in the above table there are seven coalfields which have sufficient recoverable reserves to supply the proposed power stations namely, Ermelo, Highveld, Vereeniging-Sasolburg, Free State, Witbank, Springbok Flats and Waterberg (Ellisras) Coalfields (indicated by shading in the table).

Ermelo supplies coal to Majuba power station and the previously–mothballed Camden power station[13]. While Ermelo has sufficient coal to supply a coal-fired power station the cost of mining the coal in this area is relatively high.

The Highveld Coalfield reserves are important to the long-term life of the Sasol facilities of Sasol Synthetic Fuels (SSF) and Sasol Chemical Industries (SCI), which require 40 Mt a year. It is likely that production will continue for a considerable number of years (Jeffrey, 2005) and hence this coalfield is unlikely to have capacity to supply further powers stations and Sasol's needs. The Vereeniging-Sasolburg Coalfield is also a supplier to SSF and SCI, as well as supplying coal to Eskom's Lethabo power station (Jeffrey, 2005).

The coal reserves of the Free State Coalfield, which is in the vicinity of the Vereeniging-Sasolburg coalfield, are of a low grade which is suitable for power generation and possible liquid fuel production. As mentioned in the table above, there are further coal related developments identified for the area, including at least one power station for which Eskom has applied for environmental authorisation. Furthermore, the coal field is located partially within a Priority Airshed, as declared by DEAT, and consequently further coal-related development may not be

[13] http://www.keatonenergy.com/cm/sa_coal.asp

in keeping with the proposed pollution reduction and abatement measures being applied to the airshed.

The Witbank Coalfield is nearing depletion (Jeffrey, 2005) due to the rate at which coal is being mined and it has been suggested that the Waterberg Coalfield could replace this due to its potential to be the country's largest remaining *in situ* coal resources. The Witbank Coalfield is divided into five seams, the fourth of which contains poor quality coal. The bottom layer of the No. 4 coal seam is mined for power station feedstock and domestic steam coal. The remaining seams are mined for export coal, metallurgical feedstock and coking coal (Jeffrey, 2005). There is a desire to utilize these existing coal resources in the extension of the lifespan of existing coal-related developments in the area.

The coal reserves of the Springbok Flats are largely unexplored. A range of coal grades are available including steam coal. The coal reserve is however associated with uranium deposits and the coal resource is deep. Due to the depth of the coal the cost of extraction is likely to be relatively high making this resource less desirable.

The Waterberg coal reserve is estimated at 75 000 Mt[14] of coal, which is approximately 40 % of South Africa's remaining coal reserves (Le Roux, 2007). Of this the recoverable reserves at the end of 2000 were estimated at 15 103 Mt[15]. However this estimate could increase as new methods of extraction are developed (including underground coal gasification).

Even though seven of the coal fields have significant coal resources capable of supplying the requisite quantities of coal for a power station, many of these resources are not available, as they have been committed to existing or other future projects. Consequently, Eskom issued a Request for Information to supply coal to a new coal-fired power station in South Africa. A suite of mining companies responded to the call, and made coal offers in various locations around the country. The Waterberg coalfield is considered to be a suitable source of the coal, due to the reasonable quality of the coal, and, since the coal is relatively shallow, the relative ease of extraction via open-cast mining operations. Consequently, the Waterberg coalfield was identified as the most feasible coal resource for further power station utilisation.

2.4 OVERVIEW OF THE POTENTIAL FUTURE ELECTRICITY RELATED DEVELOPMENT IN THE WATERBERG REGION

In October 2004, government took allowed Eskom to lead this current phase of building new electricity generation capacity and the associated powerline infrastructure.

[14] Recent studies have revised this figure to 163 000 Mt.
[15] This value has been revised to 40 000 Mt.

Additional power stations, major power lines and substations are urgently being constructed to meet rising electricity demand in South Africa. The approved capacity expansion budget is R343 billion[16] up to 2013 and is expected to grow to more than a trillion rand by 2026. Ultimately Eskom will double its capacity to 80 000 MW by 2026.

The planning for the execution of the build programme is continuous and thus is constantly revisited. However, the basis of the planning is through Eskom's ISEP process. This provides Eskom energy and demand forecasting for up to 20 years into the future. As part of this process, data is gathered on supply-and demand-side costs and performances. Then the mix of these options and the timing of their use are optimised to meet the load forecast with suitable reliability, taking into account risks and assessment criteria.

The planning process provides economically and environmentally acceptable options for flexible and timely decision-making, considering Eskom and our shareholder's objectives and taking into account available energy reserves and renewable energy potential. The criteria for assessing the quality of the plan include cost, flexibility, robustness, sustainability and implementation.

As indicated above, the plan is dynamic and thus there is the need for Eskom to engage with stakeholders on its planning and the build programme.

Over and above the EIA process and its public participation activities, as well as the existing stakeholder engagement initiatives Eskom is planning the establishment of fora around the country in those areas where the expansion programmes will or could take place.

The forum will provide a platform for regular engagements and communication with the affected communities and will provide timeous and up-to-date responses to stakeholder issues.

The first forum is being established in the Waterberg area. As a precursor to the establishment of the forum, an information sharing session between Eskom and any interested and affected parties in the Waterberg area and took place on 11 December 2008. This happened at two different venues, namely Thabazimbi and Lephalale or Modimolle on the same day.

The purpose of these sessions is to share Eskom's "bigger picture" - that is the long-term electricity plan (generation, transmission and distribution). The establishment of the Waterberg-Eskom Environmental Management Forum will be discussed including its make-up and objectives.

[16] This is nominal rand, and based on 2007 financial assumptions.

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3 THE SITE SELECTION PROCESS

The purpose of this chapter is to document and describe the process and rationale by which the proposed sites were identified and selected. It describes the regional boundaries within which the sites were identified and the criteria used to identify potential sites.

3.1 BACKGROUND

As outlined in **Chapter 1** above, given the need to develop additional electricity generation capacity and the reliance on coal as the source of energy for the next 20 years, Eskom initiated a site selection study and an EIA process for the development of two new coal-fired power stations in the Waterberg, Limpopo, in the vicinity of Lephalale. While Eskom had identified the broad geographic region at a strategic level, the specific sites within the region had not been identified. As part of the EIA process, the Ninham Shand EIA team, assisted by Eskom, undertook the identification of potential sites within the identified region, in order to ensure that the EIA process could commence from a robust and defendable starting point.

The process of identifying potential sites within the region included a site visit to the area under consideration and a workshop with Eskom personnel. The purpose of this Chapter is to document the process that led to the identification of candidate site alternatives for further investigation in this EIA process.

3.2 SELECTION OF POTENTIAL SITES

3.2.1 DETERMINING THE BOUNDARIES OF THE WATERBERG REGION

As outlined in **Chapter 2** above, the Waterberg region was identified as the potential source of coal for two coal-fired power stations, based on the availability of the coal, coal quality, depth to the coal resource and ease of mining. In order to determine the boundaries of the Waterberg region, a suite of criteria and existing, published data were used to delineate the boundaries of the region, including national borders.

Eskom's mandate is to provide electricity to South Africa, through amongst other things, building and operating power stations in the country. Consequently, even though the Waterberg coalfield stretches to the north and west, into neighbouring Botswana, Eskom will only consider the locations within South Africa. The national border therefore formed the northern and western borders of the Waterberg region.

The coal resources of South Africa are under the control of the DME, and are considered to be a strategic resource for the future of the country. The South African coal reserves in the Waterberg mainly occur within a band bordered by the South Africa-Botswana border in the west (the coal extends into Botswana), the Zoetfontein fault in the north and the Eenzaamheid fault in the south (see **Figure 3.1**). The coal field in the Waterberg is also divided by a north south fault, the Daarby fault. This divides the coal field into shallow coal on the west of the fault, which could be mined by open cast methods, and deep coal on the east which could be mined by underground mining methods. The sterilisation of a coal resource through development on top of it is considered to be unacceptable, especially when the life of the development is in the order of 50 years, such as in the case of a power station. Consequently, it was agreed that the power station could not be established on top of any coal reserves, and that the area to the south of the east-west trending Eenzamheid geological fault was the most suitable area for further consideration, being off-coal.

According to Eskom, currently the maximum feasible and efficient distance over which a coal conveyor of this nature can be operated is approximately 30 km; with the longest conveyor belt in South Africa presently in operation being about half this length. Transporting coal greater than 30 km is likely to have a significant effect on the price of electricity, as well as increased land requirements, security risks, operational reliability concerns, dust management, coal degradation, health risks, visual and other environmental impacts, thus compromising efficiency. Distances greater than this therefore require alternative transport mechanisms, such as road or rail, thereby increasing the transportation cost by up to three times as well as increasing environmental risks.

As the source of coal for the proposed power station has not been finalized a distance within 30 km from the boundary of the various offered coal resource was considered. The area of overlap of all these 30 km boundaries could be supplied by any of the coal resources, or from multiple resources within the area of shallow coal, as described above.

Based on the above factors, the boundaries of the region within which sites would be identified were delineated as follows (see hatched area in **Figure 3.1**):

- *Northern boundary:* The Eenzaamheid fault which is closely followed by the road (DR1675) from Lephalale to Steenbokpan.
- *Southern boundary:* The 30 km arc closest to the Eenzaamheid fault.

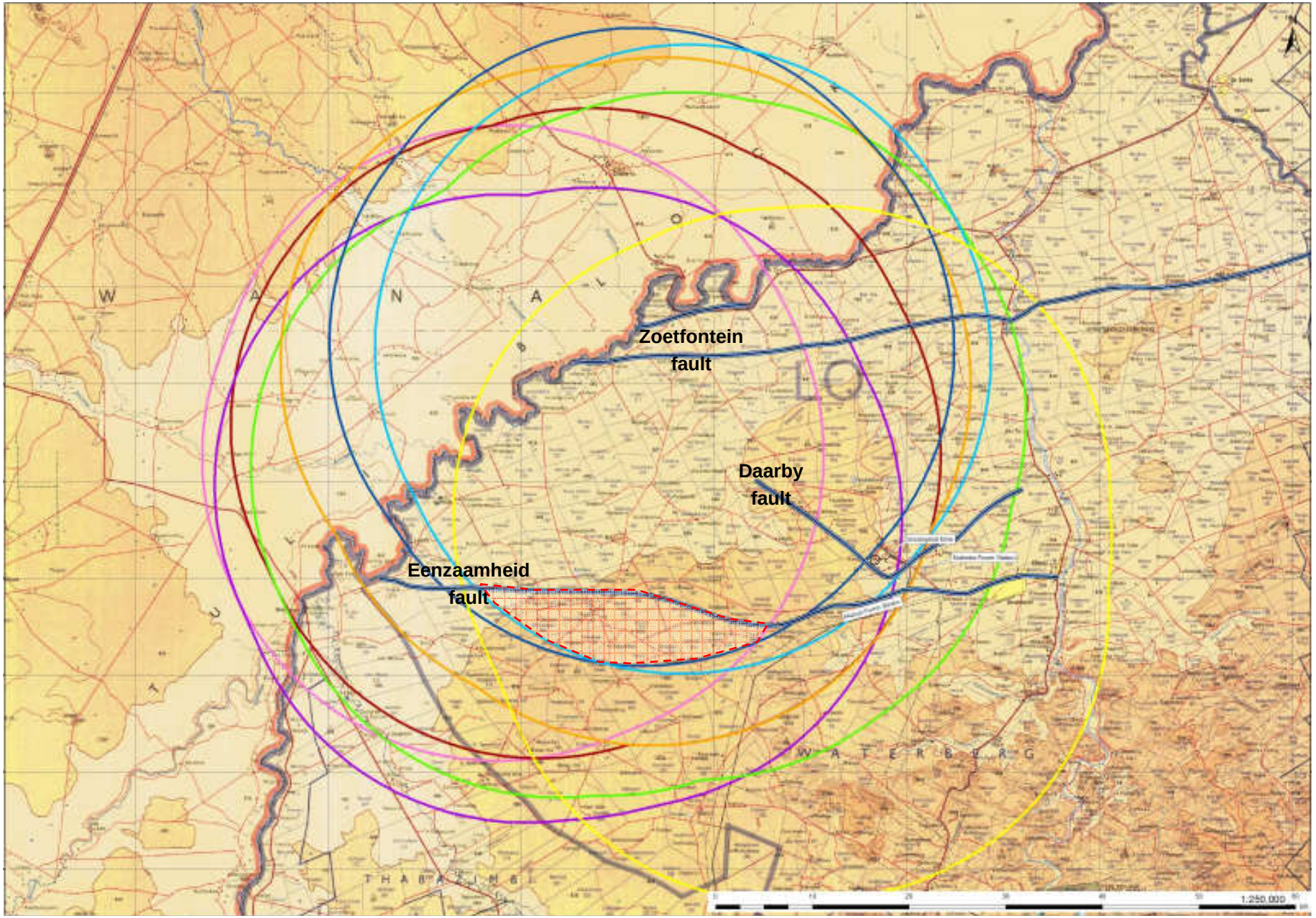


Figure 3.1 Map showing the eight geographic coal locations and 30 km lines

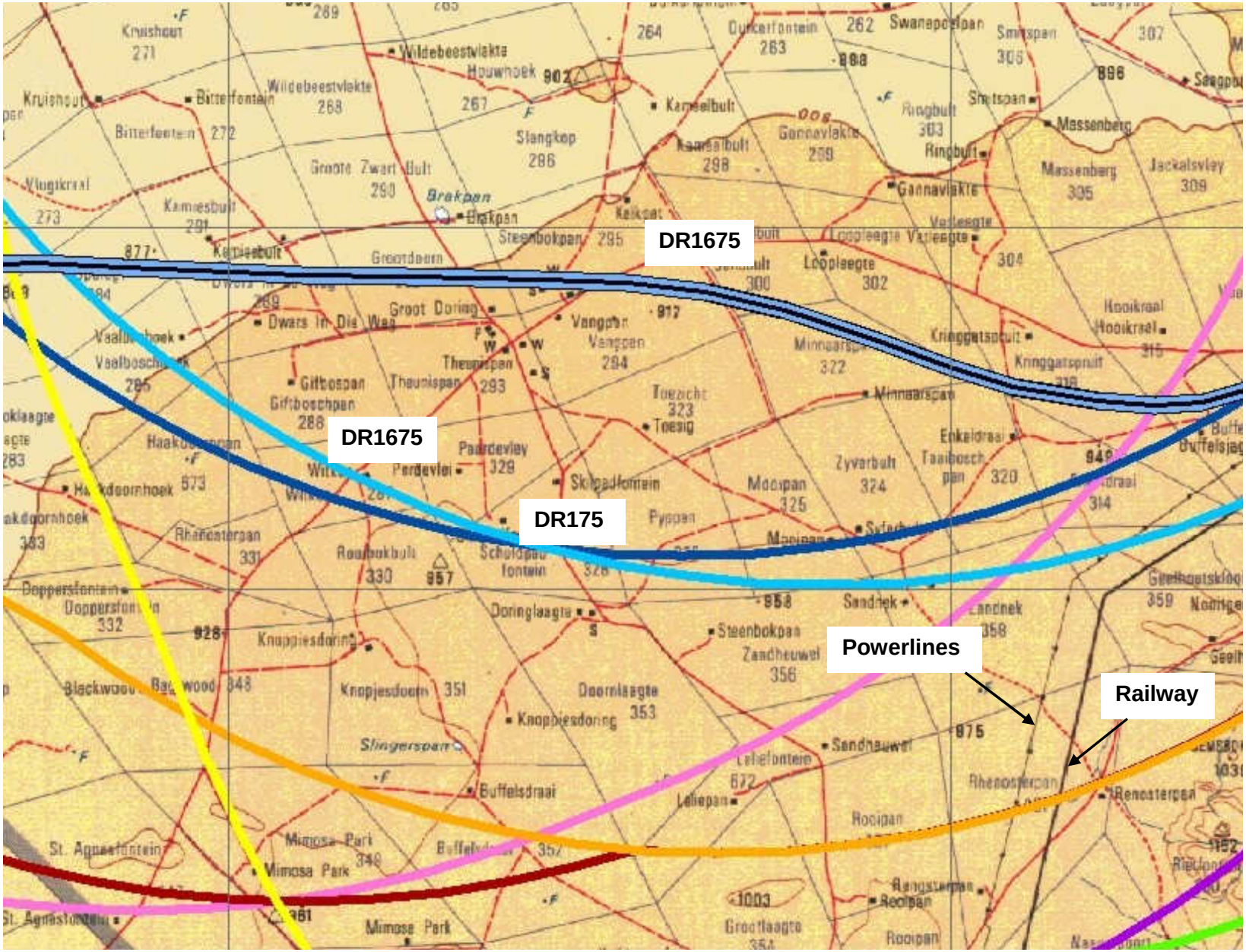


Figure 3.2 Map showing the area in which sites were identified

3.2.2 SELECTION OF POTENTIAL SITES

With the area of intersection identified, potential sites within this area were identified by considering a range of potential criteria. These included size of the sites, potential boundaries, buffer zones and other infrastructure. These are described below.

a) Required size of site

It was agreed that the initial identification of sites should consider the footprint of the power station and ancillary infrastructure (such as a WWTW, a demineralisation plant, etc) requiring at least 2 000 ha and a permanent above-ground ashing facility, requiring 3 000 ha adjacent to the power station area. Consequently sites needed to be at least 5 000 ha in extent. Although this area is larger than that required for previous power station projects, the larger size would avoid the numerous problems associated with locating the infrastructure on the site during the EIA and detailed design processes.

b) Boundaries

In the delineation of sites, boundaries such as major roads (tarred), railways, major powerlines and farm boundaries were considered. Other boundaries considered, but that did not influence the sites as there were no differences between the sites, include rivers and topography. By avoiding boundaries where possible potentially significant ecological impacts (e.g. impacts on aquatic ecology) can be limited and design issues (e.g. moving roads) can be minimised. Furthermore, by following farm boundaries, where reasonable, the number of landowners impacted by any one site would be limited and it would be less likely that the sites would divide individual farms.

c) Buffer zones around residential areas

A buffer zone was allowed around the Steenbokpan settlement, located to the west of Lephalale, in order to minimize noise and air pollution impacts on the settlement. As flue gas desulphurization was proposed for the power stations, the air quality impacts are expected to be fairly contained downwind of the power stations.

d) Other infrastructure

Other infrastructure besides the boundaries noted in (b) above were considered. In particular the proposed Delta substation which is to be constructed on the Zandnek

Farm (see **Figure 3.3**) was considered, specifically with respect to the proposed power stations' ash dumps in relation to the substation.

e) Identification of potential sites within the Waterberg region

Based on the above criteria, a total of three sites were identified (see **Figure 3.3**) within the regional boundary defined above. Approximate centre point co-ordinates of the sites are as follows: Site A 23°46'14.91"S, 27°22'16.26"E; Site B 23°46'15.03S, 27°17'25.96"E and Site C 23°43"55'18"S, 27°10'51.24"E.

The three sites identified were divided into areas suitable for a power station and an associated area suitable for an ash dump (generally outside the 30 km line to the coal areas). This allowed sufficient area for the proposed power station and infrastructure (an area of at least 2 000 ha) and for the ash dump (an area of at least 3 000 ha).

The three sites include the following farms:

Site A (total area of approximately 8 328 ha)

- Proposed Power Station Alternative A
  - Minnaarspan Farm No. 322
  - Zyferbult Farm No. 324
  - Taaiboschpan Farm No. 320
- Proposed Ash Dump Alternative A
  - Zandheuwel Farm No. 356
  - Leliefontein Farm No. 672
  - Portion of Doornlaagte Farm No. 353

Site B (total area of approximately 7 377 ha)

- Proposed Power Station Alternative B
  - Pyppan Farm No. 326
  - Mooipan Farm No. 325
- Proposed Ash Dump Alternative B
  - Knopjesdoorn Farm No. 351
  - Portion of Doornlaagte Farm No. 353
  - Schuldpadfontein Farm No. 328
  - Rooibokbult Farm No. 330
  - Portion of Paardevley Farm No. 329

Site C (total area of approximately 8 122 ha)

- Proposed Power Station Alternative C
  - Dwars-in-die-Weg Farm No. 289
  - Gifboschpan Farm No. 288
  - Witkop Farm No. 287
- Proposed Ash Dump Alternative C
  - Rooiboklaagte Farm No. 283
  - Haakdoornpan Farm No. 673
  - Haakdoornhoek Farm No. 333
  - Vaalboschhoek Farm No. 285

The three sites for the two power stations are currently larger than 5 000 ha. This is due to the sites being based on, amongst other things, existing farm boundaries.

3.2.3 OTHER CONSIDERATIONS

Other factors that were considered, but that did not significantly differ between the areas under consideration and therefore did not influence the site selection process, included topography, vegetation type, sensitive fauna, wetlands, ground water and landuse.

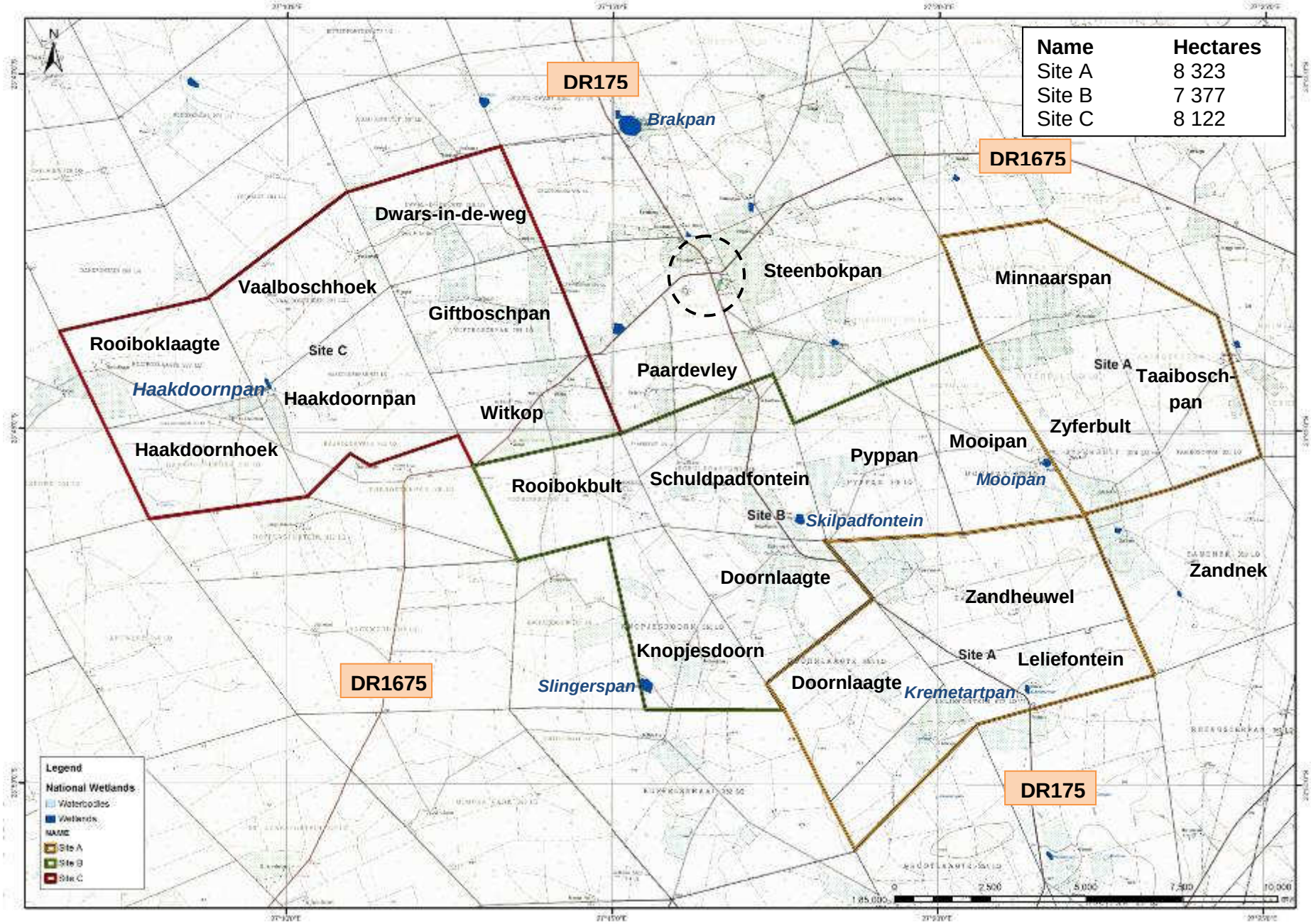


Figure 3.3 Proposed sites

4 THE PROPOSED ACTIVITY

This chapter considers the need for the proposed project, briefly outlines the nature of the proposed activities and then considers and screens the various project alternatives in order to focus the EIR phase on the feasible alternatives.

4.1 THE NEED FOR THE PROPOSED ACTIVITY

The need for the proposed project is described in detail in **Chapter 2**. However, the salient points are reiterated in this section in order to contextualise the proposed activity.

Strategic planning processes by DME, NERSA and Eskom concluded that South Africa requires additional capacity to meet projected demand. This would consist of base load and peaking electricity generating capacity. Amongst other initiatives, Eskom is pursuing the return-to-service of its three mothballed Simunye Power Stations, namely Camden (recommissioning complete), Komati and Grootvlei (both in the process of recommissioning).

Eskom is also investigating a suite of further options, including pulverised fuel (coal) power plants, pumped storage schemes, gas fired power stations, nuclear plants, as well as renewable energy options like wind and solar projects. While coal is, and will remain for the foreseeable future, the major energy source, Eskom plan to reduce coal's current approximately 90 % share of the energy mix to below 70 % by 2026. To achieve this, a much higher proportion of nuclear energy (currently 4 %) is envisaged by 2026, while additional renewable energy options (about 2 % by 2026) will also be pursued. Eskom already has environmental and other approvals for a Wind Energy Facility on the West Coast, and a 100 MW Concentrated Solar Thermal plant in the Northern Cape is currently in the approval stages. In addition, pumped-storage schemes and gas-turbine power stations will be built to meet peak demand, while electricity imports from neighbouring countries (to a maximum of the reserve margin) will also be negotiated.

Consequently, Eskom is currently constructing coal-fired power stations in Lephalale (Medupi Power Station) and in Witbank (Kusile Power Station) and is proposing additional power stations in the Waterberg and the Northern Free State[17].

4.2 DESCRIPTION OF THE PROPOSED ACTIVITY

The project comprises the design, construction, commissioning, operation and decommissioning of two coal-fired power stations and their associated infrastructure. Each power station would comprise six boiler/turbine sets with a nominal electricity generation

[17] It must be noted that the proposed power station in the Northern Free State has already gone through the EIA process, and a decision from the Environmental Authority is expected shortly.

capacity of approximately 5 400 MW (900 MW per unit[18]). Apart from the power station buildings themselves, the ancillary infrastructure may include the following:

- Coal and sorbent stock yards;
- A blackstart facility;
- Coal, ash, sorbent and gypsum conveyors;
- A High Voltage (HV) yard within the power station precinct;
- Water and wastewater treatment facilities;
- Ash and spent sorbent disposal systems and dump site;
- Gypsum storage facility;
- Access roads (temporary and permanent, and external and internal roads);
- Maintenance, medical, administration, services, control buildings;
- Water supply pipeline or construction phase;
- Raw water pipeline and reservoirs;
- Dams for storage of "clean" and "dirty" water;
- Railway lines and sidings for sorbent, heavy fuel oil (HFO) and other construction and operational equipment and material supply;
- Transmission lines (to the proposed Delta substation and to be deviated within sites);
- Power supply for the construction phase (~~substation, transmission and~~ distribution lines from Medupi power station);
- Borrow pits (on site and off site, as identified);
- Communication mast/telecommunication facilities;
- General and hazardous storage and handling facilities (temporary and permanent);
- Batching plant (including concrete and asphalt); and
- Construction ~~worker~~ accommodation.

The flow diagrams below (**Figure 4.1** and **Figure 4.2**) illustrate the process by which electricity is produced.

The power stations would be fuelled by coal, supplied from a source within approximately 30 km of the proposed power stations' sites. The initial coal supply (for commissioning and early operation) may have to be sourced from an existing colliery whilst a new mine is being commissioned.

Coal would be transported via conveyor belts from the colliery to the coal stockyard, where it would be stockpiled. The stockpile is typically divided into strategic, seasonal and live stockpile areas. Coal from the stockpile is then fed to the power station by means of conveyor belts. The coal is pulverised in a milling plant to form 'pulverised fuel' and, with a combination of air, blown into the boiler where it is burnt.

Heat released from burning the pulverised fuel is used to heat water to produce steam within a network of boiler tubing. The final superheated steam exiting the boiler is used to drive turbines coupled to generators, which generate electricity through the use of electromagnets which spin

[18] The station capacity rating is dependent on the selected technology based on various Original Equipment Manufacturer (OEM) proposals, which would be acquired during the technical and commercial evaluation process.

within large copper coils. The generated electricity is then transformed from 22 kV to 400 kV and fed via the HV yard into the transmission network. Once the steam's energy has been exhausted, it is condensed and the water is returned to the boiler to start the process again. The cooling system can use either wet or dry cooling, the dry cooling option being either direct or indirect.

The ash produced through the combustion of the coal is removed from the bottom of the boiler and from the flue gas (via electrostatic precipitators or bag filters) and sent to an ash-dumping facility using a dry stacking technology. Electrostatic precipitators and bag filters can achieve similar removal efficiencies to meet the legislative requirements. As the environmental consequences of these technologies do not differ substantively, it is proposed to consider both briefly in the EIA, although the ultimate decision on which to adopt is likely to be made on life-cycle costs and operational considerations.

The power stations would include technology to remove oxides of sulphur (SO_X) from the flue gases, referred to as Flue Gas Desulphurisation (FGD), utilising a lime or limestone sorbent. FGD technology is capable of removing 90 % or more of the SO_X from the flue gas~~, and a system with at least 90 % efficiency would be installed at the proposed power stations~~. It should be noted however, that semi-dry FGD capable of removing 60 % of SO_X will also be considered.

Oxides of nitrogen (NO_X) would be controlled through the installation of low NO_X burners, which reduce concentrations of NO_X emitted to the atmosphere. This is likely to result in emissions that comply with the applicable standards and therefore further NO_X emission abatement technologies will not be considered in the study.

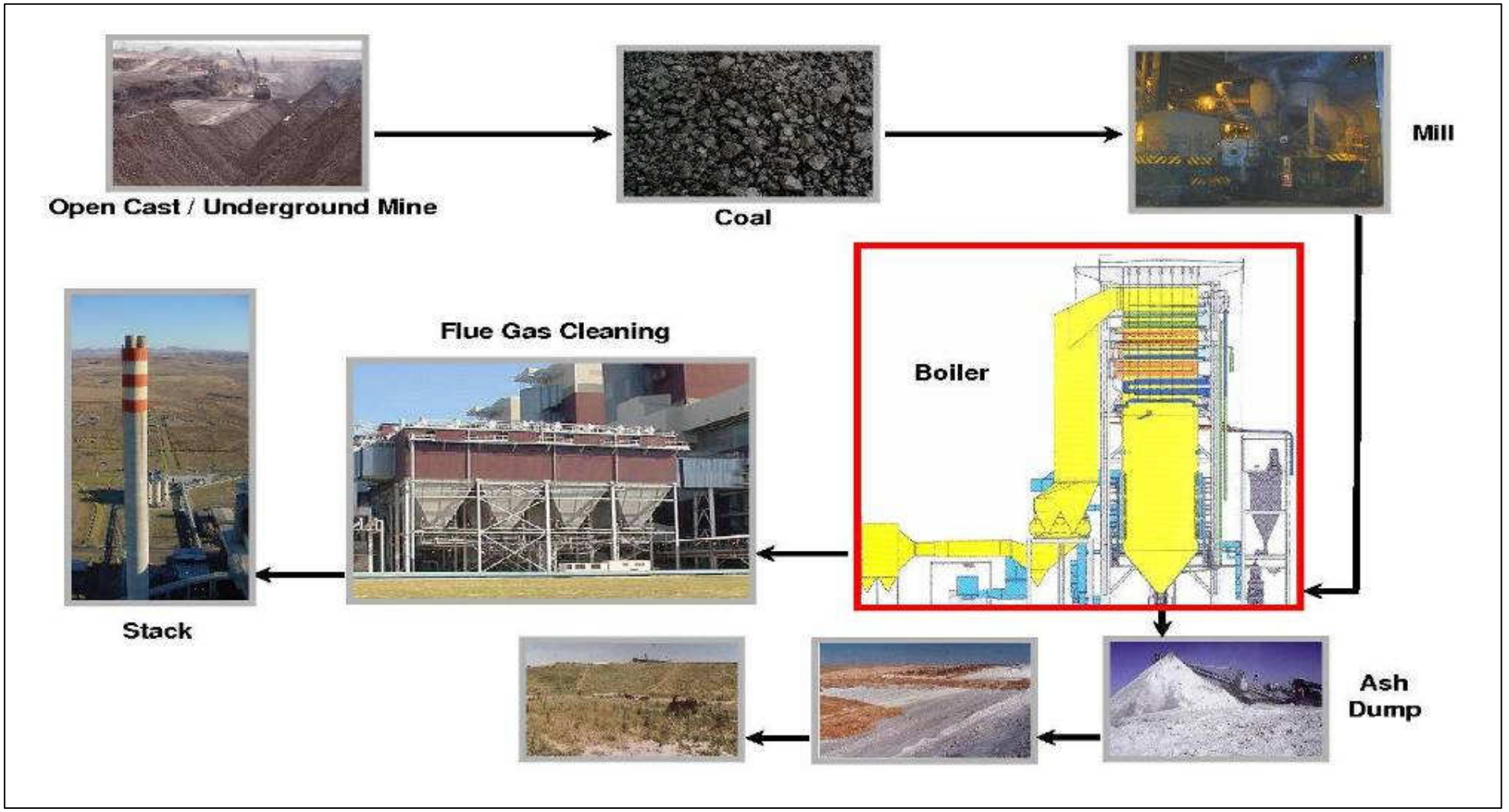


Figure 4.1 Process flow diagram for a coal-fired power station

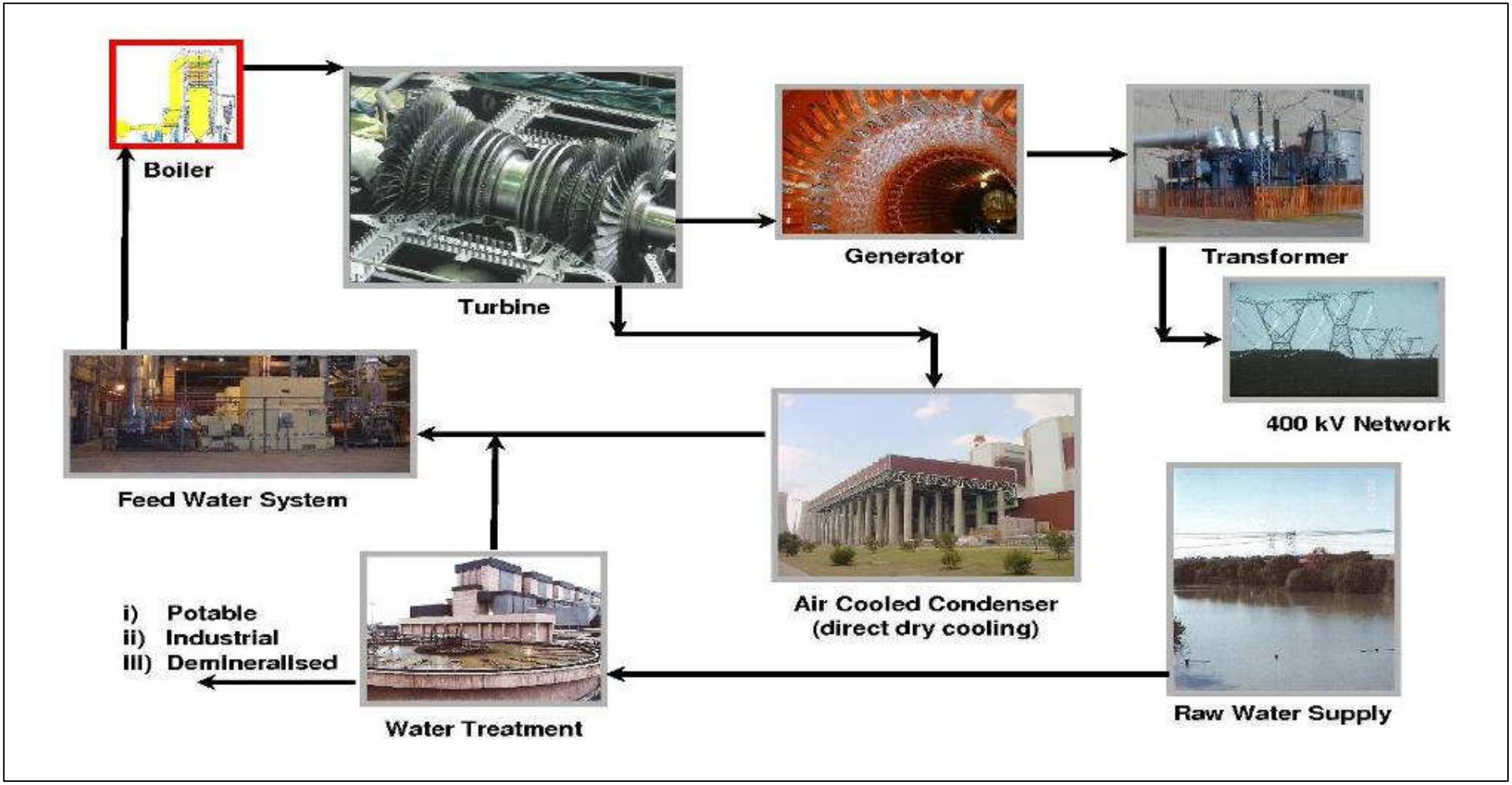


Figure 4.2 Process flow diagram for a coal-fired power station (detailed)

Figure 4.3 below shows the layout of a typical coal-fired station and some of its ancillary infrastructure. The layout would be based on the technical and environmental constraints of the chosen site[19].

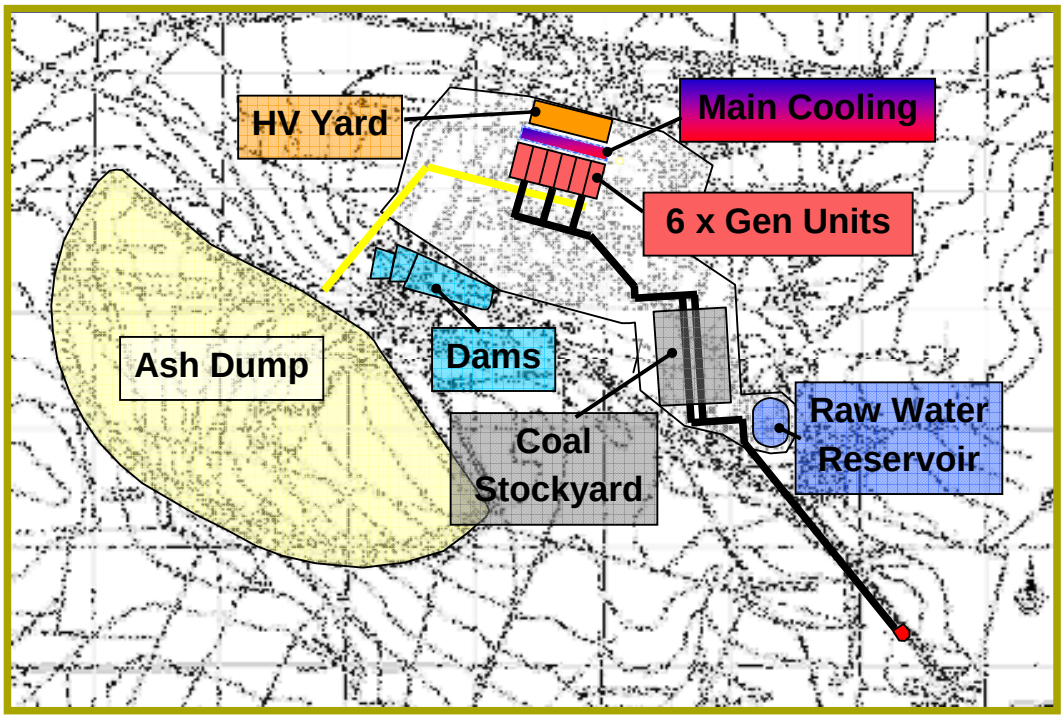


Figure 4.3 Typical layout of a coal-fired power station

4.3 CONSIDERATION OF ALTERNATIVES

4.3.1 INTRODUCTION

NEMA requires that alternatives are considered during the EIA process. An important function of the Scoping Phase is to screen alternatives to derive a list of feasible alternatives that need to be assessed in further detail in the EIR phase. An alternative can be defined as a possible course of action, in place of another, that would meet the same purpose and need (DEAT, 2004). Alternatives could include, amongst others, the following:

- Activity alternatives – also referred to as project alternatives. Requires a change in the nature of the proposed activity. This category of alternatives is most appropriate at a strategic decision-making level.
- Location alternatives – alternative locations for the entire project proposal or for components of the project proposal.
- Process alternatives – also referred to as technological or equipment alternatives. The purpose of considering such alternatives is to include the option of achieving the same goal by using a different method or process.

[19] The layout may be refined by the Technical Design Team at the detailed design phase, after the project has been authorised.

- Site layout alternatives – Site layout alternatives permit consideration of different spatial configurations of an activity on a particular site.

The above categories of alternatives are the ones most pertinent to this EIA process, and will be explored in detail below. The purpose of this section of the report is to identify (scope) and describe all potential alternatives and determine which alternatives should be carried through to the EIA Phase of the project for further assessment.

4.3.2 ACTIVITY ALTERNATIVES

Fundamentally different alternatives for achieving the project's goal are normally assessed at a strategic level. In this regard, as mentioned in **Section 1.1** above, the proposed project to establish two coal-fired power stations has come out of extensive policy and plan level investigations, undertaken by DME, NERSA and Eskom. Alternative methods of generating electricity are identified in the IEP, NIRP and ISEP planning processes. Furthermore, high-level environmental criteria were integrated in the NIRP and ISEP, focusing on environmental life-cycle assessments, site-specific studies, water-related issues and climate change considerations. Consequently, this Scoping Report only considers project level alternatives related to the two proposed new coal-fired power stations in the Waterberg and does not evaluate any other power generation options.

The 'no-go' alternative is the option of not establishing new coal-fired power stations at the proposed sites in the Waterberg. As described in **Section 1.1** above, the electricity demand in South Africa is placing increasing demand on the country's existing power generation capacity. South Africa is expected to require additional baseload generating capacity by 2014 and beyond, dependent on the average growth rate. The 'no-go' alternative ~~is likely to~~ will result in these electricity demands not being met, with the concomitant potentially significant negative impacts from an economic and social perspective for South Africa and is not explicitly assessed in the EIR phase. It is however, implicitly assessed in the EIR as it effectively represents the baseline or *status quo* against which all of the potential impacts will be assessed.

4.3.3 SITE LOCATION ALTERNATIVES

Once the need for the new coal-fired power stations was established, Eskom undertook a process to identify broad geographic regions within which to site the new power stations. As outlined in **Section 2.3** above, the Waterberg was identified for the development of new coal-fired power stations. Ninham Shand, with support from Eskom undertook a process to define the boundaries of the Waterberg region, and to delineate candidate sites. This resulted in three sites being identified and all were recommended for further detailed investigation during the EIA process. This process is described in detailed in **Section 3.2** of this Scoping Report

4.3.4 PROCESS ALTERNATIVES

Process alternatives relate to alternative technologies that could be implemented at a new coal-fired power station, and include combustion, cooling and atmospheric emission control technology alternatives and ash disposal alternatives. Each of these is discussed below.

a) Combustion technology alternatives

There are a suite of combustion technology options potentially available for new coal-fired power stations. Eskom is proposing to utilise pulverised fuel technology. This and other potential combustion technologies are described below.

i) Pulverised fuel combustion boiler

With pulverised fuel combustion technology, the coal is first pulverised into a very fine dust, and then blown into the boiler where it is burned much in the manner of a combustible gas.

It should be noted that all of Eskom's existing coal-fired generation employs pulverised fuel technology, as does that of the vast majority of the rest of the world. It is the only technology which is proven for plant of this magnitude and hence it is the technology which will be assessed in this process.

ii) Fluidised bed combustion boiler

A fluidised bed is a layer of solid particles kept in turbulent motion by bubbles of air being forced into the bed from below. Coal is added and burned in this bed. The coal burnt in a fluidised bed combustion (FBC) boiler is generally low grade coal, which is theoretically, less costly. Heat transfer to the water and steam in the tubes takes place from the hot solids and gases. Using a limestone bed can capture the sulphur in the coal to produce calcium sulphate as a waste product. As the bed operates at less than 900^{o}C, thermal nitrogen oxide emissions are reduced.

This technology has been available for some years with a number of units throughout the world. However this technology is internationally unproven in unit sizes greater than 300 MW. To obtain the economies of scale required for this project, the individual station unit sizes need to be between 600 MW and 1 000 MW.
Based on the above, FBC is not being considered as a viable option for this power station and accordingly will not be considered further in the EIA.

iii) Coal gasification technologies

Coal gasification involves the creation of a combustible synthesis gas (syngas) through the partial oxidisation of coal. The syngas can then be used as fuel for power generation

or other applications. Integrated coal gasification combined cycle (IGCC) power plants and underground coal gasification (UCG) are two such technologies.

IGCC power plants convert the coal to gas and then burn the gas to create electricity. UCG technology partially oxidises the coal *in situ* before the syngas is extracted and co-fired with coal to generate electricity. Eskom has established a UCG demonstration plant at the Majuba power station and the gas that is currently produced is being flared. Eskom is investigating the up scaling of the demonstration plant and the development of a commercial plant. However, neither of these technologies is commercially proven for plant of the desired magnitude (i.e. 600 to 1 000 MW units).

Based on the above, coal gasification technology is not considered to be a viable option for these power stations, and accordingly will not be considered further in this EIA.

b) Steam temperature and pressure alternatives (range)

The resultant heat from the combustion in the boiler is used to convert water into steam, which is used to drive a turbine coupled to a generator. The boilers would operate within OEM design parameters, the most important of which being pressure and temperature. Each of the six boilers would heat water to produce steam within a pressure and temperature range of 24 MPa – 26 MPa and 540^{o}C – 600^{o}C respectively. There is no significant impact on cost across this range although operation at the higher pressure and temperature range allows for increased efficiency (reduction in coal consumption and associated emissions by some 5 % to produce the same amount of energy).

c) Cooling technology alternatives

As mentioned in **Section 4.2** the steam used to drive the turbine has to be condensed back into water on exiting of the turbine to enable the thermodynamic cycle to repeat itself. A primary (main) cooling process is required to facilitate the condensation of steam in the circuit.

Cooling options include wet cooling, and direct or indirect dry cooling, and are explained below. Note that FGD is not included in the description of the cooling options below. FGD would increase the water consumption of the power stations and this will be considered later in the EIA phase.

i) Indirect wet cooling

Wet cooled systems utilise a circulating cooling water system, which absorbs heat during the steam condensation process and expels the heat to the atmosphere by the evaporation of some of the cooling water through the cooling towers. A wet cooling system uses approximately 1.8 l water per kWh sent out, ie some 78 million m^3 per annum for a 5 400 MW power station. Wet cooling uses approximately nine times the volume of water as is used by dry cooling. As South Africa is a water scarce country and

wet cooling uses far greater volumes of water than dry cooling, wet cooling will not be considered as an alternative in this EIA.

ii) Indirect dry cooling

An indirect dry-cooling system works similarly to the wet-cooled system, with the primary difference being that the heat is dissipated in the cooling towers via water-to-air heat exchangers, rather than evaporation of the cooling water. Dry cooling uses approximately < 0.2 l of water per kWh sent out. A significant advantage of dry-cooling technology is the conservation of water, which is critical in a semi-arid country like South Africa. Another advantage is the lack of wet plumes (steam) from the cooling towers (see **Figure 4.8**). However, with dry-cooling, the turbine output deteriorates significantly at higher ambient temperatures, decreasing the amount of energy sent out of the process. A reduction of 60 MW could be expected over an ambient temperature increase of 25^{o}C.

Stack-in-tower system of indirect dry cooling

In a stack-in-tower system of indirect dry cooling, steam is condensed in a water cooled condenser (see **Figure 4.4**) and warm cooling water is cooled in a water-to-air heat exchanger (see **Figure 4.5**) in a closed loop. This system is more efficient than other direct cooling technologies when the ambient temperature is higher and it also produces less noise than direct air cooling.

Figure 4.4 Photograph showing a power station with the dry cooling tower of the Stack-in-Tower system of indirect dry cooling technology

Figure 4.5 Photograph showing a power station with the water-to-air heat exchangers of the Stack-in-Tower system of indirect dry cooling technology

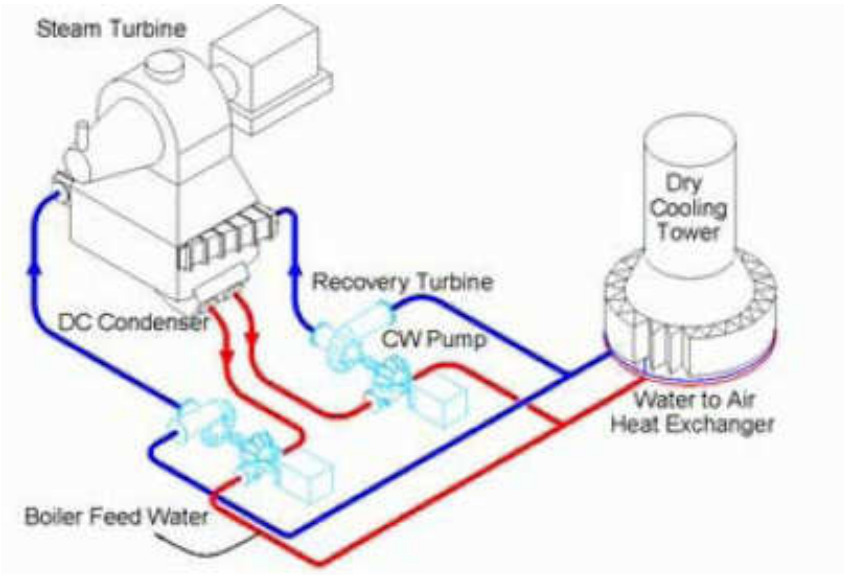


Figure 4.6 Schematic of the stack-in-tower system of indirect dry cooling system

The system is particularly useful when flexibility in cooling tower siting is required, and further can result in lower ground level concentration of airborne pollutants, having a positive on ambient air quality and community health.

As South Africa is a water scarce country and wet cooling uses far greater volumes of water than dry cooling, wet cooling will not be considered as an alternative in this EIA. Due to the significant improvements to that can be achieved by the indirect, direct and the stack-in-Tower system of dry cooling technologies, it is proposed that all three technologies are considered in further detail in the EIA.

iii) Direct dry cooling

In a direct dry-cooling system, the steam is condensed directly by air in a heat exchanger and the condensate is returned to the boiler in a closed loop. The air flow for the condensation process is induced solely by mechanical fans, rather than through the updraft induced by cooling towers. As stated above, dry cooling utilises approximately < 0.2 l of water per kWh sent out. A further advantage of direct dry cooling is the lack of cooling towers, which reduces the visual impact and capital cost of the project (see **Figure 4.8**).

DWAF is cognisant of future expansions in mining and industry in the Lephalale area and is planning for this through a bulk water transfer scheme. However, Eskom is committed to minimising the utilisation of scarce water resources and therefore wet cooling is not considered environmentally desirable and will not be considered further in this EIA. However, the implications of both indirect and direct dry cooling will be considered in further detail in the EIA.

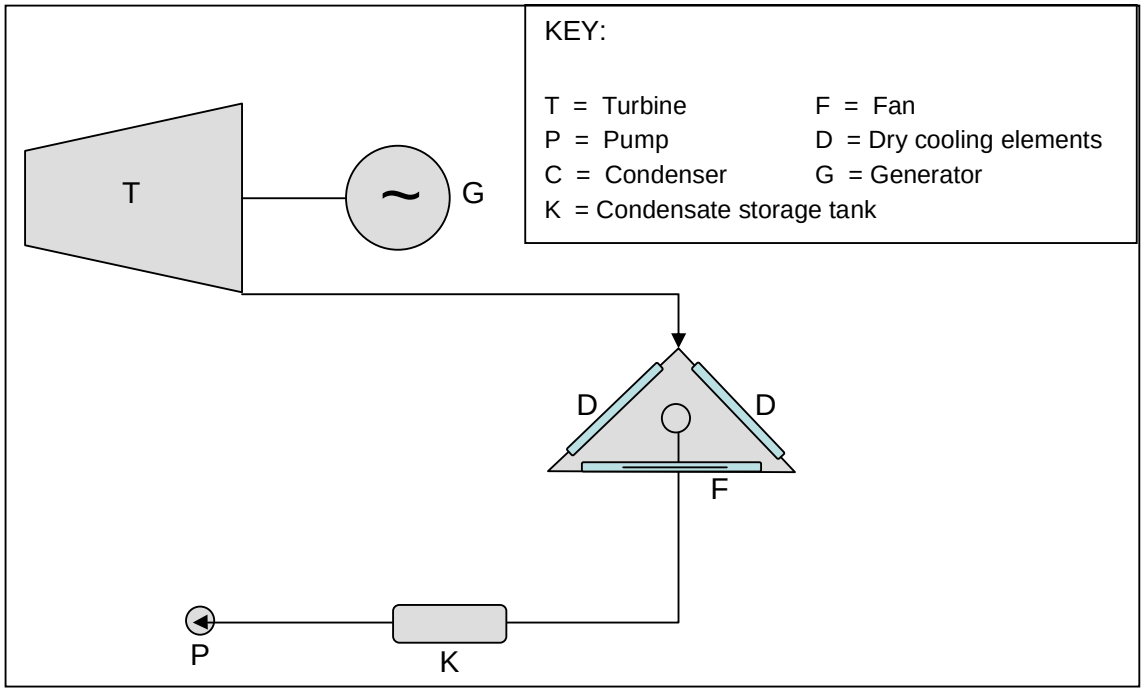


Figure 4.7 Schematic of the direct dry cooling process

Figure 4.8 Photograph showing a power station with indirect dry cooling technology

Figure 4.9 Photograph showing a power station with direct dry cooling technology

d) Ash disposal alternatives

There are three methods of disposing of ash (coarse and fly ash)[20]; namely above-ground ashing, in-pit ashing and back-ashing. These three options are described below.

i) Above ground ashing

Ash and FGD byproducts are conveyed to an ash dump, within the power station precinct, where it is stacked and spread. The ash dump would have to be able to accommodate the likely total volume of ash and FGD byproducts that would be generated throughout the power station's life-spans i.e. some 300 million tons which would cover a footprint of approximately 2 500 ha. The ash dump would be continuously rehabilitated over time, using accepted rehabilitation methods. Rehabilitation measures include, reshaping, application of topsoil and revegetation with an acceptable grass species. Further detail will be provided in the EIR. Co-disposal of ash and FGD by-products as well as separate disposal of ash and FGD by-products, within the same area, will be studied during the EIR phase.

ii) In-pit ashing

The ash and FGD byproducts from the power station would be dumped directly into the pit of the open-cast coal mine which supplies coal[21] to the power station. The overburden[22] and topsoil are placed onto the ash before the land is rehabilitated.

iii) Back-ashing

The primary difference between in-pit and back-ashing is that in back-ashing, the overburden is returned to the pit of the open-cast mine, prior to the ash and byproducts being dumped. Topsoil is then placed onto this and the ash dump would be continuously rehabilitated over time, using accepted rehabilitation methods.

In-pit and back-ashing would have to be undertaken in consultation with the relevant mining house supplying the coal to the power station and would only become potential options in the future, after any open cast mining operation has been completed or space is available in parts of the mine to allow these forms of ash disposal. In this instance above ground ashing facilities would therefore be required for the period prior to back- or in-pit ashing being possible.

Consequently, this EIA process will only consider above-ground ashing (for the life of the station) within the power station precinct as the means of ash-disposal. However, it is

[20] Note that large amounts of FGD byproducts will be either co-disposed with the ash or disposed separately within the same disposal area.
[21] The only other open cast mine in the area is the Grootegluk open cast mine which is still operational, and as such it is unsuitable for in-pit ashing. There are no other suitable areas available.
[22] Overburden is the layer of surface material that is removed prior to mining of the coal.

recommended that the EIA process for the colliery investigate in-pit and back-ashing, as these may be preferable to above-ground ashing in the medium to long term.

4.3.5 SITE LAYOUT ALTERNATIVES

Site layouts (one or more) will be developed for each of the three sites. These would take the form of a guide as to where the main components of the power station would be located, rather than a detailed layout of the power station precinct. The development of these layouts will be based on *inter alia* the following criteria:

- Technical constraints
    - Spatial orientation requirements of certain plant;
    - Topographical constraints of dams;
    - Layout relative to other existing infrastructure, such as power lines and roads; and
    - Geotechnical considerations.

- Environmental constraints
    - Topographical constraints, including surface and groundwater;
    - Local air quality implications;
    - Aquatic and terrestrial constraints (presence of wetlands, rivers, protected plant communities); and
    - Aesthetics and neighbouring land use.

The site layouts will be developed during the EIR phase, and will be presented and assessed in the Draft EIR.

5 THE PUBLIC PARTICIPATION PROCESS

The purpose of this chapter is to provide a summary of the Public Participation Process to date and the way forward with respect to the process as part of the EIA phase of this project. A summary of the key issues raised by I&APs to date is also provided.

5.1 INTRODUCTION

Consultation with I&APs forms an integral component of an EIA process (see **Figure 1.2**) and enables *inter alia* directly affected landowners, neighbouring landowners, stakeholders, communities and interested parties to identify the issues and concerns relating to the proposed activity, which they feel should be addressed in the process. The approach to this public participation process, summarised in the Plan of Study for EIA (**Chapter 7**), has taken cognisance of the DEAT guideline on Stakeholder Engagement (2002).

Public participation, as required in terms of the EIA Regulations can, in general, be separated into the following phases:

Initiation of the Public Participation Process

- During this phase I&APs are notified of the initiation of the environmental investigation, to enable them to raise issues and concerns at the outset of the investigation.

Comment on the Draft Reports

- During the Scoping and EIR phases, registered I&APs are provided with an opportunity to comment on draft versions of the reports. This is enabled by the lodging of the reports at suitable locations and invitations to public meetings/open houses to discuss the content of the relevant report.

Decision and Appeal period

- This is the final phase of the public participation process. Once the competent authority have made their decision and issued an Environmental Authorisation, the applicant and I&APs are notified of the decision and have the opportunity to appeal to the National Minister of Environmental Affairs and Tourism.

Progress with respect to these various stages for the current project is discussed in more detail below. It should be noted that the public process developed for this investigation exceeds the minimum requirements of NEMA. The Public Participation Process is being facilitated by Zitholele Consulting, a consulting firm, which has extensive experience in stakeholder engagement and facilitation.

5.2 INITIATION OF THE PUBLIC PROCESS

The approach adopted for the current investigation was to identify as many I&APs as possible initially, through a suite of activities, including placing public notices in national, regional and local newspapers, visiting many of the potentially affected landowners and identifying I&APs from other databases in the area and placing posters on sites. Thereafter, the remainder of the communications will be focused on registered I&APs and on regional advertising. Consequently, the initial advertising campaign was broad and thorough and invited the members of the public to register as I&APs.

5.2.1 COMPILATION OF THE I&AP DATABASE

The initial database of I&APs was compiled using a list of stakeholders provided by Eskom, using the I&AP database for the Medupi Power Station, and through liaison with the local municipality, agricultural unions and other organisations in the area. Furthermore, an extensive survey of potentially directly affected landowners was undertaken, where representatives from the Public Participation Team contacted all the potentially directly affected landowners telephonically and provided information in the form of a BID, and an invitation to attend a Landowners and Agricultural Sector Meeting.

The initial database included directly affected landowners, relevant district and local municipal officials, relevant national and provincial government officials, and stakeholders from previous studies. This database is augmented via chain referral, and is continually updated as new I&APs are identified throughout the project. The current list of I&APs, comprising approximately 200 individuals and organisations, is included in **Annexure E**. The sectors of society represented by I&APs on the database are listed in **Table 5.1** below.

Table 5.1 Sectors of society represented by I&APs on the database

• National government • Provincial government (Limpopo) • Local government (district as well as local municipality) • Organised agriculture • Business/Commerce • Environmental and conservation organisations • Industry • Education: local schools	• Local landowners (on the three alternative sites) • Local communities, including tribal authorities, women's groups, development committees and other community based organisations (CBOs) in the project area • Media (print and broadcast) • Transport	• Water organisations (Irrigation Boards, Water Boards, Water Committees, and Water User Associations) • Non Government Organisations • Researchers and consultants • Tourism • Action groups

5.2.2 COMPILATION AND DISTRIBUTION OF BACKGROUND INFORMATION DOCUMENT

A BID for the proposed project was compiled in English and Afrikaans, which are the prominent languages used in the region. The BID provided a background to the proposed project and highlighted the legal requirements and EIA process to be followed for the project. A Response Form was enclosed/ attached, inviting I&APs to provide any comments regarding the proposed activities, to identify any further I&APs who should be consulted, and to register on the I&AP database. The BID and a Response Form were distributed via post, fax or e-mail to all I&APs on 16 September 2008. A copy of the BID is included in **Annexure C**. As the BID only included the description of a single power station an urgent letter was distributed to all I&APs who had received a copy of the BID or registered before 1 October 2008. This letter notified I&APs of the change in the project description to include a second power station and the reasons behind this change. A copy of this notice is included in **Annexure C**.

5.2.3 ADVERTISING IN THE NATIONAL, REGIONAL AND LOCAL NEWSPAPERS

Advertisements for the EIA process appeared in a suite of national, regional and local newspapers between 15 September and 19 September 2008, as reflected in **Table 5.2**. The advertisements provided a background to the proposed activities and EIA process, and invited members of the public to register as I&APs, and raise any issues or concerns. Copies of the advertisements are included in **Annexure C**.

Table 5.2 List of publications including advertisement language and date

Coverage	Publication	Language	Date
National	Sunday Times	English	21 September 2008
	Rapport	Afrikaans	21 September 2008
Regional	The Star	English	15 September 2008
	Beeld	Afrikaans	16 September 2008
	Sowetan	English	17 September 2008
	Citizen	English	18 September 2008
Local	Mogol Post	English	19 September 2008
	Kwêvoël	Afrikaans	19 September 2008
	Limpopo Beat	English	17 September 2008
	Capricorn Voice	English	17-19 September 2008

5.2.4 INITIAL LANDOWNER AND KEY STAKEHOLDER MEETINGS

Initial meetings were held with authorities as well as directly affected landowners and representatives of the agricultural sector on 3 and 4 October 2008, in Lephalale and Steenbokpan, respectively. The main purpose of these meetings was to provide the directly affected authorities and key stakeholders with an opportunity to meet the study team and to raise any initial issues and concerns regarding the project. A brief background to the EIA, site

selection and land acquisition processes were provided at the meeting (the presentations are included in **Annexure C**). The presentations were delivered in English and Afrikaans. The meetings are listed in the table below.

Table 5.3 List of meetings held during the announcement of the EIA

Date	Venue	Time	Attended by
Friday 3 October 2008	Machauka Lodge, Lephalale	11:00 - 15:00	Authorities of national, provincial and local government. This meeting also included a site visit to the proposed alternative sites.
Saturday 4 October 2008	Steenbokpan in the old NTK Building	10:00 - 13:30	Agricultural sector and landowners

5.2.5 ISSUES AND CONCERNS RAISED

Issues were submitted to the public participation facilitator via telephone, mail, fax, email and at the meetings. Comments and concerns raised by I&APs (see **Annexure F**) with regards to the proposed activities have been incorporated into a detailed 'Issues Trail' which is included as **Annexure G**. The Issues Trail records all the issues and concerns raised by I&APs during the Scoping Process, and provides the project team and proponent's response thereto. The major issues raised by I&APs can briefly be summarised as follows:

Biophysical issues

- Impacts on the ambient air quality of the region;
- Lack of sufficient water for proposed power stations; and
- Decision to pursue the coal-fired power station option, in preference to gas, nuclear or renewable energy options.

Social issues

- Indirect impacts on adjacent landowners;
- Impacts on the social environment and economy;
- Impacts on the sense of character of Steenbokpan; and
- Loss of areas currently utilised for amenity/recreational purposes (i.e. getaways etc)

Economical issues

- Concerns regarding the compensation process and adequacy of the compensation received; and
- Location of the new township.

Planning issues

- Relevance of the EIA when three EIAs previously undertaken in the area;
- Lack of trust between I&APs and Eskom concerning Eskom's long term planning, adherence to mitigation measures in previous EIA's; and
- Separation of the EIA's for the power stations and transmission lines.

5.2.6 MINUTES OF THE INITIAL PUBLIC MEETINGS

Detailed notes were taken during the focus group meetings in order to capture the issues and concerns raised. Thereafter, notes of the meetings were compiled, translated into Afrikaans and distributed to the relevant meeting attendees. Copies of the presentations given at the meetings and copies of the attendance lists were attached and distributed with the meeting notes. The notes of these meetings are included in **Annexure C.**

5.3 COMMENT ON THE DRAFT SCOPING REPORT

The next stage of the public participation process involved the lodging of the Draft Scoping Report (DSR) in public libraries and on the Internet (Eskom and Ninham Shand's websites), and the hosting of a Public Meeting / Open House.

The first round of Public Meetings / Open Houses was held on 26 November 2008 at the following venue:

Date	***Venue***	***Time***
26 November 2008	Mogol Club, Conference Centre, Lephalale	16:00 – 20:00

The formal meeting only started at 18:00. An Open House was held before this meeting, during which information was on view (e.g. posters and maps) and informal discussions took place.

The purpose of this meeting was to present the DSR and provide the public with an opportunity to comment on the findings. All registered I&APs were notified of the meetings by means of a letter sent by post, fax or email on 3 November 2008. Furthermore, public notices were placed in the local newspapers between 5 and 7 November 2008, inviting the general public to attend the meetings. The letters of notification also included a copy of the Executive Summary of the DSR and a Response Form for comments in English and Afrikaans. Copies of this DSR have been lodged in the following locations and on the Eskom (www.eskom.co.za/eia) and Ninham Shand (www.ninhamshand.co.za) websites from 5 November 2008:

- Lephalale Local Municipal office, Lephalale;
- Lephalale Public Library, Lephalale;
- Agri Lephalale local office;
- Marapong Clinic (Mosethla Street, Marapong); and
- Lephalale District Agricultural Union.

I&APs were allowed until 9 January 2009 to submit their written comments on the DSR to Zitholele Consulting. However, a request arose from the landowners for a meeting later in January 2009 (24 January 2009), and the closing date for the comments period on the DSR was extended until 30 January 2009. This was to allow the landowners an opportunity to submit any comments they might have after the presentation of the DSR. Cognisance was taken of all comments when compiling the final report, and the comments, together with the study team and

client's responses thereto, are included as an annexure in the final report. Where appropriate, the report was updated.

5.4 REVIEW AND DECISION PERIOD

On completion of the Final Scoping Report it will be submitted to DEAT for their review and decision regarding approval of the Report and related Plan of Study for EIA. DEAT will thereafter issue a letter accepting the Scoping Report and Plan of Study for EIA and advise the EAP to proceed with the tasks contemplated in the Plan of Study, or request amendments or reject the Scoping Report and Plan of Study for EIA.

6 DESCRIPTION OF THE AFFECTED ENVIRONMENT AND POTENTIAL IMPACTS

The purpose of this chapter is to provide a brief description of the affected environment and the potential impacts that could result from the proposed project. Where additional information is required for detailed assessment in the EIR ToR for specialist studies are given.

6.1 INTRODUCTION

The description of the affected environment given below draws on existing knowledge from published data, previous studies, specialist investigations, site visits to the area and discussions with various role-players. The identification of potential impacts which may occur as a result of the proposed activities described in **Chapter 4** of this report is broad, to cover the operational phase as well as the construction phase of the project. In cases where there is currently inadequate information, a draft ToR and proposed specialist consultant is provided. Impacts of lesser importance are identified and will be considered in the EIR. ~~also screened out, with reasons, to ensure that the EIR is focused on the potentially significant impacts.~~

6.2 OPERATIONAL PHASE IMPACTS ON THE BIOPHYSICAL ENVIRONMENT

This section of the report describes the biophysical environment and considers the long-term or operational phase impacts on the biophysical environment that may be associated with the proposed activities, including the following:

- Impact on the terrestrial fauna and flora;
- Impact on aquatic flora and fauna;
- Impact on ambient air quality;
- Impact of founding conditions on the power stations; and
- Impact on groundwater resources.

Long-term impacts on the socio-economic environment are described in **Section 6.3**, while the construction phase impacts are outlined in **Section 6.4**.

6.2.1 IMPACT ON TERRESTRIAL FAUNA AND FLORA

According to Mucina and Rutherford (2006) two vegetation types are found within the vicinity of the candidate sites, namely Limpopo Sweet Bushveld and Western Sandy Bushveld. Note that both vegetation types are listed as Least Threatened.

According to Mucina and Rutherford (2006), Limpopo Sweet Bushveld is found on plains, sometimes undulating or irregular, crossed by several tributaries of the Limpopo River. It forms

short open woodland and in disturbed areas forms impenetrable thickets of Blue Thorn (*Acacia erubescens),* Wait-a-Bit Thorn *(A. mellifera)* and Kalahari Christmas Tree *(Dichrostachys cinerea)*. The succulent herb *Piaranthus atrosanguineus* is a Central Bushveld endemic found in this vegetation type. Limpopo Sweet Bushveld is widespread, extending from the lower reaches of the Crocodile and Marico Rivers down the Limpopo River Valley including Lephalale and north to the Usutu border post as well as into Botswana. This vegetation type is classified as Least Threatened with a conservation target of 19 %. Approximately 1 % is statutorily conserved and 5 % is transformed, mainly due to cultivation. Though limited by low rainfall this vegetation type is good grazing for game and cattle due to the high grazing capacity of sweet veld (Mucina and Rutherford, 2006).

Western Sandy Bushveld occurs on the flats and undulating plains. It varies in form from tall open woodland to low woodland, which has prominent broad-leaved and microphyllous tree species. Dominant species include Blue Thorn (*A. erubescens)* on flat areas, Red Bushwillow *(Combretum apiculatum)* on shallow soils of gravelly upland sites and Silver Clusterleaf *(Terminalia sericea)* on deep sands (Mucina and Rutherford, 2006). Western Sandy Bushveld extends from Assen northwards past Thabazimbi and west of the Waterberg Mountains towards Steenbokpan in the north. This vegetation type is classified as Least Threatened with a conservation target of 19 %. Approximately 6 % is statutorily conserved, mainly in Marakele National Park, and approximately 4 % is transformed, mainly due to cultivation (Mucina and Rutherford, 2006).

Land use at the three candidate sites appears to be similar, with a mix of grazing and game farming. There are no formally protected areas within 25 km of the candidate sites. The Waterberg Biosphere Reserve lies over 100 km to the east south east of the sites.

Animals in the greater Waterberg region include, amongst others, Nyala antelope (*Tragelaphus angasii)*, white rhino (*Ceratotherium simum)*, giraffe (*Giraffa camelopardalis)*, waterbuck (*Kobus ellipsiprymnus)*, zebra (*Equus burchellii)*, tsessebe (*Domaliscus lunatus)* (classified as Endangered by the Endangered Wildlife Trust (EWT)), eland (*Taurotragus oryx)* and others. It also includes a variety of predators such as leopard (*Panthera pardus)*, brown hyena (*Hyaena brunnea)* (classified as Near Threatened by the EWT), jackal and smaller cats.

The Cape vulture, listed in the Red Data Book by EWT as Critically Endangered, breeds within the Waterberg area. As it nests on cliffs the breeding of Cape vultures would be unaffected by the footprint of the power station which is in a relatively flat area. However, Cape vultures may use the study area for scavenging and could therefore be affected by the proposed project.

The site requirements for the establishment of a coal-fired power station and its ancillary infrastructure is at least 5 000 ha although the average size of sites being investigated is approximately 8 000 ha. The total area would not, however, be disturbed, which would mitigate the impact on flora and fauna partially. It should also be noted that portions of the three candidate sites have been historically disturbed through grazing and game farming. Furthermore, the inherent mobility of most faunal species would enable those communities within the affected area to move away from the construction area to undisturbed land in the immediate vicinity. In the medium to long term, the areas not directly affected by the proposed development could be conserved.

In conclusion, given the limited conservation of Limpopo Sweet Bushveld and Western Sandy Bushveld and the extent of the sites that could be disturbed, it is recommended that a specialist terrestrial ecology assessment be undertaken, focused within the three candidate sites under consideration. The proposed ToR for this specialist study are as follows:

- Undertake an initial site visit with the EIA team in order to obtain an overview of the candidate sites and to refine the ToR.
- Source and review baseline information and participate in the finalisation of these ToR.
- Undertake the requisite field work and compile a report that considers the following aspects:
    - A broad description of the terrestrial ecological characteristics of the candidate sites and surrounds;
    - Identification and description of biodiversity patterns at community and ecosystem level (main vegetation type, plant and animal communities in vicinity and threatened/ vulnerable ecosystems species), at species level (Red Data Book species, presence of alien species) and in terms of significant landscape features;
    - Identification of potential impacts and recommendations to mitigate these;
    - Comment on whether or not biodiversity processes would be affected by the proposed project, and if so, how these would be affected;
    - Provide a preference ranking of the sites in terms of terrestrial fauna and flora, with and without mitigation measures; and
    - Comment on the cumulative impacts of two power stations, as well as developments in the broader area (e.g. Sasol's proposed coal-to-liquids facility).

It is proposed that Dr Johan du Preez of Makecha Development Associates undertake the requisite assessment. He is an ecologist with a doctorate in plant ecology. He has extensive knowledge of the region and experience in undertaking similar assessments, and is also a senior lecture at the University of the Free State.

Cumulative impacts on terrestrial fauna could result from developments associated with the proposed power stations, for instance additional footprint impacts from a new coal mine. The establishment of a coal mine is likely to have a greater footprint impact than the power station, especially if the mine uses open-cast mining technology. These potential cumulative impacts on terrestrial fauna will be discussed in the EIR.

It is also noted that the emissions of the power station could affect both the communities and the game animals in the surrounding area. Similar concerns were raised during and after the Matimba "B" EIA process (now referred to as Medupi power station). The effects of SO_2, NO_2 and PM_{10} on human health, at levels beyond certain concentrations, are well studied and well known. However, the effects of these irritants on animals are less known and in many cases are completely unstudied. Extrapolating from human health studies, increases in PM_{10} levels could have an impact on the respiratory health of game animals and SO_2 could cause cardiopulmonary effects. NO_2 is believed to enhance the effects of exposure to other known irritants, such as ozone, SO_2 and particulates in humans and it is possible that it could have the same effects in game animals.

Given the large number of game farms in the general vicinity of the proposed candidate sites, it is recommended that an animal toxicology study be undertaken. The proposed ToR for this specialist study are as follows:

- Review of available literature on the toxicity and mode of action of particulates (with a diameter of 10 µm or more) (PM_{10}), sulphur dioxide and nitrogen dioxide in game species;
- Comparison of modes of action of the selected pollutants between game species, based on principles of physiology;
- Review of ambient air concentrations of particulates (PM_{10}), sulphur dioxide and nitrogen dioxide at the receptor location, based on dispersion modelling, considering different averaging times as may be required. Concentrations must take into account background levels of the substances of potential concern;
- Interpret modelled air concentrations of particulates (PM_{10}), sulphur dioxide and nitrogen dioxide in terms of potential health effects on game species.

Dr Jan Myburgh is a qualified veterinarian with over 10 years experience in service rendering (clinical veterinary work) to commercial and small-scale farmers in the Gauteng and Northwest Province. Clinically, he has a special interest in bovine medicine (pharmacology and toxicology) and reproduction. Dr Myburgh currently works for the University of Pretoria and is a senior lecturer in the Department of Paraclinical Sciences and is responsible for teaching Pharmacology and Toxicology to pre- and postgraduate students. Dr Myburgh will be working under the auspices Dr Willie van Niekerk of Infotox.

6.2.2 IMPACT ON AQUATIC FLORA AND FAUNA

The Waterberg falls within the Limpopo primary catchment and more specifically the Mokolo and Matlabas Key Areas, which drain into the Limpopo River to the north. Although the Sandloop (a tributary of the Mokolo), Limpopo and Matlabas Rivers are the nearest to the candidate sites these are approximately 29 km (east), 20km (north) and 20 km (west) away, respectively (see **Figure 6.2**). The Sandloop, Limpopo and Matlabas Rivers are categorised as having a Present Ecological Status of Class C, moderately modified, with the Limpopo and Matlabas Rivers being perennial and the Sandloop River non-perennial (Driver *et al*, 2004).

The Mokolo Key Area appears to be in balance currently and DWAF has noted that no further allocations should be made from surface water without carrying out detailed analyses to verify a sustainable source of supply (DWAF, 2004).

The Matlabas Key Area is a dry catchment with non-perennial flow and hence no sustainable yield from surface water. The limited water use in this catchment is mostly from groundwater, which is under-exploited (see **Section 6.2.4** below). DWAF has noted that new allocations in this Key Area can only be made from groundwater or from additional yield which could be created by the construction of farm dams (DWAF, 2004).

However, the Lephalale area has been earmarked as a growth node by the provincial government and it is anticipated that the water demand will increase with new developments proposed such as new or expanded mining activities, new power stations and other

developments. DWAF has consequently taken note of the proposed developments and is proposing an augmentation scheme to increase the supply in the Mokolo Water Management Area (WMA). Options being considered include (see **Figure** 6.1 showing possible augmentation options below):

- the re-allocation (temporarily or permanently) of the Mokolo Dam water;
- and/or the raising of the Mokolo Dam; and
- transferring surplus effluent return flows from the Crocodile West / Marico WMA .

A transfer pipeline from the Crocodile River (West), to augment the water requirements of the Mokolo catchment is the preferred long term option for implementation. A Feasibility Study for this option is currently underway (pers.comm. W Comrie).

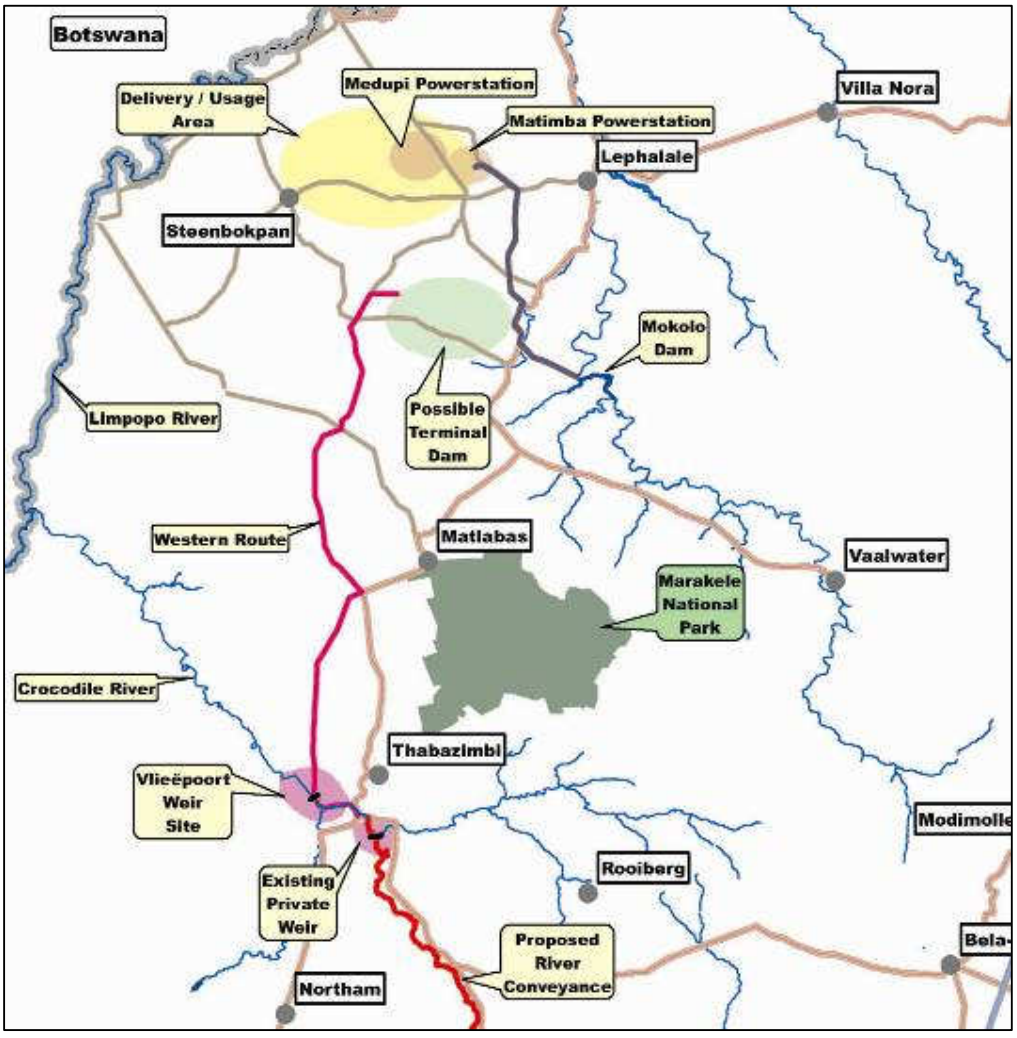


Figure 6.1 Locations of possible augmentation schemes

Within the candidate sites five pans (classified as wetlands) are found (see **Figure 3.3**) with an average area of 4.2 ha. The largest pan, Slingerspan on Knopjesdoorn farm, is 8.1 ha in extent. The largest pan in the surrounding area is Brakpan approximately 3 km east of Site C which covers an area of 25.6 ha.

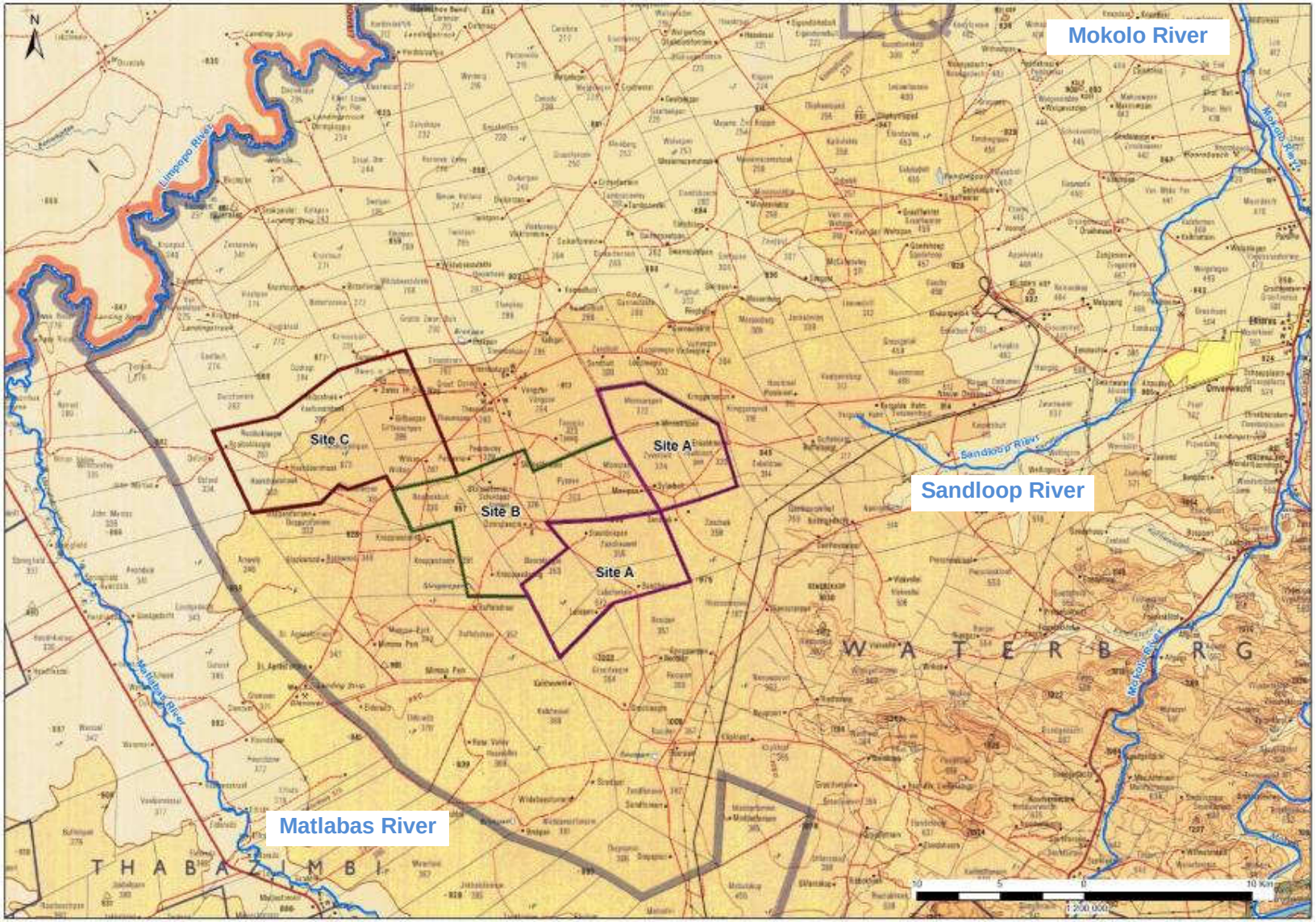


Figure 6.2 Rivers found in proximity to the candidate sites

South Africa recognises the importance of its wetlands as sensitive ecosystems that require conservation, and accordingly has become a signatory to the international Convention on Wetlands of International Importance (also known as the Ramsar convention). While there are no Ramsar listed wetlands in the vicinity of the candidate sites, the importance of wetland conservation is noted.

As mentioned previously, the proposed power station would require approximately 5 000 ha of land, even though only a portion of this would be developed with the power station infrastructure, and a portion being used mainly for the creation of an ash and gypsum disposal facility and a coal stockyard. The proposed development could therefore have an impact on the extent and integrity of any wetlands on the candidate sites. Furthermore, any run-off and leachate from the ash disposal facility and coal stockyard could contaminate any wetlands, if not dealt with effectively, affecting their ecological integrity and functioning.

Given the importance of the conservation of water resources in South Africa, specifically wetlands it is recommended that an aquatic ecological assessment be undertaken. The proposed ToR for this specialist study are as follows:

- Undertake an initial site visit with the EIA team in order to obtain an overview of the candidate sites and to refine the ToR.
- Undertake an initial desktop study of reputable sources to compile an expected species list and to focus the aquatic ecology study.
- Undertake the requisite field work and compile a report that considers the following aspects:
    - Broad description of the aquatic ecology of the candidate sites and surrounding wetlands and streams including aquatic assessment and habitat classification;
    - Delineation of wetlands, utilising DWAF's approved methodology;
    - Identification and description of biodiversity patterns at community and ecosystem level (plant and animal communities in vicinity and threatened/vulnerable ecosystems species), species level (Red Data Book species, presence of alien species) and in terms of significant landscape features (e.g. wetlands);
    - General comment on whether ecosystem processes would be affected (including comment on how these would be affected);
    - Identification of potential impacts and recommendations to prevent or mitigate these;
    - Offer an opinion on site rankings in terms of aquatic ecosystems including wetlands, with and without mitigation measures; and
    - Comment on the source of water supply to the wetlands and identify potential impacts to any wetlands downstream to the development; and
    - Comment on the cumulative impacts of two power stations, as well as developments in the broader area (e.g. Sasol's proposed coal-to-liquids facility).

Golder Associates, an environmental services consulting firm, lead by Mr Daniel Otto, has been appointed to undertake the aquatic ecological assessment. Mr Daniel Otto has over 16 years experience in aquatic hydrology and has assisted in research such as passive treatment wetland projects and *A Manual on Mine Water Management and Treatment Practices in South Africa*. Mr Otto has lectured at the Vista University in Johannesburg and has also worked as a

researcher. Mr Otto specializes in environmental rehabilitation, environmental management plans implementation, audits, liability assessment and environmental risk assessment audits.

Cumulative impacts on aquatic flora and fauna could result from developments associated with the proposed power stations, for instance through pollution of the surface water or through direct footprint impacts from the development of the coal mine. These potential cumulative impacts will be discussed in the EIR.

6.2.3 IMPACT ON AMBIENT AIR QUALITY

The three candidate sites are located within the Waterberg region, near Lephalale. Coal mining operations at the Grootegeluk mine, the Matimba power station and the Medupi power station (currently being constructed), and a brick works located at Hanglip are all located within 25 – 30 km of the candidate sites. Furthermore, household fuel burning, veld fires, windblown dust from the area and agricultural activities, vehicle exhaust emissions and cross-boundary pollution from Botswana, in particular further contribute to atmospheric pollution in the area. The ambient air quality in the near vicinity of these areas was recently studied by Airshed Planning Professionals (2006) for the siting of the Medupi power station. The following findings were noted:

- SO_2 concentrations were found to infrequently exceed short term air quality limits at several monitoring stations. Given that short-term limits are exceeded due to the operations of the existing power station (Matimba) it is likely that the addition of Medupi power station will increase the frequency of exceedance downwind of the power stations. However, the Environmental Authorisation authorizing the Medupi power station was issued with the condition that Medupi power station and the Matimba power station should be fitted with SO_X abatement technology, should monitoring in populated areas indicate non-compliance with South African ambient air quality standards, in order to ensure compliance with these standards.
- Predicted PM_{10} concentrations were within the South African daily and annual limits but exceeded the more stringent South African National Standards (SANS) and European Union limit values in the vicinity (within 4 km) of the existing ash dump at the Zwartwater farm and the proposed Medupi ash dump on the Eenzamheid Farm.
- NO_2 concentrations were found to be below local and international air quality limits (including the predictions for the proposed Medupi power station emissions).

The establishment of the two proposed power stations is likely to result in a range of emissions including SO_x, NO_x, CO_2 gases as well as particulate matter being emitted into the atmosphere. Furthermore, other coal-related developments are also being considered in the area, most notablely Sasol's investigation into the establishment of a coal-to-liquids plant in the area, which will add further pressure to the air shed. Further afield, coal developments are taking place, such as in Botswana, which should be noted.

Oxides of sulphur, oxides of nitrogen, as well as particulate matter and heavy metals would all be emitted from the power stations. The emission of sulphur dioxide (SO_2) and oxides of nitrogen oxide is likely to have an impact on the biophysical environment and on human health and could possibly result in cumulative impacts due to the existing industries. Health aspects

are further considered in **Section 6.3.3** below. Furthermore, the emission of carbon dioxide into the atmosphere contributes to global warming with concomitant impacts on global climate change and concomitant human and ecological wellbeing both locally and internationally.

As noted in **Section 4.3.4** above, Eskom has committed to installing a suite of appropriate atmospheric emission abatement technologies to reduce its atmospheric emissions, including technologies to reduce oxides of sulphur emissions (flue gas desulphurisation), particulate removal (bag filters or electrostatic precipitators) and boilers that produce low NO_X emissions.
As air quality is one of the key factors affecting the proposed project it is recommended that a detailed air quality assessment be undertaken. The ToR for this study are as follows:

- Undertake an initial site visit with the EIA team in order to obtain an overview of the candidate sites and to refine the ToR.
- Establish baseline conditions, by:
    - Describing the atmospheric dispersion potential of the area based on available meteorological data.
    - Describing existing sources of atmospheric emissions in the area.
    - Describing the existing air quality, especially with respect to particulates, oxides of sulphur and oxides of nitrogen.
    - Providing an overview of legislative and regulatory requirements pertaining to atmospheric emissions and ambient air quality, including local and international air quality guidelines and standards.
    - Initial screening dispersion modelling of power station configuration scenarios to provide input into air quality technology alternatives that may be considered.
    - Validation of the dispersion model, by comparing the model results to measured data from a suite of local monitoring stations.
- Predict potential impacts of the proposed power stations by:
    - Compiling a comprehensive emissions inventory for the construction and operational phases of the project and taking into account:
    - Three operating scenarios:
        1. 6 x 900 MW (nominal), pulverised fuel, with operating at 90 % and 60 % efficiencies on any one site alternative,
        2. 6 x 900 MW (nominal), pulverised fuel, with operating at 90 % and 60 % efficiencies FGD on any two site alternatives (i.e. two power stations),
        3. A worst case of two 6 x 900 MW (nominal), pulverised fuel, with FGD operating at 90 % and 60 % efficiencies power stations, and the proposed Sasol coal-to-liquids facility, a coal mine, Mmamabula Power Station in Botswana operating at 2 400 MW capacity, Morupule Power Station in Botswana and the proposed Morupule B Power Station and Exxaro Coke Plant.
    - Construction phase emissions e.g. site clearance and earthworks,
    - Operational phase emissions e.g. ashing operations, raw materials handling, waste disposal and power station stack emissions,
    - Emissions during routine and emergency conditions,
    - Emissions during shutdowns,
    - Selecting and populating of a suitable air dispersion model,

  - Undertaking stack height screening modelling to inform recommendations regarding a suitable stack height,
  - Applying the air dispersion model to determine incremental and cumulative pollutant concentrations in the ambient air as a result of both the construction and operational phases of the proposed power stations,
  - Assessment of air quality impacts including:
    1. Evaluating estimated emissions,
    2. Comparing estimated emissions to local and international limits,
    3. Evaluating emissions in terms of global warming potential, within the context of South Africa's last reported contribution to greenhouse gases,
    4. Evaluating (a) magnitude, frequency of occurrence, duration and probability of impacts, (b) local, regional national and international significance of predicted impacts, and (c) level of confidence in findings,
  - Recommendation of mitigation measures to address predicted impacts.
- Compile an air quality assessment report that documents the tasks mentioned above.
- Compile an air quality management plan in consultation with Ninham Shand and Eskom, for incorporation into the construction and operational phase Environmental Management Plan (EMP) to be developed for the proposed power station. The air quality management plan would include:
  - Identification of mitigation and management measures to meet required control efficiencies,
  - Liaising with Eskom to determine stack height and develop ambient monitoring measures, and
  - Documentation of the monitoring, mitigation and management measures for integration into the project EMP.

Airshed Planning Professionals, led by Dr Lucian Burger, has been appointed to undertake the air quality impact assessment. Lucian Burger is the Managing Director of Airshed Planning Professionals. His postgraduate studies were specifically focused on the development of dispersion modelling theory and related software applications.

Cumulative impacts on air quality could result from developments associated with the proposed power stations, for instance increased dust from a new coal mine or other developments in teh area such as a CTL facility. These potential cumulative impacts will be modelled in the air quality study and discussed in the EIR.

At the request of DEAT a peer review of the air quality specialist study has been proposed. The ToR for this study is as follows:

- Assess whether the study has met the specified terms of reference.
- Appraise whether the methodology/modelling was adequately described and appropriate to the study. Note whether the technical information used in the study was relevant and appropriately detailed. Evaluate whether the model was suitably validated. This review is to include not only the written report but all input files, data files and output files of the dispersion model.

- Note whether assumptions were explicitly stated and uncertainties and limitations noted.
- Comment on whether all the issues and topics have been covered in an appropriate manner, and at an appropriate level of detail.
- Note whether there were any obvious information gaps, omissions, or inaccuracies that may need to be addressed.
- Comment on whether the recommendations of the study were practicable reflected the best options.

Two specialist air quality companies were identified that could potentially undertake the review. These are TRC, a company based in the United States of America, and uMoya-NILU, a Durban based company.

TRC has been involved in air quality for 40 years and is one of the leading and largest providers of emission measurement services throughout the world. TRC is the home of CALPUFF, an air quality dispersion model, which is being used for the air quality study. TRC is involved in, *inter alia*, annual compliance testing, mercury sampling, emissions mapping and ambient air monitoring. Mr Joe Scire, who would be undertaking the review should TRC be appointed, is the Vice President of the Atmospheric Studies Group of TRC and is the chief programmer of the Calpuff dispersion model. He has a wealth of experience and regularly consults for various industries.

uMoya-NILU is an air quality consulting company that combines South African expertise and experience with resources offered by the Norwegian Institute for Air Research (NILU). uMoya-NILU has developed experience through operational air quality management, consulting and research projects over more than 25 years. Dr Mark Zunckel, who would be undertaking the review should uMoya-NILU be appointed, is a meteorologist with 28 years in air pollution and meteorological research. His experience includes air quality specialist studies for industrial developments, the Dynamic Air Pollution Prediction System and leading the development of the National Framework for Air Quality Management. Dr Zunckel has conducted courses in Air Quality Management and dispersion modelling, and is an Honorary Professor at the University of Kwa-Zulu Natal.

6.2.4 IMPACT OF FOUNDING CONDITIONS ON THE POWER STATION

The Waterberg area is mainly flat, with some rolling plains. It is bordered to the east by the Waterberg Mountain Range, the most prominent topographical feature in the district, and the Limpopo River to the north east.

a) Lithology

The lithology of the Waterberg area comprises several geological sequences:

- The oldest rocks, lying to the south of the area, are sedimentary rocks comprising the Waterberg Group. This comprises quartzitic sandstones, conglomerates and grits. The

dip of the strata is generally to the south and south west at shallow angles (5˚ to 20˚). The Waterberg rocks are intruded by sills (more horizontal orientation) and dykes (more vertical orientation) of pre-Karoo diabase.

- Overlying these, in the main part of the study area, are rocks of the Karoo Supergroup, Ecca Group (sandstone grit and shales with coal seams (Middle Ecca) and carbonaceous shales with coal seams (Upper Ecca)).
- Higher up the geological sequence, and outcropping to the north, are rocks of the Karoo Supergroup, Molteno Elliot and Clarens Formation (mudstone and sandstone) with some Drakensberg Formation basalt. Coal seams also occur in the Molteno Formation.

Refer to **Figure 6.3** for the lithology found within the broader area. There do not appear to be any major recorded faults or lineations crossing the area.

b) Founding conditions

As mentioned in **Chapter 3** above, the power station would have to be located on an area which is free of coal, to avoid sterilising coal reserves. Consequently, it is likely that the power station and associated infrastructure would be positioned on either:

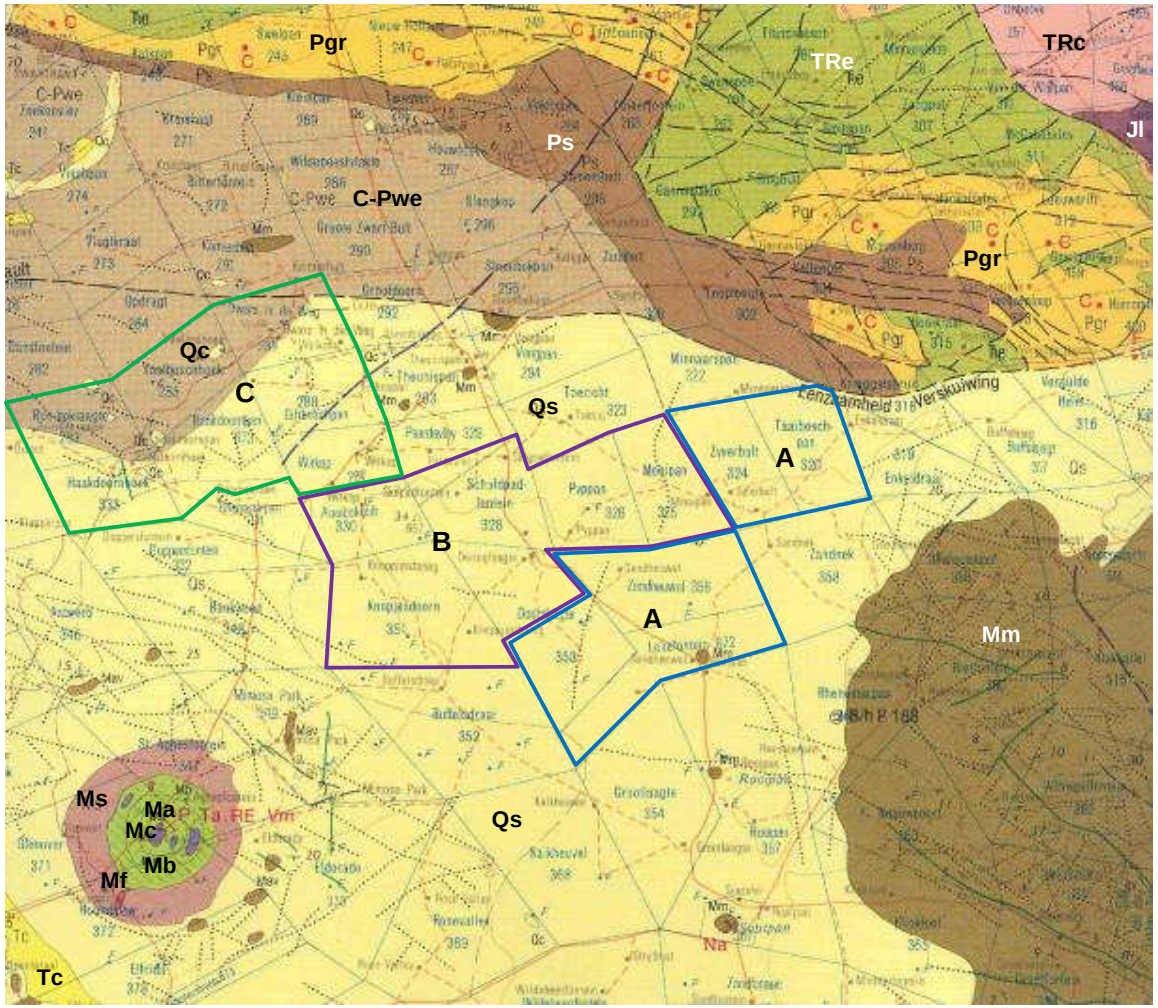
i) Waterberg Group rocks (to the south): Suitable founding with adequate bearing capacity for heavy equipment would be on sound rock at shallow depth. Although aeolian (windblown) sands with a collapsible fabric or expansive soils derived from the weathering of local diabase intrusions could occur at the surface, these problems could be overcome with the appropriate foundation design; or

ii) Karoo sandstones (to the north/east): Generally little weathering takes place where sandstones are cemented with silica and competent founding conditions are likely at reasonably shallow depths (pers.comm. M Wynne).

c) Seismic Hazard

From the Probabilistic Seismic-Hazard Maps the site lies in a region with a low expected seismic level. The peak ground acceleration (g) is about 0.03 with a 10 % probability of being exceeded in a 50-year period. Possible seismic activity in the Waterberg area would only be associated with local mining activity (e.g. stope closure underground). There is no severe probability of such activity in the area, since most of the current and proposed mining is opencast. However, at design stage, the appropriate “earthquake” base factors should be used in structural design calculations (pers.comm. M Wynne).

As issues have arisen at the construction phase in previous power station sitings due to insufficient detailed geotechnical information, such as at the Medupi power station site, a detailed investigation of the geological conditions is being undertaken by Eskom. Information from the geotechnical study will be reflected in the EIA where relevant.



KEY			
Group	**Complex/Formation**	**Map Symbol**	**Lithology**
Waterberg Group		Qs	Sandy soil
Waterberg Group		Qc	Ferricrete
	Glenover complex (area of Glenover Phosphate mine to the south west of the candidate sites. Minerals previously mined here are tantalum/niobium, rare earths, vermiculite and phosphate.	Ma	Apatite breccias
		Mc	Carbonatite
		Mb	Biotite complex
		Mf	White fenite,
		Ms	Fenitised sandstone; minor red fenite
		Tc	Calcerous sandstone and conglomerate, consolidatedsoil covered by red sand
Waterberg Group	Mogalakwena group	Mm	Coarse-grained purplish brown sandstone
Karoo Group	Dwyka Group	C-Pwe	Mudstone, siltstone, minor grit
Karoo Group	Swartrant Formation	Ps	Sandstone, gritstone, mudstone, coal
Karoo Group	Grootegeluk Formation	Pgr	Mudstone, carbonaceous shale, coal
Karoo Group	Eendragtpan Formation	TRe	Variegated shale
Karoo Group	Clarens Formation	TRc	Fine-grained cream-coloured sandstone
		Jl	Basalt

Figure 6.3: Geology of area (taken from the 1985 1:250 000 geological map)

Table 6.1 Geological formations in the region of the candidate sites

Formation/Group	Description
Clarens Formation	Argillaceous and arenaceous rocks
	Intergranular and fractured aquifers
	Borehole yields 0.1 - 0.5 l/s
Ecca Group (Grootegeluk)	Upper and middle Ecca
	Fractured aquifers
	Borehole yields 0.5 – 2.0 l/s
Ecca Group (Swartrant)	Lower Ecca
	Intergranular and fractured aquifers
	Borehole yields 0.5 – 2.0 l/s
Dwyka Group	Predominantly arenaceous rocks
	Fractured aquifers
	Borehole yields 0.5 – 2.0 l/s
Waterberg Group	Predominantly arenaceous rocks
	Fractured aquifers
	Borehole yields 0.5 – 2.0 l/s

(from Bohlweki Environmental, 2006)

6.2.5 IMPACT ON GROUNDWATER RESOURCES

The Waterberg Group and Karoo Supergroup sediments and volcanics underlie the area. **Figure 6.3** illustrates the geology of the area and is described in more detail in **Section 6.2.4** above.

Based on regional data from the 1: 500 000 hydrogeological map (Sheet 2326 Polokwane), the following can be noted of the formations in the region:

Groundwater is generally under-utilised in the study area and DWAF (2004) has noted that the first option to supply increased requirements should be from groundwater, provided the water quantity and quality are acceptable for its intended use. There are no artesian boreholes located within the adjacent area and no large scale groundwater abstraction occurs in the study area currently (Bohlweki Environmental, 2006).

The groundwater potential of the geological formations located in the study area is limited in their pristine, unweathered state due to low permeability, storage and transmissivity. However, in their weathered, fractured state water is able to permeate the fractures and hence the formations' groundwater potential in these fractured transitional zones between weathered and unweathered crystalline Letaba basalt rocks, found in the study area, is good. Deeper fractures within the basalt, associated with faulting, also have good groundwater potential as the water collects within the fractures. Fractured fault zones, especially if related to tensional stress, are potentially productive targets for groundwater development. The graben structures[23] in the study

[23] Typically a "rift" valley formed by the sinking of land between two roughly parallel faults.

area are associated with tensional stresses, thus the Eenzaamheid fault could be an area of increased groundwater potential. The Daarby thrust fault is impermeable (Bohlweki Environmental, 2006).

The proposed power station could have an impact on groundwater resources through contamination from various components of the power station, but most notably from the ash disposal facility, 'dirty water' dams and the WWTW. As described in **Section 4.3.4** above, the only ash disposal technology being considered for the proposed power station is above-ground ash disposal. Run-off from the ash disposal facility and leachate generated through infiltration of water have the potential to contaminate the groundwater resource.
It is therefore recommended that a groundwater impact assessment be undertaken to quantify the potential impacts on the groundwater resource and to recommend potential mitigation measures to minimise or eliminate the potential impacts. The ToR for the groundwater impact assessment are as follows:

- Undertake an initial site visit with the EIA team in order to obtain an overview of the candidate sites and to refine the ToR.
- Undertake a literature review and collect baseline data to establish the *status quo* of quality and quantity of groundwater resources at the candidate sites.
- Collect relevant data from existing boreholes and other available information sources on the candidate sites and report on the flow direction and pattern of groundwater in the area.
- Undertake an assessment of potential impacts of the proposed power station and associated infrastructure on the groundwater in terms of the scale of impact (local, regional, national), magnitude of impact (low, medium or high) and the duration of the impact (construction, up to 10 years after construction, more than 10 years after construction).
- Comment on the potential cumulative impacts of the second power station, as well as developments in the broader area (e.g. Sasol's proposed coal-to-liquids facility), on the groundwater.
- Assess the groundwater impacts of above-ground ash disposal, and comment on the implications of back ashing and in-pit ashing.
- Propose mitigation measures that could reduce, eliminate or prevent the occurrence of the identified impacts and comment on the effectiveness of these.
- Compile a groundwater monitoring plan for the operational phase of the project.

Groundwater Consulting Services (GCS), led by Andrew Johnstone has been appointed to undertake the groundwater impact assessment. Mr Johnstone has over 24 years experience as a hydrogeologist with key expertise in the exploration and design of wellfields and regional hydrogeological investigations and mapping. GCS has also been involved in determining the groundwater impacts of other similar coal-fired power stations in South Africa.

Cumulative impacts on groundwater could result from developments associated with the proposed power stations, for instance the new coal mine could pollute groundwater through the open cast mining process or through the abstraction of groundwater, thereby decreasing the water level. These potential impacts could be felt by those using the groundwater resources in the area for stock watering. These potential cumulative impacts will be discussed in the EIR.

6.3 OPERATIONAL PHASE IMPACTS ON THE SOCIAL ENVIRONMENT

This section of the report describes the socio-economic environment and considers the long-term or operational phase impacts on the social environment that may be associated with the proposed activities, including the following:

- Visual impacts;
- Noise impacts;
- Impact on health of surrounding people;
- Risk assessment;
- Impact on heritage resources;
- Impact on local economy;
- Impact on land use and planning;
- Impact on livelihood security;
- Impact on tourism
- Impact on traffic and
- Impact on agricultural potential.

6.3.1 VISUAL IMPACTS

The study area in the vicinity of the candidate sites is located at some 940 metres above mean sea level (mamsl). The area is relatively flat, with a very gradual slope south to north towards the Matlabas River. The highest point in the immediate surrounds is 1 003 mamsl on Grootlaagte Farm (No. 354) immediately south of Leliefontein Farm (which forms part of Site A). The Waterberg foothills start rising to the east of Site A beyond the railway line.

The landscape is dominated by bushveld except where the Matimba Power Station can be seen, with the existing power station and stacks visible for many kilometres. The Matimba Power Station, Medupi Power Station (in the process of being constructed) and the Grootegeluk Mine are all located within 20 to 40 km of the candidate sites. Many transmission lines, including high voltage 400 kV lines also cross the landscape in places. Furthermore, new transmission lines are proposed in the area, between Botswana and the study area, and to the south of the study area. To the west of the candidate sites is a phosphate mine and mine dump which can be seen from the road DR1675. Land use on the three candidate sites is mainly game farming with some agriculture land and cattle farming. The natural vegetation is dominated by bushveld. See **Figure 6.4** to **Figure 6.11** for photographs of the surrounding area.

The proposed power station infrastructure would include the following (see **Figure 6.12**):

- Two flue gas stacks (should direct dry cooling or indirect dry cooling with flue gas stacks be implemented) between 150 and 300 m high;
- The core power station building, likely to be 150 m wide and 500 m long;
- A total of six cooling towers (should indirect dry cooling be implemented), approximately 160 m high; and

Figure 6.4 Windpump and reservoir along the DR1675

Figure 6.5 Natural pan (from the air)

Figure 6.6 Typical bushveld and grazing land (seen from the air)

Figure 6.7 Transmission lines crossing the bushveld (seen from the air)

Figure 6.8 Pump station and café at Steenbokpan

Figure 6.9 Informal housing at Steenbokpan

Figure 6.10 Typical bush veld characteristic of the area

Figure 6.11 Typical grazing land found in the area

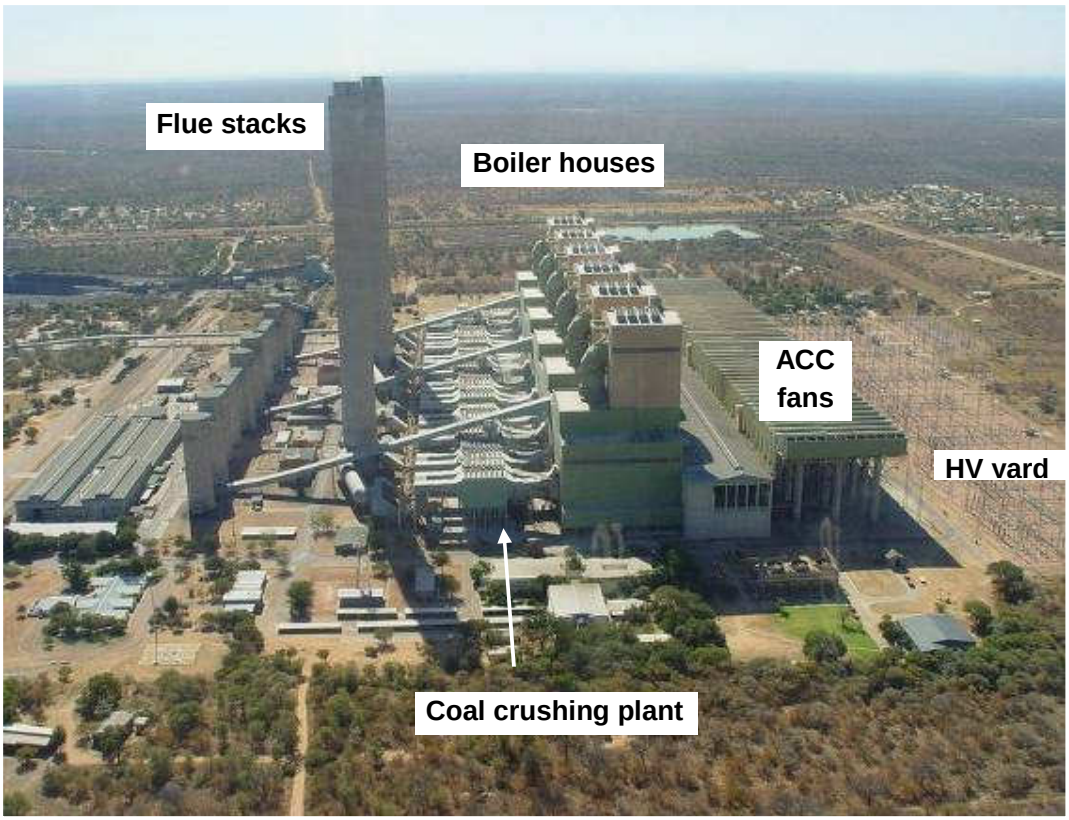


Figure 6.12 Photograph indicating typical power station components

- Other infrastructure such as a coal and sorbent stock pile, coal conveyors, ash conveyors, an ash handling facility (ash dump), telecommunications facilities/mast and transmission and distribution lines within the site, etc.

As noted in **Section 4.3.4** above, if indirect dry cooling technology is selected by Eskom, cooling towers would be required for the cooling system. However, if direct dry cooling technology is implemented, the cooling towers are replaced with a bank of cooling fans. The candidate sites are quite flat and the ability of the natural vegetation to absorb the visual impact is low.

Furthermore, there are many game farms in the area which are a tourist attraction. Consequently viewer incidence and perception is likely to vary across the study site and in the broader region.

In light of the above, it is recommended that a visual impact assessment (VIA) be undertaken as part of the EIA process. The ToR for the VIA are as follows:

- Undertake an initial site visit with the EIA team in order to obtain an overview of the candidate sites and to refine the ToR.
- Undertake a review of baseline information, describe the receiving environment; and establish a view catchment area, view corridors, view points, receptors and identification of potential lighting impacts at night,
- Undertake photomontage simulations for the sites for two operating scenarios, namely,

one power station on each of the alternative sites and two power stations on combinations of two of the three candidate sites, demonstrating where applicable:
    - Views with and without mitigation;
    - Views under worst (least visible) and best (most visible) weather conditions; and
    - Views during night time.
- Undertake an assessment of the visual impacts at the three candidate sites, in terms of the scale of impact (local, regional, national), magnitude of impact (low, medium or high) and the duration of the impact (construction, up to 10 years after construction, more than 10 years after construction);

- Describe potential mitigation measures to reduce or eliminate the potential visual impacts identified.

Strategic Environmental Focus' landscape architecture unit has been appointed to undertake the VIA. The team will be led by Mr Eamonn O'Rourke, a Landscape Architect with over 14 years experience in the field. He has undertaken a suite of VIAs for a range of projects in the mining and industrial sector and for linear infrastructure developments, including transmission lines and power stations such as the Project Bravo and Project Golf power stations and the Kudu transmission and substation project.

Cumulative impacts on the visual aesthetics of the area could result from developments associated with the proposed power stations, such as the coal mine. The mine could be highly visible, depending on its location and the method used to extract the coal (open cast versus underground mining). These potential cumulative visual impacts will be discussed in the EIR.

6.3.2 NOISE IMPACTS

As mentioned above, the general terrain of the candidate sites is flat, falling gently to the north. Existing infrastructure which contributes to the ambient noise levels includes roads, the railway line and the existing Matimba power station, which uses direct dry cooling technology. Medupi power station, currently under construction, would also add to the future ambient noise. The roads running past the candidate sites include the DR1675 which passes west through Steenbokpan, and the DR175 which runs to the north through Steenbokpan and passes into Botswana at the Stockpoort border post. A railway line runs in a north-south direction, across the DR175 and terminates at the Matimba power station and the Grootegeluk mine. The existing power station conveyor belts for coal and ash, the ash spreading activities at the ash disposal facility and the WWTW may also contribute to ambient noise levels at the candidate sites. Furthermore, increased traffic volumes on the local roads due to the construction of the Medupi power station is also likely to be adding to the ambient noise levels of the area. Once the power station is operational, the ambient noise levels are likely to persist, with the large volumes of workers driving to work.

The significance of noise impacts is linked to the type of surrounding land use in the area, and can be divided into residential, industrial, mining and agriculture. The human settlement that is most likely to be sensitive to increased noise levels is Steenbokpan, located to the north of Site B and east of Site C. Current industrial and mining activities are located at least 20-40 km

away from the candidate sites and from Steenbokpan. Agriculture (including game farming) is the dominant land use, with several farm houses and farm labourer houses spread over the candidate sites.

The proposed power station would be similar to the existing Matimba power station, in that it would include conveyors of up to 30 km in length to transport the coal to the power station, conveyors to transport the ash to the ash disposal facility located within close proximity to the power station, machinery to spread the ash at the ash disposal facility and a WWTW on the site. However, the main noise source at the proposed power station would be from the cooling fans, should Eskom choose to implement direct dry cooling technology. Matimba power station utilizes 48 fans per generating unit, and the Medupi power station currently being constructed would use 54 fans per generating unit. Since there are six generating units proposed for each of the power stations this would equate to more than 324[24] fans per power station, or a total of more than 648 fans for two power stations utilising direct dry cooling technology.

The proposed power station and its ancillary infrastructure is likely to increase the ambient noise levels in the region, which may have an impact on the surrounding land users such as the Steenbokpan settlement, especially if direct dry cooling technology is implemented. It is therefore recommended that a noise impact assessment be undertaken to determine the extent of the potential impact. The ToR for a noise impact assessment are as follows:

- Undertake the collection of baseline data from existing sources, through liaison with other specialist teams, and ground-truthing in order to determine:
    - Major noise sources in the vicinity of the candidate sites; and
    - Appropriate noise measurement locations.
- Establishing the ambient noise context in the region by means of a noise measurement survey, which will include:
    - Undertaking noise measurements in terms of SANS 10103:2003, "The measurement and rating of environmental noise with respect to land use, health, annoyance and speech communication";
    - Assessing and recording the qualitative nature of the noise climate i.e. to ensure a correlation between noise perceived by the human ear and noise measured by instruments.
- Assessing the potential noise impacts of the proposed power station on the ambient noise levels at the candidate sites. This will include:
    - Identifying potential noise impacts associated with the construction and operational phases of the proposed power stations;
    - Assessing the impacts of two operating scenarios and evaluating the effect on the change in the noise climate in terms of the scale of impact (local, regional, national), magnitude of impact (low, medium or high) and the duration of the impact (construction, up to 10 years after construction, more than 10 years after construction). The operating scenarios comprise (1) a single power station on each of the alternative sites and (2) two power stations on combinations of two of the three candidate sites.

[24] The exact number of fans is likely to be higher than 324 and this will be confirmed in the EIR and the correct number modeled by the noise specialist.

- Identify mitigation measure to minimise or eliminate predicted impacts on noise receptors. This will include providing input into the construction and operational phase EMP to be developed for the project.

Mr Derek Cosijn of Jongens, Keet and Associates has been appointed to undertake a noise impact assessment. Mr Cosijn has over 40 years of experience over a wide range of civil engineering, transportation planning, environmental and acoustic engineering projects. Some of the approximately 110 environmental and noise impact projects with which he has been involved with over the last 10 years include Gautrain Noise Impact Study, Tutuka Power Station Coal Supply Railway Noise Impact Assessment, Majuba Power Station Coal Supply Railway Noise Impact Assessment, Medupi Power Station Noise Impact Assessment and the Olifants River Water Resources Development Project Noise Impact Assessment.

Cumulative impacts of noise could result from developments associated with the proposed power stations, for instance noise from coal mining operations or other industrial activity that develop as a result of the power station. The increased noise from the mining activities would relate to the transport of coal via conveyor belts as well and the additional traffic that be directed to the area. These potential cumulative impacts on noise will be discussed in the EIR.

6.3.3 IMPACT ON HEALTH OF SURROUNDING PEOPLE

The establishment of the two proposed power stations is likely to result in a range of emissions including SO_x, NO_x, CO_2 gases as well as particulate matter being emitted into the atmosphere. In terms of human health, SO_2 emissions and heavy metals are part of the concern and the threshold concentrations of these pollutants are controlled by a suite of South African and international air quality legislation and standards.

SO_2 is damaging to human respiratory functioning, increasing both the prevalence of chronic respiratory disease, and the risk of acute respiratory disease. Being highly soluble, SO_2 is more likely to be absorbed in the upper airways rather than penetrate to the pulmonary region. Exposure to heavy metals such as lead and mercury are of particular concern as these can cause nervous system disorders, respiratory problems and even cause cancer. Oxides of nitrogen are particularly harmful to children and can lead to respiratory diseases.

The production of SO_2, NO_x and particulate matter arising out of the burning of fossil fuels as would be the case at the proposed coal-fired power stations, would contribute to the ambient levels of the above-mentioned compounds.

It is therefore recommended that a detailed air quality impact assessment be undertaken to establish the ambient air quality levels, to predict what impact the proposed power stations would have on the ambient levels, and to determine whether or not the proposed atmospheric emission abatement technologies would be able to meet the South African and international air quality standards (see **Section 4.3.4** above). The ToR for this study are outlined in **Section 6.2.3** above.

Cumulative impacts on the health of surrounding people could result from developments associated with the proposed power stations, such as from increased dust from a coal mine or additional industrial activity. These potential cumulative impacts on health of surrounding people will be modelled in the air quality study and will be discussed in the EIR.

6.3.4 SOCIETAL RISK

The proposed power stations would require a suite of chemicals to be stored and used on site, during the operation of the stations. Chemicals required include amongst others, chlorine, ammonia, caustic soda and sulphuric acid. Diesel, petrol and bunker oil would also be required and stored on site. The handling, transportation and storage of this material is covered by a range of legislation, including the Occupational Health and Safety Act (No. 85 of 1993), the Major Hazardous Installation Regulations (July 2001), and the Road Transportation Act (No 74 of 1977). Given the requirement for hazardous material to be stored on site during the operational phases of the project, the determination of the risk to employees and surrounding landowners at a preliminary level[25] is recommended. The ToR would be as follows:

- Undertake an initial site visit with the EIA team in order to obtain an overview of the candidate sites and to refine the ToR.
- Undertake a preliminary risk assessment to
    - review the scope of the project;
    - list hazardous materials that would be associated with the operation of the power station;
    - Provide a general process description;
    - Describe possible major incidents associated with this type of installation and the consequences of such incidents (including potential incidents);
    - Provide an estimate of the probability of a major incident;
    - Provide a rough estimate of the consequences under “worst case” scenario for on-site workers health as well as the consequences of causing an offsite incident for one power station on each of the alternative sites and two power stations on combinations of two of the three candidate sites
    - Describe the potential effect of a major incident on any other installation, members of the public (including all persons outside the premises) and on residential areas; and
    - Describe any requirements in terms of NEMA,
- Compile an assessment of the risks associated with the proposed power stations (for the scenarios of one and two power stations), in terms of the scale of impact (local, regional, national), magnitude of impact (low, medium or high) and the duration of the impact (construction, up to 10 years after construction, more than 10 years after construction).
- Describe mitigation measures that could reduce or eliminate the risks.

Mr Mike Oberholzer from Riscom (Pty) Ltd. has been appointed to undertake the preliminary risk assessment. Mr Oberholzer has undertaken a suite of risk assessments and Riscom is one

[25] A Major Hazard Installation assessment is likely to be required at a later point in terms of the Occupation Health and Safety Act.

of few companies that is an Approved Inspection Authority for Major Hazard Installations in South Africa. Mr Oberholzer has over 20 years experience in all aspects of project implementation. Since 2001, Mike has concentrated on risk studies in various industries including offshore assignments in the oil and gas, chemical, petrochemical, agrochemicals, mining and food industries.

Cumulative impacts on societal risk from developments associated with the proposed power stations, such as increased fire risk to persons in the area, could result. These potential cumulative impacts on societal risk will be discussed in the EIR.

6.3.5 IMPACT ON HERITAGE RESOURCES

Heritage resources include archaeological material (e.g. rock paintings, stone tools), palaeontological material (e.g. fossilised materials) and cultural heritage material (e.g. old graveyards, fences or ruins of buildings). Since some potential heritage material is buried, it is often only found during the construction phase of a project.

A previous heritage study (PDA & Margen, 2007) undertaken in the general area of the candidate sites for transmission lines found the following heritage material:

- Limited stone tool occurrences;
- Engravings on a kopjie, Nelsonskop;
- A number of historical houses and other historical remains;
- The historical Steenbokpan rural village (townscape) that incorporates shops, residences and graveyards that are older than sixty years; and
- A number of graves. Some of the graveyards were historical in nature.

The stone tools and historical houses were considered to have low to medium heritage significance, while the engravings, Steenbokpan townscape and the graves and graveyards were considered to have high heritage significance (PDA & Margen, 2007).

A second heritage study (Bohlweki Environmental, 2006) undertaken in the general area of the candidate sites for Medupi power station also found graves, as well as small pieces of Iron Age and stone tools. The sites of the findings were not considered to be of heritage significance although it was recommended that all the graves be avoided.

A large scale development such as the proposed coal-fired power station and ancillary infrastructure can have a negative impact on archaeological and cultural heritage resources by damaging or destroying such material, by requiring the material to be removed and stored *ex-situ* or by making sites more easily accessible to the general public and therefore prone to vandalism or destruction. It is therefore essential that the potential impacts of any development be assessed at the earliest possible phase of project planning, in order to determine the best course of action for heritage resources found on site. Furthermore, it is important to include mitigation measures in a construction phase Environmental Management Plan to provide guidance to contractors in the event that archaeological or palaeontological material is found on

site during the construction phase. It is therefore recommended that a Phase 1 Archaeological Assessment be undertaken. The ToR for the assessment are as follows:

- Undertake an initial site visit with the EIA team in order to obtain an overview of the candidate sites and to refine the ToR.
- Undertake a Phase 1 archaeological assessment of the candidate sites in accordance with the requirements of Section 38(3) of the NHRA, which would include:
    - Conducting a detailed desk-top level investigation to identify all archaeological, cultural and historic sites in the area;
    - Undertake field work to verify results of desktop investigation;
    - Document (GPS coordinates and map) all sites, objects and structures identified on the candidate sites.
- Compile a report which would include:
    - Identification of archaeological, cultural and historic sites within the proposed development areas;
    - Evaluation of the potential impacts of construction, operation and maintenance of the proposed development on archaeological, cultural and historical resources, in terms of the scale of impact (local, regional, national), magnitude of impact (low, medium or high) and the duration of the impact (construction, up to 10 years after construction, more than 10 years after construction);
    - Comment on the impacts of two power stations, as well as other developments in the broader area (e.g. Sasol's proposed coal-to-liquids facility);
    - Recommendation of mitigation measures to ameliorate any negative impacts on areas of archaeological, cultural or historical importance;
    - The preparation of a heritage resources management plan which includes recommendations on the management of the objects, sites or features, and also guidelines on procedures to be implemented if previously unidentified cultural resources are uncovered during later developments in the area.

Dr Johnny van Schalkwyk, a private heritage consultant, has been appointed to undertake the requisite heritage impact assessment. Dr van Schalkwyk has undertaken over 800 archaeological, anthropological and social impact assessments, including the assessments of two power station projects in the Northern Free State and Mpumalanga and has worked in the Waterberg area previously (most notably on the Medupi power station project). Other projects assessed include powerlines, roads, pipelines, dams, mine developments, water purification works, historical landscapes, refuse dumps and urban developments.

Cumulative impacts on heritage resources from developments associated with the proposed power stations could take the form of additional footprints impacts or increasing changes to the rural sense of place. Potential cumulative impacts on heritage resources will be discussed in the EIR.

6.3.6 IMPACT ON LOCAL ECONOMY

The three candidate sites are located within the Waterberg District Municipality, and in the Lephalale Local Municipality (LM). According to the Lephalale LM IDP, the Lephalale municipal economy is dominated by the electricity/water sector and specifically by power generation,

which is represented by the Matimba Power Station. This sector is responsible for 72.5 % of the value of production in the municipality, which reflects a low level of diversification and a high level of vulnerability (Lephalale LM, 2007).

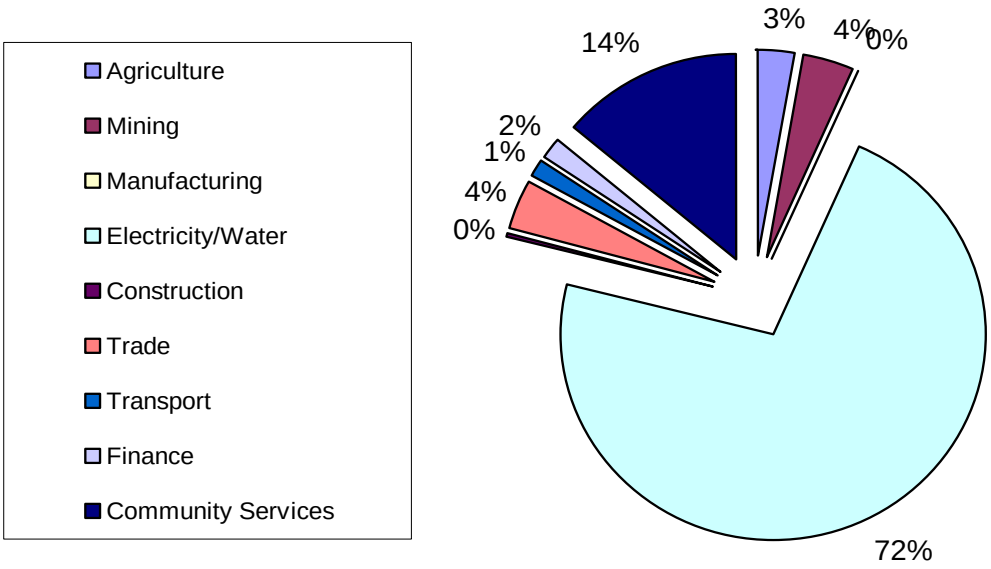


Figure 6.13: Contributions of all sectors to the Lephalale local economy
(from Lephalale LM, 2007)

Agriculture is the fifth biggest contributor to the municipal economy, but it appears to be in decline. The average compounded economic growth rate for the period 1995 to 2000 was 6.5 %, which is below the inflation rate for the same period. It implies that the municipal economy has declined in real terms over this period (Lephalale LM, 2007).

The economically active section of the population consists of 84.5 % employed and 15.5 % unemployed persons (Lephalale LM, 2007). This unemployment rate is well below the South African average of 23.1 % unemployed (in the second quarter of 2008)[26].

The occupation structure of the employed persons shows that the majority of employed people are concentrated in elementary occupations (48 %) with the second major occupation category being skilled agricultural workers (13 %).

The establishment of two additional power stations in the Lephalale area is likely to result in the injection of billions of Rands into the local economy directly and further capital indirectly. During the construction phase of a project of this nature, approximately 8 000 people at the height of construction would be employed across a range of skills from unskilled labourers, to semi-skilled and skilled professionals. Eskom's policy dictates that they would attempt to source the labour locally from the surrounding settlements, and would specify a local labour target for the successful contractor(s). The operational phase of the power station would result in the creation of some 600 permanent employment opportunities. Eskom may establish a settlement for these employees and as such this could create further opportunities for the generation of

[26] http://www.statssa.gov.za/keyindicators/keyindicators.asp

income in the region. Further to the above, a new coal mine would be required to provide a dedicated source of coal to the power station. This development would result in further job creation and investment of capital in the region.

An influx of people to the region and an increase in employment levels is also likely to result in an increase in disposable income and spending patterns, with a potential positive impact for local businesses.

However, in light of the above, the establishment of the power stations would also result in the loss of agricultural land and is likely to impact on the livelihood security of the farmers and farm workers that are displaced through the land negotiation and acquisition processes. Since agriculture in this area only contributes some 3 % to the GGP of the region, the loss in agricultural land would not be of great significance to the local economy. This impact is however discussed in detail in **Section 6.3.6**.

Given the wide array of potential economic spin-offs and potential financial difficulties for local farmers, it is recommended that a socio-economic assessment be undertaken as part of the EIA process to address, amongst other things, the potential impacts identified above. The ToR for this study are as follows:

- Undertake an initial site visit with the EIA team in order to obtain an overview of the candidate sites and to refine the ToR.
- Collect relevant data to establish baseline socio-economic/ economic conditions of the region, as input data for the regional Social Accounting Matrix (SAM) for the Limpopo Province, including:
    - Engagement with the Social specialist, the Agricultural Potential specialist, the Public Participation facilitator and Eskom in order to gather relevant baseline information;
    - Identifying up- and down-stream activities that may be influenced by the proposed power station;
    - Undertake socio-economic and economic profiling of the candidate sites;
- Run the regional Impact Assessment Model (based on the SAM) for the Waterberg region in order to quantify:
    - Direct and indirect impacts;
    - Induced impacts;
    - Cumulative impacts (additive, synergistic, time crowding and space crowding);
    - Duration of impacts;
    - Separate Construction (CAPEX Phase) and Operational (OPEX Phase) impact assessments;
- Compile an assessment of the potential impacts associated with the proposed project, in terms of the scale of impact (local, regional, national), magnitude of impact (low, medium or high) and the duration of the impact (construction, up to 10 years after construction, more than 10 years after construction). This assessment must include the cumulative impacts of two power stations built in consecutive phases.
- Develop socio-economic and economic management plans, which will include:
    - Mitigation measures to reduce or eliminate predicted negative impacts;
    - Measures to enhance predicted positive impacts;
    - Provide practical, realistic implementation guidelines; and

- Possible targets and action plans in support of the implementation guidelines.

Urban Econ, led by Mr Ben van der Merwe, has been appointed to undertake the socio-economic assessment. He has over 25 years experience as a Development Economist and has undertaken many similar assessments. Mr van der Merwe has developed and implemented innovative economic impact modelling techniques to quantify economic development indicators for capital expenditure projects. His skills have been applied in numerous local economic development and database development studies.

Cumulative impacts on the economy from developments associated with the proposed power stations could take the form of additional stimulus to the economy through increased industrial activity and spending in the Waterberg region as well as through an increased population and hence economic base. Potential cumulative impacts on the economy will be discussed in the EIR.

6.3.7 IMPACT ON LAND USE AND PLANNING

As mentioned in the section above, the three candidate sites are located with the Waterberg District Municipality and more specifically within the Lephalale LM. The land within the three candidate sites is currently owned by private individuals and in some cases family trusts or companies, with the majority of the land being under agriculture (either dry land agriculture, grazing or game farming)[27]. The total estimated number of residents in the Lephalale Municipality is approximately 104 144 (Lephalale LM, 2007). However it is estimated that no more than 30 landowners spread over the three candidate sites would be potentially directly affected by the proposed development.

The Lephalale Municipality SDF (2006) indicates that the land within the three candidate sites is privately owned consisting of game farms and small areas of cultivated land, as noted above. It also indicates that the candidate sites and Steenbokpan are located on top of coal fields, which happen to be deep coal reserves. This is in conflict with the geological information (see **Figure 6.3**) which indicates that there is no coal in this area. Steenbokpan is designated as a local service point for the area, with a secondary school less than 3 km north east of Steenbokpan and a primary school approximately 8 km to the south on the Doornlaagte farm.

The SDF indicates in its forward planning that Steenbokpan is designated as a future growth point. Lephalale and the area of the existing power station and Grootegeluk mine are designated as a development node. A marula fruit production project has been identified as a local economic development project situated within the Steenbokpan Service Point.

According to the IDP 180 electrical connections are required for Steenbokpan and approximately 150 houses are still needed for farm workers even though 150 houses were built by 2005 (Urban-Econ, 2007).

[27] Note that the exact zoning of farms and any restrictive title deed conditions will be detailed in the EIR.

Development opportunities outlined in the Waterberg District Municipality: Local Economic Development Strategy (Urban-Econ, 2007) include:

- Creating an enabling environment where the electricity sector can become a hub within the provincial and national economy.
- Using the primary resources to create an opportunity for tourism development in the Lephalale region.
- Supporting by creative and sustainable developments as it is an important sector within the Lephalale economy.
- Developing small, micro and medium enterprises to integrate the agricultural and mining sectors with tourism developments.
- Adding value to the raw materials. The manufacturing of products that use the raw materials mined at Lephalale should be a core development objective.

The establishment of the two proposed power stations will require some 5 000 ha of land each, which is currently predominantly used for agriculture. The proposed power stations would therefore deviate from the proposed land use patterns identified in the SDF. In order to confirm the current planning and land use in the area, and to determine what further authorisations and actions would be required to obtain the requisite land use planning approvals, a specialist land use planning study is recommended. The ToR for the study are as follows:

- Undertake an initial site visit with the EIA team in order to obtain an overview of the candidate sites and to refine the ToR.
- Obtain title deeds for the candidate sites and comment on the zoning of farms and any restrictive title deed conditions.
- Assessment of policies and proposals contained in the relevant Municipal Integrated Development Plans and Spatial Development Frameworks and their relevance to and impact on the proposed power station.
- Assessment of development proposals (e.g. the proposed Sasol coal-to-liquids facility and township), policies and township/ rezoning applications currently approved or being processing, within the study area.
- Assessment of any land claims made against the candidate sites.
- Comment on exploration and mineral rights for the candidate sites.
- Determining what land use rights are required from the relevant local and district Municipalities in respect of zoning and Town Planning Schemes and providing guidance on the requisite planning processes that would need to be undertaken by Eskom.

Mr Wim Jacobsz of Winterbach Potgieter & Partners Town and Regional Planners has been appointed to undertake this study. Winterbach Potgieter & Partners has extensive experience in town planning and has undertaken numerous studies in the Waterberg area.

Cumulative impacts on the land use and planning of the area could result in a change in the municipal plans for the future growth of the area. Increased industrial activity could limit tourism ventures and other land uses in the area. Potential cumulative impacts on land use and planning will be discussed in the EIR.

6.3.8 IMPACT ON LIVELIHOOD SECURITY

Agricultural activities are by far the predominant land use in the area, and include cattle and game farming as well as some dry land agriculture. Many of the farms have been owned for many generations by the same family, and many farmers in the area own a suite of farms which are not always contiguous. As mentioned above, agriculture contributes some 3 % to the Lephalale Municipal economy.

As Eskom does not currently own any of the land it requires within the three candidate sites, it would have to purchase this land from the current owners, most of whom are farmers. The loss of land for farmers may have an impact on the security of many farmers' livelihoods. Eskom would compensate farmers at market values as well as for financial losses which should allow them to re-establish their activities elsewhere. It may however, be challenging for farm workers to find alternative employment due to lack of skills.

The socio-economic assessment outlined in **Section 6.3.6** above would partially address the potential impacts on livelihood security. It is recommended that a comprehensive social impact assessment (SIA) also be undertaken to further address the impacts on livelihood security. The ToR for the SIA are as follows:

- Undertake an initial site visit with the EIA team in order to obtain an overview of the candidate sites and to refine the ToR.
- Collect data from a variety of sources, including, *inter alia*, key stakeholders interviews; site visit(s); project team; documentation on similar studies, census figures and statistics and spatial planning documents.
- Identify and assess potential impacts that could occur. The assessment will concentrate on the following impact categories:
    - Settlement Patterns;
    - Land Use Patterns (particularly agricultural and industrial);
    - Land ownership and use;
    - Comment on individuals and families potentially impacted;
    - Existing social infrastructure and social institutional frameworks and patterns;
    - Traversing Patterns;
    - Community and social dynamics; and
    - Any other relevant categories to be identified during the course of the study.
- Comment on the implications for communities that might be relocated and/or farm workers where farms will be purchased for the proposed development.
- Comment on the indirect impacts on the town of Lephalale as a result of the proposed project, with respect to access to resources and services, impacts on social fabric and changes in sense of place of the town.
- Recommend mitigation measures to reduce the impacts, where necessary.
- Comment on the impacts of two power stations, as well as other developments in the broader area (e.g. Sasol's proposed coal-to-liquids facility);

Ms Ilse Aucamp of Ptersa Environmental Management Consultants would undertake the SIA.

Ms Aucamp is the Director of Ptersa Environmental Management Consultants and has been involved in the social environment for over 13 years. Ms Aucamp has compiled numerous SIAs for various industries, including bulk water supply projects, smelters and resorts.

Cumulative impacts on livelihood security of the area, for instance through increasing industrialisation and decreasing tourism, could result from developments associated with the proposed power station. Potential cumulative impacts on livelihood security will be discussed in the EIR.

6.3.9 IMPACT ON TOURISM

The malaria-free Waterberg region is a tourism destination, attracting both international and local tourist. The bushveld game farms of the Lephalale area include the "Big Five" game and are marketed as ecotourism and trophy hunting destinations. Fishing opportunities are offered at the Mokolo dam to the south east of the candidate sites, while there is hiking, picnicking and bird watching in D'Nyala Nature Reserve. Festivals held annually in the area include the Bushveld Festival and the Marula Amateur Golf Tournament and the Ellisras Fire Arms Festival (www.lephalale.com).

The two proposed power stations would be located within the bushveld area approximately 48 km and 50 km from Lephalale and the Mokolo Dam, respectively. Potential visual and noise impacts, and potential impacts on human health may discourage people from visiting the area, which would have an impact on tourism for the Waterberg region.

Potential impacts on tourism are dealt with in the socio-economic assessment, outlined in **Section 6.3.6** above. Furthermore, the social ramifications would be addressed in the social impact assessment, as described in **Section 6.3.8** above.

Cumulative impacts on tourism could result from developments associated with the proposed power station which could potentially preclude tourism activities through changing the character and aesthetics of the area. Potential cumulative impacts on tourism will be discussed in the EIR.

6.3.10 IMPACT ON TRAFFIC

The proposed project is likely to result in an increase in traffic volumes within the region, during the construction and operational phases of the project. Road upgrades may therefore be required to the existing road network. It is therefore recommended that a traffic assessment be undertaken, the ToR as follows:

- Undertake an initial site visit with the EIA team in order to obtain an overview of the candidate sites and to refine the ToR.
- Collection of background information and undertake traffic counts at each of the sites to establish a baseline and peaks of traffic in the area.
- Superimpose the generated traffic on the current and future road and traffic system and determine the current operating Levels of Service of the affected roads. Assess how

these would be impacted by only one power station as well as by two power stations.
- Analyse the temporary as well as long term effects of access roads, loading and storage and commuting.
- Comment on access configurations, site layout and circulation, freight and public transport facilities, control and road infrastructure improvements.
- Discuss the outcomes of the study with the relevant road authorities, where required.
- Propose mitigation measures, where necessary, to mitigate the assessed impacts and for inclusion in an EMP.

Mr Louis Roodt of Ndodana Consulting Engineers, a transportation engineer with over 32 years experience in the transport sector would undertake this study. Mr Roodt has undertaken a number of Traffic Impact Assessments for various projects including shopping malls, municipal transport plans, industry and township establishment and rezoning applications.

Cumulative impacts on traffic could result from developments associated with the proposed power station through increasing the number of goods vehicles as well as daily worker transport. Potential cumulative impacts on traffic will be discussed in the EIR.

6.3.11 IMPACT ON AGRICULTURAL POTENTIAL

As mentioned above, the loss of agricultural land is likely to be significant for individual landowners and their workers, due to the potential impact that the project could have from a livelihood security perspective. While the economic issues are being addressed through the socio-economic assessment, it is recommended that an agricultural potential assessment be undertaken to determine the agricultural potential of the candidate sites, and the impact of the subsequent loss of land. The ToR for the study are as follows:

- Undertake an initial site visit with the EIA team in order to obtain an overview of the candidate sites and to refine the ToR.
- Undertake a literature review and collection of baseline data, to establish the *status quo* of agricultural resources within the study area and at the candidate sites (detailed grids will not be undertaken).
- Undertake fieldwork to gather additional data and to determine the soil potential of the candidate sites and describe the soil characteristics, both physical and chemical.
- Determine the land capability and landuse of the candidate sites.
- Undertake an assessment to predict the potential impacts on agricultural potential at the three candidate sites, in terms of the scale of impact (local, regional, national), magnitude of impact (low, medium or high) and the duration of the impact (construction, up to 10 years after construction, more than 10 years after construction);
- Comment on the cumulative impacts of the two power stations, as well as developments in the broader area (e.g. Sasol's proposed coal-to-liquid facility), on the agricultural potential.
- Propose mitigation measures that could reduce or eliminate the identified impacts.

Ms Alta van Dyk would undertake this study. She is the Managing Director of Ivuzi Environmental Consultants and has over 15 years experience in the environmental field

focusing on impact assessments, water and waste aspects, remediation initiatives and legislative compliance. Ms van Dyke is registered with the South African Council for Natural Scientific Professions.

Cumulative impacts on agricultural potential could result from developments associated with the proposed power station through decreasing the amount of land available for agriculture or polluting resources, such as water, on which agriculture is dependant. Potential cumulative impacts on agricultural potential will be discussed in the EIR.

6.4 CONSTRUCTION PHASE IMPACTS ON THE BIOPHYSICAL AND SOCIAL ENVIRONMENTS

The construction phase is likely to result in a number of negative impacts on the biophysical and the social environment. These could potentially include:

- Disturbance of flora and fauna;
- Sedimentation and erosion of water ways;
- Increase in traffic volumes;
- Interruption of road and rail services;
- Storage of hazardous substances on site;
- Increased risk of fire;
- Security risks;
- Health issues;
- Noise pollution;
- Light pollution; and
- Dust impact.

The significance of construction phase impacts is likely to be limited by their relatively short duration, since the construction phase should last approximately nine years per power station. There is the possibility that construction of the second power station could commence while the first power station is still being constructed, magnifying the construction related impacts for a shorter period. Many of the construction phase impacts could be mitigated through the implementation of an appropriate EMP. During the EIR phase, the construction phase impacts on the biophysical and socio-economic environment will be assessed, in terms of the methodology outlined in the Plan of Study for EIR (see **Chapter 7**). Furthermore, a framework EMP will be compiled as part of the EIA process, and submitted as part of the EIR, to provide mitigation and ascribe responsibilities for many of the construction phase impacts.

6.4.1 DISTURBANCE OF FLORA AND FAUNA

This impact considers impacts beyond the permanent footprint impacts of the proposed power station. Alien plant seeds could be introduced with construction material such as sand or other materials, with any disturbed areas being particularly vulnerable.

As outlined above, the affected fauna are largely mobile and would relocate during the construction phase and are likely to recolonise the area once the construction phase has been completed and the disturbed areas rehabilitated.

6.4.2 SEDIMENTATION AND EROSION

The sediment loads of any drainage depressions and wetlands or pans may increase due to the major excavations on the site, the laying of linear infrastructure across drainage lines and other construction related activities. This would be exacerbated during the wet season and during intense rainfall events.

6.4.3 INCREASE IN TRAFFIC VOLUMES

Construction vehicles are likely to make use of the existing roads, including the DR175 and DR1675 to transport equipment and material to the construction site. Furthermore, the construction site is likely to operate on a 24-hour basis at times. Construction related traffic could impact negatively on the traffic flow in the vicinity and on the integrity of the affected roads. Furthermore, this may exacerbate the risk of vehicular accidents, especially at night.

6.4.4 INTERRUPTION OF ROAD AND RAIL SERVICES

Traffic flows on the main roads may be partially interrupted if new access routes are required and also during the construction of the coal conveyors and pipelines at the points where they cross major roads or the railway line.

6.4.5 STORAGE OF HAZARDOUS SUBSTANCES ON SITE

As at any construction site, various hazardous substances are likely to be used and stored on site. These substances include amongst other things, diesel, curing compounds, shutter oil and cement. Utilisation of such substances in close proximity to the aquatic environment such as wetlands or pans is of greater concern than when used in a terrestrial environment.

Use of hazardous substances at a construction site is controlled by various pieces of legislation. The management and protection of the environment would however be achieved through the implementation of an EMP, which would *inter alia* specify the storage details of hazardous compounds and the emergency procedures to follow in the event of a spillage.

6.4.6 INCREASED RISK OF FIRE

Temperatures in the Waterberg can rise to 40ºC in summer. Furthermore, the bushveld vegetation is prone to fires being started by lightning strikes in summer. Construction activities

onsite may increase the risk of fire in the area in both the wet summer months and the dry winter months. The outbreak of fire at the construction site could have serious safety, economic and ecological implications. The risk of fire would be managed through the EMP, which would include procedures for dealing with emergency situations such as fires.

6.4.7 SECURITY RISKS

As mentioned above, during the construction phase some 8 000 people are likely to be employed, with the numbers rising and falling throughout the construction period, dependent on the activities taking place at the time. While Eskom would want to source construction labour locally, it is inevitable that there will be an influx of people to the area. The increase in people to the area, as well as the periods where some construction workers are unemployed could lead to an increase in crime and violence in Lephalale, Steenbokpan, Onverwacht, Marapong and the surrounding areas.

6.4.8 HEALTH ISSUES

The migration of construction workers into the Lephalale region could result in an increase in the prevalence of diseases in the area including *inter alia* HIV/AIDS and tuberculosis. Health risks could be increased by an influx of sex workers to the area, fed by a large number of construction workers who are away from their families. Medical facilities in the area may not be equipped to deal with the increased requirement for healthcare as a result of the construction activities.

6.4.9 NOISE POLLUTION

As mentioned above, the construction site is likely to operate 24-hours a day, for a portion of the construction period. An increase in noise pollution would be expected from the operation of heavy machinery during the construction period, as well as due to the increased traffic. The severity of this impact is likely to be reduced due to the low numbers of people in close proximity to the candidate sites.

6.4.10 LIGHT POLLUTION

Large floodlights are likely to be installed at the construction site to enable construction activities to continue 24 hours per day, when required. The relatively low numbers of people in close proximity to the candidate sites is likely to reduce the severity of this impact.

As mentioned, many of the construction phase impacts could be managed or mitigated through the implementation of an appropriate enforceable EMP. A framework EMP will be compiled as part of this EIA process and will be contained in the EIR.

6.4.11 DUST IMPACTS

Construction vehicles are likely to make use of the existing roads, including the DR175 and DR1675 to transport equipment and material to the construction site. Furthermore, the construction site is likely to operate on a 24-hour basis at times and large earthworks would be undertaken. These activities would exacerbate dust especially in the dry winter months. The dust impact would be managed through the EMP, which would include procedures for dealing with dust pollution events including watering of roads, etc.

7 PLAN OF STUDY FOR EIA

The purpose of this chapter is to detail the Plan of Study for the EIA Phase to ensure that this EIA process satisfies the requirements of NEMA

7.1 PURPOSE OF THIS PLAN OF STUDY FOR EIA

The Scoping process has been documented in this Scoping Report, which has identified various potential environmental impacts and project alternatives that require detailed investigation. This Plan of Study is the culmination of the Scoping Phase and its purpose is to ensure that the EIA phase of this EIA process satisfies the requirements of NEMA. Accordingly, this Plan of Study for EIA outlines the anticipated process and products for the EIA phase.

This Plan of Study for EIA has been compiled in terms of Government Notice No R.385 of 21 April 2006 of NEMA (specifically Section 29(1)i) and will be submitted to DEAT for their consideration.

7.2 DESCRIPTION OF THE ACTIVITY

The nature of the activity is described in detail in **Chapter 4**, but in brief includes the following:

- Construction of two coal-fired power stations with six boiler/ turbine sets with a nominal electricity generation capacity of approximately 5 400 MW (900 MW per unit[28]) each.

Associated infrastructure that could also be established includes the following:

- Coal and sorbent stock yards;
- A blackstart facility;
- Coal, ash, sorbent and gypsum conveyors;
- A HV yard within the power station precinct;
- Water and wastewater treatment facilities;
- Ash and spent sorbent disposal systems and dump site;
- Gypsum storage facility
- Access roads (temporary and permanent, and external and internal roads);
- Maintenance, medical, administration, services, control buildings;
- Water supply pipeline or construction phase;
- Raw water pipeline and reservoirs;
- Dams for storage of “clean” and “dirty” water;

[28] The station capacity rating is dependant on the selected technology based on various Original Equipment Manufacturer (OEM) proposals, which would be acquired during the technical and commercial evaluation process.

- Railway lines and sidings for sorbent, heavy fuel oil (HFO) and other construction and operational equipment and material supply;
- Transmission lines (to the proposed Delta substation and to be deviated within sites);
- Power supply for the construction phase (~~substation, transmission and~~ distribution lines from Medupi power station);
- Borrow pits (on site and off site, as identified);
- Communication mast/telecommunication facilities;
- General and hazardous storage and handling facilities (temporary and permanent);
- Batching plant (including concrete and asphalt); and
- Construction ~~worker~~ accommodation.

7.3 DESCRIPTION OF TASKS TO BE PERFORMED

7.3.1 POTENTIAL ENVIRONMENTAL IMPACTS IDENTIFIED DURING SCOPING

Chapter 6 has reviewed the range potential environmental impacts associated with the proposed establishment of a coal-fired power station and associated infrastructure in the Waterberg. Pursuant to this assessment, which was based on literature, input from the authorities, interested and affected parties (I&APs) and various specialists, a shortlist of potentially significant environmental impacts were identified for further, more detailed investigation during the EIR phase. Specifically the following potential environmental impacts have been identified:

- Operational phase impacts on the biophysical environment:
    - Impact on the terrestrial fauna and flora;
    - Impact on aquatic flora and fauna, inclusive of wetlands;
    - Impact on ambient air quality;
    - Impact of founding conditions on the power stations; and
    - Impact on groundwater resources.
- Operational phase impacts on the social environment:
    - Visual impacts;
    - Noise impacts;
    - Impact on health of surrounding landowners;
    - Societal risk;
    - Impact on heritage resources;
    - Impact on local economy;
    - Impact on land use and planning;
    - Impact on livelihood security;
    - Impact on tourism;
    - Impact on traffic; and
    - Impact on agricultural potential.
- Construction phase impacts on the biophysical and social environments:
    - Disturbance of flora and fauna;
    - Sedimentation and erosion of water ways;
    - Increase in traffic volumes;

- Interruption of road and rail services;
- Storage of hazardous substances on site;
- Increased risk of fire;
- Security risks;
- Health issues;
- Noise pollution;
- Light pollution; and
- Dust impact.

7.3.2 METHOD OF 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.[29]

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

Table 7.1 Assessment criteria for the evaluation of impacts

CRITERIA	CATEGORY	DESCRIPTION
Extent or spatial influence of impact	**Regional**	Beyond a 30 km radius of the candidate site.
	Local	Within a 30 km radius of the candidate site.
	Site specific	On site or within 100 m of the candidate site.
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*

[29] The applicant will be requested to indicate at the Draft EIR stage which alternative and mitigation measures they are prepared to implement.

CRITERIA	CATEGORY	DESCRIPTION
Duration of impact	Construction period	Up to 10 years
	Medium Term	Up to 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 7.2**.

Table 7.2 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 **Table 7.3** and **Table 7.4** 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 outlined in **Table 7.5**.

Table 7.3 Definition of probability ratings

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

Unlikely	Estimated less than 5 % chance of the impact occurring.

Table 7.4 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 7.5 Definition of reversibility ratings

REVERSIBILITY RATINGS	CRITERIA
Irreversible	The activity will lead to an impact that is in all practical terms permanent.
Reversible	The impact is reversible within 2 years after the cause or stress is removed.

7.4 NEED FOR ADDITIONAL INFORMATION: SPECIALIST STUDIES

In reviewing the potential environmental impacts, all impacts initially identified during the Scoping phase have been identified as being of concern and requiring further investigation. Accordingly, we propose to undertake the following specialist studies, in order to address a suite of potential environmental impacts.

Study	Consultant and Organisation
Air quality impact assessment	Lucian Burger of AirShed Planning Professionals
Noise impact assessment	Derek Cosijn of Jongens Keet Associates
Visual impact assessment	Eamonn O'Rourke of Strategic Environmental Focus (SEF)
Terrestrial ecology assessment (including toxicology)	Johann du Preez of Makecha Development Association; Jan Myburgh under InfoTox
Aquatic ecology assessment	Daniel Otto of Golder Associates
Groundwater assessment	Andrew Johnstone of GCS
Risk assessment	Mike Oberholzer of Riscom
Archaeological impact assessment	Johnny van Schalkwyk (private consultant)
Socio-economic assessment	Ben van der Merwe of Urban-Econ
Social impact assessment	Ilse Aucamp of Ptersa Environmental Management Consultants
Land use planning study	Wim Jacobzs of Winterbach, Potgieter and Associates
Traffic assessment	Louis de Villiers Roodt of Ndodana Consulting Engineers
Agricultural potential assessment	Alta van Dyke of Ivuzi Environmental Consulting

The ToR for these investigations as well as the identified specialists are outlined **Chapter 6**. A short summary of the various specialist consultants is given below. CVs are available upon request.

Airshed Planning Professionals, led by ***Dr Lucian Burger***, has been appointed to undertake the air quality impact assessment. Lucian Burger is the Managing Director of Airshed Planning Professionals. His postgraduate studies (MSc Eng and PhD) were specifically focused on the development of dispersion modelling theory and related software applications.

Dr Burger has completed 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. Power stations assessed by Dr Burger include, *inter alia*, Kelvin Power Station (Johannesburg), Athlone Power Station (Cape Town), regional impacts of all Eskom power stations, and Kendal, Matimba, Duvha and Majuba Power Stations in particular. Dr Burger has published more than fifty scientific publications in the open literature and many confidential technical publications, reports, business proposals and reviews.

Mr Derek Cosijn is a partner with Jongens Keet Associates and has over 40 years of experience over a wide range of civil engineering, transportation planning, environmental and acoustic engineering projects. Mr Cosijn has been actively involved in numerous environmental projects since 1975 and his area of special expertise is environmental noise (acoustical engineering). The environmental projects have ranged through EIAs and noise impact assessments, policy formulation and procedural guideline development. Some of the 110 odd environmental and noise impact projects with which he has been involved with over the last 10 years are the City of Tshwane Noise Management Policy, Gautrain Noise Impact Study, Tutuka Power Station Coal Supply Railway Noise Impact Assessment, Majuba Power Station Coal Supply Railway Noise Impact Assessment, Gauteng Freeway Congestion SEA Noise Impact Assessment, Petronet Multi-product Pipeline (Northern Section) Noise Impact Assessment, Medupi Power Station Noise Impact Assessment, Olifants River Water Resources Development Project Noise Impact Assessment, Steelpoort Pump Storage Scheme Power Station.

Strategic Environmental Focus' landscape architecture unit has been appointed to undertake the VIA. The team will be led by ***Mr Eamonn O'Rourke***, a Landscape Architect with over 14 years experience in the field. He has undertaken a suite of VIAs for a range of projects in the mining and industrial sector and for linear infrastructure developments. As the Unit Manager of the Landscape Architecture unit in Stategic Environmental Focus Mr O'Rourke is responsible for, *inter alia*, the research, co-ordination and compilation of landscape rehabilitation programmes and visual impact assessments and mitigation recommendations. Mr O'Rourke has worked on numerous infrastructure projects including transmission lines and power stations such as the Kendal and Vaal South power stations and the Kudu transmission & substation.

Mr Johan du Preez of Makecha Development Associates has over 24 years experience in the environmental field. Dr du Preez has been involved in numerous specialist studies for various developments including business and open space developments, fuel filling stations, housing developments, pipelines, power lines, roads, sewage works and reservoirs. Dr du Preez is the

author of 36 research articles and technical reports and is a senior lecturer in ecology and environmental management at the University of the Free State.

Mr Jan Myburgh is a qualified veterinarian with over 10 years experience in service rendering (clinical veterinary work) to commercial and small-scale farmers in the Gauteng and Northwest Province. Clinically, he has a special interest in bovine medicine (pharmacology and toxicology) and reproduction. Mr Myburgh currently works for the University of Pretoria and is a senior lecturer in the Department of Paraclinical Sciences and is responsible for teaching Pharmacology and Toxicology to pre- and postgraduate students. Mr Myburgh will be working under the auspices Dr Willie van Niekerk of Infotox.

Mr Myburgh was the main or co-author of 15 articles published in refereed journals and 27 articles published in non-refereed journals or proceedings. He also contributed one chapter (as a co-author) to the book, *Infectious Diseases of Livestock*, which was published in 1994. Mr Myburgh's main research interest is veterinary environmental problems. Research for his PhD was started in 2003 and will be based on the development of biomarkers for African aquatic species (Nile crocodile and Sharptooth Catfish) to facilitate detection of pollution or the presence of hazardous constituents in rivers and dams in southern and East Africa.

Mr Daniel Otto of Golder Associates has over 16 years experience in aquatic hydrology and has assisted in research such as passive treatment wetland projects and A Manual on Mine Water Management and Treatment Practices in South Africa. Mr Otto has lectured at the Vista University in Johannesburg and has also worked as a researcher. Mr Otto specializes in environmental rehabilitation, environmental management plans implementations, audits, liability assessment and environmental risk assessment audits.

Mr Andrew Johnstone is the founder and Managing Director of GCS. He has over 24 years experience as a geohydrologist and has under numerous studies as part of EIA's. Mr Johnstone specializes in the exploration and design of wellfields in aquifers, mining related hydroheology, regional hydrogeological investigations and mapping, hydrochemical investigations (natural and contamination) and environmental due diligence investigations. Mr Johnstone has published over 11 papers.

Mr Michael Oberholzer is currently director of Riscom. He is a registered Professional Engineer holds a BSc (Chemical Engineering) from the University of the Witwatersrand (1982). Mr Oberholzer has over 20 years experience with Dow chemicals and Sentrachem in all aspects of project implementation. This includes Process Engineering Manger, Project Manager and Commissioning Manager. Since leaving Dow, Mike has concentrated on risk studies and completed a number of Risk Assessments studies and Process Hazard Analysis in various industries including offshore assignments in the oil and gas, chemical, petrochemical, agrochemicals, mining and food industries.

Mr Oberholzer has undertaken numerous risk assessments including those for the coal based power stations near Witbank and Vaal South, as well proposed peaking power plants in Kwazulu-Natal and Eastern Cape.

Dr Johnny van Schalkwyk, a private heritage consultant, has been appointed to undertake the requisite heritage impact assessment. Dr van Schalkwyk has undertaken over 800 archaeological, anthropological and social impact assessments, including the assessments of two power station projects in the Northern Free State and Mpumalanga and has worked in the Waterberg area previously. Other projects assessed include powerlines, roads, pipelines, dams, mine developments, water purification works, historical landscapes, refuse dumps and urban developments. Dr van Schalkwyk has published more than fifty papers on topics relating to anthropology, archaeology, history and impact assessment in various scientific journals. He is the current Head of Research of the National Cultural History Museum.

Mr Ben van der Merwe of Urban-Econ has wide-ranging knowledge and experience in economic development analyses. His special field of interest relates to the utilisation and application of the input-output technique in the development milieu. He has conducted various multi-sectoral economic development studies, which incorporated liaison with communities to ensure local involvement. Due to his interest in economic modelling and research, he has extended his expertise in industrial complexes, input/output and impact analyses to address urban management and spatial economic problems. Ben has developed and implemented innovative economic impact modelling techniques to quantify economic development indicators for capital expenditure projects, therefore equipping the firm with forefront modelling techniques. He has successfully managed and coordinated large research, data gathering and strategic development studies in the SADC countries. His management skills have been applied in numerous LED and database development studies.

Ms Ilse Aucamp is the Director of Ptersa Environmental Management Consultants and has been involved in social environment for over 13 years. Ms Aucamp has compiled numerous SIAs for various industries, including bulk water supply projects, smelters and resorts. Ms Aucamp is currently busy with a PhD in Social Sciences at the University of Pretoria. Her topic is: Social Impact Assessment in a South African Context: *An Integrated Social and Environmental Sciences Approach*. She has published and presented five papers at various conferences.

Mr Wim Jacobsz of Winterbach Potgieter & Partners Town and Regional Planners has been appointed to undertake this study. Winterbach Potgieter & Partners specialises in Town and Regional Planning and has undertaken extensive work in the Waterberg area, including numerous SDFs such as the Waterberg District Municipality. The firm does not concentrate on limited aspects of town planning but operates in the broader spectrum of planning and development, which acknowledges and respects the interrelations among the physical, natural, social and economic spheres of development. This includes, *inter alia*, regional, strategic and development Planning, SDFs, town planning schemes and amendment schemes and technical investigations.

Mr Louis Roodt of Ndodana Consulting Engineers, a transportation engineer with over 32 years experience in the transport sector. Mr Roodt has undertaken a number of Traffic Impact Assessments for various projects including shopping malls, municipal transport plans, industry and township establishment and rezoning applications. Mr Roodt is experienced in many aspects of transport work including road safety audits, the interaction of road geometry and

driver behaviour, driving speed and collisions, interchange designs, geometric design of ramps and speed camera effectiveness.

Ms Alta van Dyk is the Managing Director of Ivuzi Environmental Consultants and has over 15 years experience in the environmental field focusing on impact assessments, water and waste aspects, remediation initiatives and legislative compliance. Ms van Dyke is registered with the South African Council for Natural Scientific Professions.

7.5 REASONABLE PROJECT ALTERNATIVES IDENTIFIED DURING SCOPING

Chapter 4 reviewed a range of project alternatives associated with the proposed activities. Pursuant to this Scoping exercise, which was based on input from the authorities, I&APs and various specialists, a shortlist of reasonable project alternatives has been identified for further, more detail investigation during the EIR phase, namely:

- Three candidate site alternatives;
- Combustion technology alternative;
    - Focused on pulverised fuel combustion
- Cooling technologies;
    - Indirect dry cooling and
    - Direct dry cooling
- Ash disposal alternatives;
    - Focused on above-ground ashing
- Site layout alternatives.

Other potential alternatives were considered and screened out in **Chapter 4**. These are documented in **Section 4.3**.

7.6 THE ENVIRONMENTAL IMPACT REPORT

The purpose of the EIR would be to undertake a comparative assessment of the relative significance of the potential environmental impacts for the proposed power station technology and layout 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 affected 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 7.3.2**, 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, together with a framework Environmental Management Plan. The mitigation measures would be informed by the specialist studies, professional experience and comment received from the I&APs.
- A set of recommendations regarding the way forward would be provided, should any of the proposed alternatives be authorised in terms of NEMA.

7.7 PUBLIC PARTICIPATION PROCESS

The purpose of the public participation process would be to provide I&APs with adequate opportunity to have input into the environmental process. The public participation process would include the following:

7.7.1 PUBLIC COMMENT ON THE DRAFT EIR

Following the completion of the Draft EIR (refer to **Section 7.6** above), it will be lodged at a suite of relevant libraries, Municipal offices and on the Eskom (www.eskom.co.za/eia) and Ninham Shand websites (www.ninhamshand.co.za). Registered I&APs will be notified of the lodging by means of letters, and given 30 days in which to comment on the report. During the comment period a public meeting would be held in Lephalale to enable I&APs to provide feedback on the draft report. The public would be notified of the meeting via a public notice in the local press and by way of the letter used to inform the I&APs of the lodging of the Draft EIR.

All written correspondence would be in English and Afrikaans. The public meeting would also be run in English and Afrikaans.

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 the Project Team's responses thereto. The draft report would also be revised in light of feedback from the public.

a) Opportunity for appeal

All registered I&APs would be notified in writing of the release of the Environmental Authorisation. They would be reminded of their right to appeal against DEAT's decision to the Minister of Environmental Affairs and Tourism in terms of NEMA.

7.8 PROPOSED PROGRAMME

A summary of the proposed programme is given in the table below.

Table 7.6 Proposed EIA programme

Activity	Proposed date	Deliverable
2nd round of public engagement:		
• Letter to I&APs & adverts	4/11/2008	Informed I&APs
• Lodge draft SR in public venues and with Authorities	5/11/2008	Draft SR in libraries, websites etc.
• Open day & public meeting	26/11/2008	Public engagement
• Public comment period ends	30/01/2009	Updated issues trail
Submit final SR (incl. Plan of Study for EIR) to environmental authority	31/03/2009	Approved SR & PoS EIR
Specialist studies	11/2008 – 5/2009	Specialist reports
3rd round of public engagement:		
• Letter to I&APs & adverts	06/2009	Informed I&APs
• Lodge draft EIR in public venues	06/2009	Draft EIR in libraries, website etc.
• Open day & public meeting	07/2009	Public engagement
• Public comment period ends	07/2009	Updated issues trail
Submit final EIR to environmental authority	08/2009	Environmental Authorisation

7.9 PERSONNEL

As for the Scoping Report phase, Ninham Shands' Brett Lawson would provide strategic guidance to the EIA process and Ashwin West would undertake the management of the EIA process and, together with Louise Corbett, the requisite reporting. Mr Lawson is a certified EAPSA, and is registered as a Professional Natural Scientist with the South African Council for Natural Scientific Professions. Mr West is registered as a Professional Natural Scientist with the South African Council for Natural Scientific Professions.

Anelle Odendaal of Zitholele Consulting would facilitate the public participation process. A short summary of these consultants is given below. CVs are available upon request.

Mr Brett Lawson has spent 12 years in wildlife management and research with conservation agencies in southern and South Africa, and nine years in the more holistic field of environmental management in the National Lake Areas and with Eskom. Thereafter, Mr Lawson was one of the founders in 1995 of Bohlweki Environmental, the first emergent environmental consultancy established in South Africa, and later started The Environmental Partnership which he relinquished in 2004 as a fully empowered environmental consultancy. He thus has considerable multi-disciplinary experience across the range of environmental sciences.

As a Principal Environmental Practitioner, ***Mr Ashwin West*** has been involved in undertaking Environmental Impact Assessments, the development, implementation and auditing of Environmental Management Plans, water resources and augmentation studies and the development, implementation and auditing of Environmental Management Systems in South Africa and the United Kingdom. Mr West has over six years experience and has undertaken numerous projects in the petrochemical, housing and service supply industries amongst others.

As an Environmental Practitioner, ***Ms Louise Corbett*** has been involved in undertaking Environmental Impact Assessments, the development and implementation of Environmental Management Plans, and the development and implementation of Environmental Management Systems. Ms Corbett has three years experience in the environmental field and has been involved with a variety of industries such as the petrochemical, housing, service supply and transport industries amongst others.

Mrs Anelle Odendaal of Zitholele Consulting has 10 years experience in managing public participation projects and awareness creation programmes. Her experience includes designing and managing countrywide public participation and awareness creation projects, managing multi-project schedules, budgets and achieving project goals. Mrs Odendaal has coordinated several dozens of stakeholder workshops, forum meetings, focus group meetings and public meetings, some of which on international scale. She has coordinated the production of a wide variety of publications transferring scientific and technical material in non-technical languages to readers representing all spheres of society.

8 CONCLUSIONS AND WAY FORWARD

The purpose of this Chapter is to briefly summarise and conclude the Scoping Report and describe the way forward.

8.1 CONCLUSIONS

As per the requirements of NEMA, this Scoping investigation has reviewed a range of project alternatives and contemplated the array of potential environmental impacts associated with the following proposed activities in the Waterberg region:

- The establishment of two coal-fired power stations of approximately 5 400 MW of generation capacity each; and
- The establishment of ancillary infrastructure including amongst other things a WWTW, a WTW, including a demineralisation plant, ash disposal facility and SO_x abatement measures.

The following feasible alternatives have been identified for further consideration in the EIR:

- Three candidate site alternatives;
- Combustion technology alternative;
    - Focused on pulverised fuel combustion
- Cooling technologies;
    - Indirect dry cooling and
    - Direct dry cooling
- Ash disposal alternatives;
    - Focused on above-ground ashing
- Site layout alternatives.

Specifically the following potential environmental impacts have been identified for further consideration in the EIR:

- Operational phase impacts on the biophysical environment:
    - Impact on terrestrial fauna and flora;
    - Impact on aquatic fauna and flora;
    - Impact on ambient air quality;
    - Impact on founding conditions; and
    - Impact on groundwater resources.
- Operational phase impacts on the social environment:
    - Visual impacts;
    - Noise impacts;
    - Impact on health of surrounding landowners;
    - Risk assessment;
    - Impact on heritage resources;
    - Impact on local economy;
    - Impact on land use and planning;

  - Impact on livelihood security;
  - Impact on tourism;
  - Impact on traffic; and
  - Impact on agricultural potential.
- Construction phase impacts on the biophysical and social environments

The following specialist studies and specialists will be commissioned to provide more detailed information on those environmental impacts which have been identified as potentially being of most concern, and/or where insufficient information is available, namely:

Study	Consultant and Organisation
Air quality impact assessment	Lucian Burger of AirShed Planning Professionals
Noise impact assessment	Derek Cosijn of Jongens Keet Associates
Visual impact assessment	Eamonn O'Rourke of SEF Jan Myburgh under InfoTox
Terrestrial ecology assessment (including toxicology)	Johann du Preez of Makecha Development Association
Aquatic ecology assessment (including wetland delineation)	Daniel Otto of Golder Associates
Groundwater assessment	Andrew Johnstone of GCS
Risk assessment	Mike Oberholzer of Riscom
Archaeological impact assessment	Johnny van Schalkwyk (private consultant)
Socio-economic assessment	Ben van der Merwe of Urban-Econ
Social impact assessment	Ilse Aucamp of Ptersa Environmental Management Consultants
Land use planning study	Wim Jacobzs of Winterbach, Potgieter and Associates
Traffic assessment	Louis de Villiers Roodt of Ndodana Consulting Engineers
Agricultural potential assessment	Alta van Dyke of Ivuzi Environmental Consulting

The rationale for these specialist investigations and the ToR has been outlined under the relevant impacts in **Chapter 6** of this report.

The approach to the EIR phase should be conducted in terms of the guidelines outlined in the Plan of Study for EIA in **Chapter 7**.

8.2 THE WAY FORWARD

The next stage of the public participation process involves the lodging of the DSR and the hosting of a public meeting to receive feedback on the DSR.

The open day and public meeting will be held on 26 November 2008. The details are as follows:

Date	***Venue***	***Time***
26 November 2008	Mogol Club, Conference Centre, Lephalale	16:00 – 20:00

Note that the formal meeting will only start at 18:00. An open day will be held before this whereby information is on view (e.g. posters and maps).

Copies of this DSR have been lodged in the following locations:

- Local Municipal Office, Lephalale;
- Lephalale Main Public Library;
- Agri Lephalale local office;
- Marapong Clinic (Mosethla Street, Marapong);
- Lephalale District Agricultural Union;
- www.eskom.co.za/eia; and
- www.ninhamshand.co.za.

Written comments on the report will be received until 9 January 2009. Cognisance will be taken of all comments when compiling the final report, and the comments, together with the study team's and client's responses thereto, will be included as an Annexure in the final Scoping Report. Where necessary, the report will be updated to take these comments into account.

Once the final Scoping Report has been completed and all I&AP comments have been incorporated into the report, and the client has approved the report, it will be submitted to DEAT and DEDET for their review and comment, respectively. DEAT will either reject the application or instruct the applicant to proceed to the EIR phase, either as proposed in the Plan of Study for EIR, or direct that amendments are made before continuing.

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9.3 PERSONAL COMMUNICATION

Personal communication between M Wynne of Ninham Shand and A West of Ninham Shand by e-mail on 16/01/2008.

Personal communication between W Comrie of Ninham Shand and L Corbett of Ninham Shand by e-mail on 1410/08 regarding W Comrie's work under Ockie van den Berg of DWAF National Water Resource Planning: Options analysis.