

## 1. INTRODUCTION

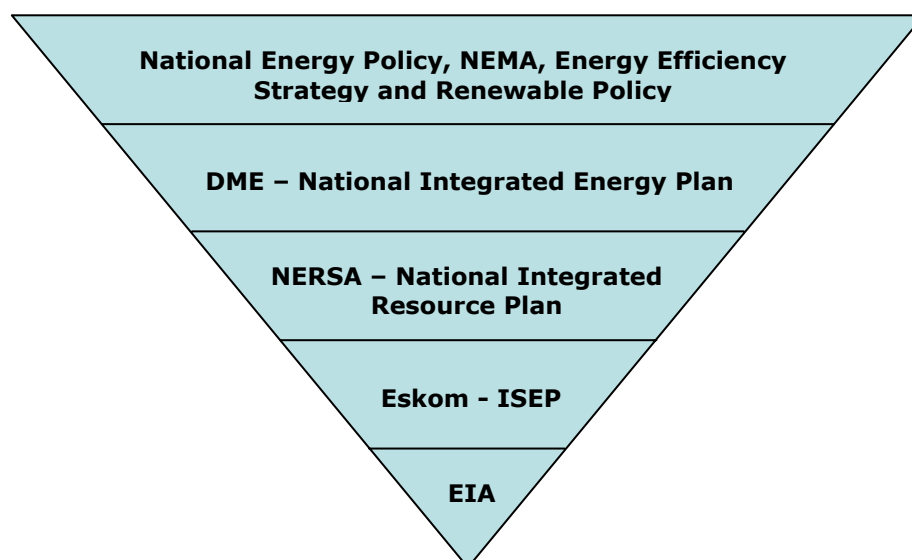
Eskom Holdings Limited (hereinafter referred to as Eskom) has appointed Bohlweki Environmental (Pty) Ltd to conduct the independent Environmental Impact Assessment (EIA) process for the proposed construction and operation of a pumped storage power generation facility in the Steelpoort area, in terms of the National Environmental Management Act Regulations (No. 385, 386 & 387 of 2006). This Environmental Scoping Study (ESS) forms part of the EIA process for the proposed project.

An Environmental Screening Investigation<sup>1</sup> (ESI) has been conducted by BKS Consulting in order to evaluate three possible alternative sites for the proposed SPSS. The findings of this ESI have been used to inform the ESS and to highlight areas where more information is required.

### 1.1. Energy Policy framework

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 Department of Minerals and Energy (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 by Figure 1.1 and described below.

**Figure 1.1:** Hierarchy of policy and planning documents



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<sup>1</sup> Project Lima Supplementary Feasibility Study – Phase 1: Site Selection Study Main Report, June 2006. BKS Palace Consortium.  
Project Lima Supplementary Feasibility Study – Environmental Screening Investigation Report, May 2006. BKS Palace Consortium.

### **1.1.1. White Paper on the Energy Policy of the Republic of South Africa – 1998**

Development within the energy sector in South Africa is governed by the White Paper on the Energy Policy, 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 health, safety and environmental 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.

### **1.1.2. Integrated Energy Plan (IEP) – 2003**

DME commissioned the IEP to provide a framework in which specific energy policies, development decisions and energy supply trade-offs can be made on a project-by-project basis. The framework is intended to create a balance in providing low cost electricity for social and economic development, ensuring a 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 has concluded that, based on energy resources available in South Africa, coal will be the primary fuel source for the current expansion period.

### **1.1.3. National Integrated Resource Plan (NIRP) – 2003/2004**

In response to the White Paper's objective relating to affordable energy services, the National Electricity Regulator (now NERSA) commissioned a National Integrated Resource Plan (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. These are:

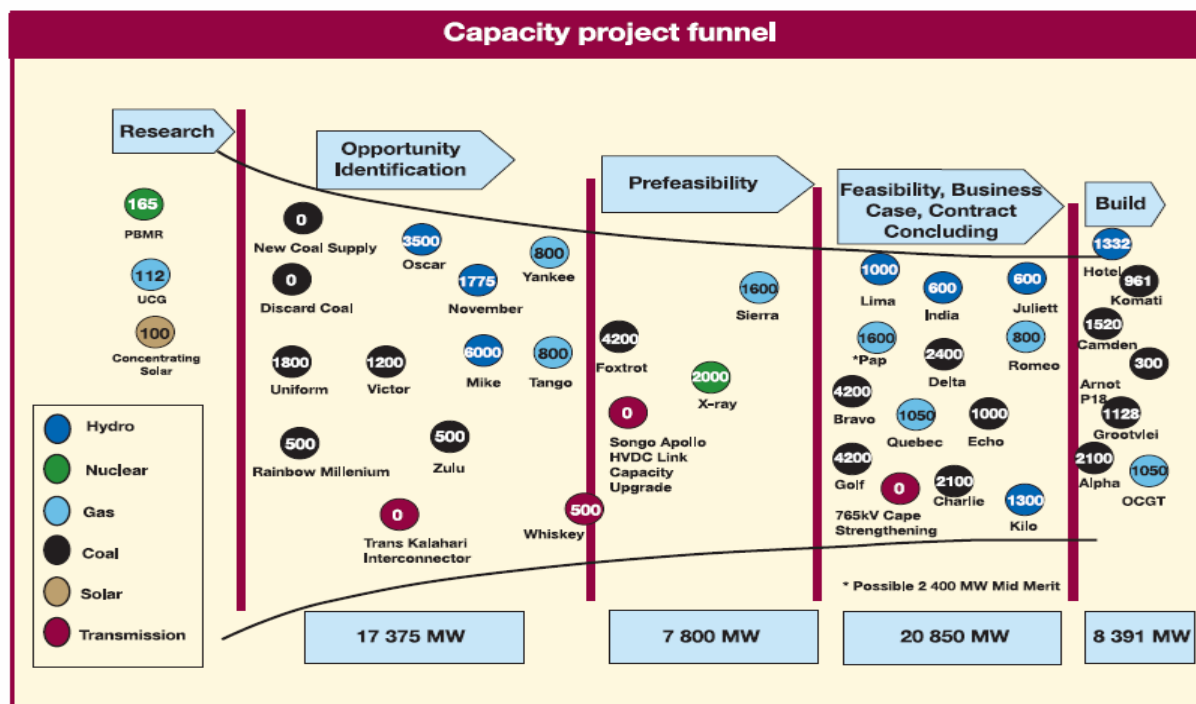
- A 2.8% average annual economic growth;
- The development and expansion of a number of large energy-intensive industrial projects;
- Electrification needs;
- A reduction in electricity-intensive industries over the 20 year planning horizon;
- A reduction in electricity consumers – NIRP anticipates people 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 determined that while the coal-fired option of generating electricity would still be required over the next 20 years, additional energy generation facilities would be required by 2007.

#### **1.1.4. Eskom Integrated Strategic Electricity Planning (ISEP) – 2005**

Eskom applies an Integrated Strategic Electricity Planning (ISEP) process to identify long-term options regarding both the supply and demand sides of electricity provision in South Africa. The most recently approved ISEP plan (October 2005) identifies the need for increased peaking supply by about 2006/7 and base load by about 2010. Figure 1.2 overleaf illustrates Eskom's "project funnel", which shows the range of supply options being considered by Eskom to meet the increasing demand for electricity in the country. There are currently 34 projects in the project funnel ranging from research projects to new-build projects. Research projects include a demonstration solar power project, underground coal gasification and the pebble bed modular reactor (PBMR). Three 'mothballed' stations, viz. the Camden, Komati and Grootvlei power stations, are currently being returned-to-service, and are therefore reflected in the 'build' portion of the funnel diagram.

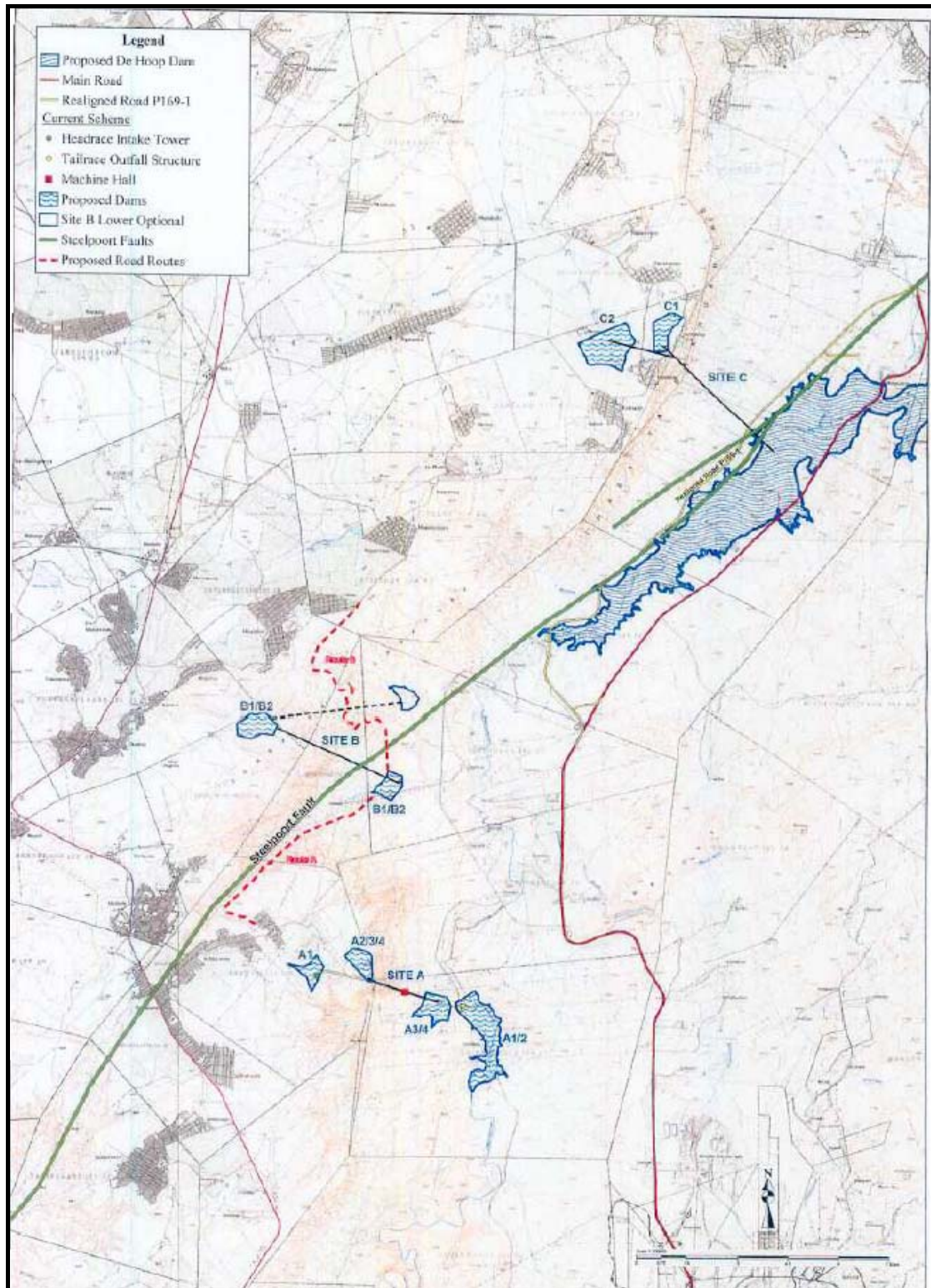
**Figure 1.2:** Project funnel



As part of the increased electricity supply plan, Eskom proposes constructing a Pumped-Storage Scheme at the border between the Limpopo and Mpumalanga Provinces – the proposed PSS (refer to Figure 1.3 or to Appendix A for the locality map).

Electricity by nature cannot be stored and therefore must generally be used as it is generated. Therefore, electricity is usually generated in accordance with supply-demand requirements. However, the innovative technology used in pumped storage facilities **enables energy to be “stored” for later use during peak energy demand periods.** While it will not be a nett producer of electricity, the proposed PSS is therefore anticipated to alleviate pressure on electricity supply during peak periods by releasing “stored” energy when it is most needed. This will result in reduced “wastage” of electricity and strengthen electricity supply without the need for additional power plants for generation of additional electricity. Existing electricity generation infrastructure will therefore be optimised. It is anticipated that the scheme will have an installed capacity of approximately 1520 MW.

**Figure 1.3:** Locality Map



## 1.2. Overview of the Proposed Project

The proposed project involves the construction and operation of a pumped storage scheme (power generation facility) in the Steelpoort area. The function of a pumped storage scheme is to supply power during the time of peak demands and to store surplus power during off-peak periods, which will be utilized later. Electricity supply is thereby "shifted" from off-peak times, when there is surplus electricity, to peak times, when there is often a shortage of available electricity.

The proposed scheme consists of the following components:

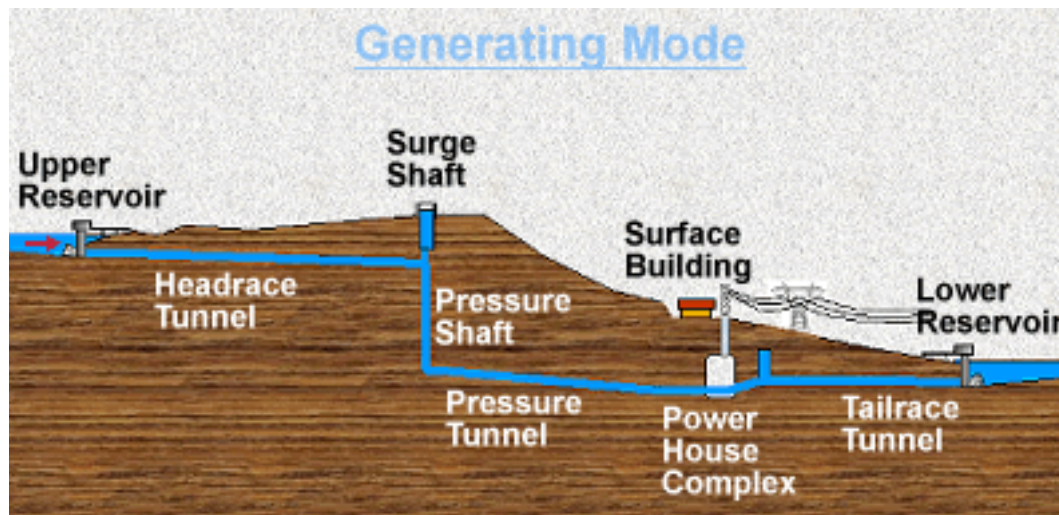
- Upper and lower reservoirs;
- Underground power house complex and associated waterways that link the reservoirs; and
- Ancillary works such as roads, transmission lines and other associated infrastructure.

It is important to note that very little of the scheme will be visible above-ground, as most of the infrastructure will be located underground. The only parts of the scheme that will be visible above-ground will be the dams and an intake tunnel, and the visual impact of these will be mitigated through various mitigation and management measures, which will be investigated and developed in detail during the EIA phase of the project.

There are three general types of hydroelectricity:

- **Run of River Hydroelectricity** – where electricity is generated from within a river (instream);
- **Hydroelectric Dams** – where dams are constructed along a river to harness water for later use in generating electricity e.g. Gariep Dam in the Free State; and
- **Pumped Storage Schemes** – which take excess power from power stations during off peak times and uses it to pump water from the lower reservoir to the upper reservoir. At times of peak electricity demand, the water is let back down/released through turbines, generating electricity (refer to Fig. 1.4 below).





**Figure 1.4:** Schematic showing the two different operating modes of a pumped storage scheme namely generating and pumping modes.

Pumped storage sites are not net producers of electricity – it actually takes slightly more energy to pump the water up than is recovered when it is released. However, they are a valuable addition to electricity supply systems. Their value is in their ability to store excess energy for use at a later time when peak demands are occurring. Additionally, pumped storage schemes can be started-up within a few minutes when electricity is needed.

### **1.3 Environmental Legal Requirements**

In order to protect the environment and ensure that this development is undertaken in an environmentally responsible manner, there are two significant pieces of environmental legislation that focus this assessment. They are the following:

#### **1.3.1 The National Environmental Management Act**

The National Environmental Management Act (NEMA) (No. 107 of 1998) states that the principles of Integrated Environmental Management (IEM) should be adhered to in order to ensure sustainable development. A vital underpinning of the IEM procedure is accountability to the various parties that may be interested in or affected by a proposed development. Public participation is a requirement of the IEM procedure, in terms of the identification of potentially significant environmental impacts during the Scoping Phase. The IEM procedure aims to ensure that the environmental consequences of development proposals are understood and adequately considered during all stages of the project cycle, and that negative aspects are resolved or mitigated and positive aspects enhanced.

Furthermore, Section 28(1) of the Act 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 therefore has the responsibility to ensure that the proposed activity as well as the EIA process conforms to the principles of the National Environmental Management Act. In developing the EIA process Bohlweki have been cognisant of this need, and accordingly the EIA process undertaken here has been informed by the underlying NEMA principles.

The NEMA EIA regulations, which replace the ECA EIA regulations, have been promulgated and came into effect on 3 July 2006. Sections 24 and 24D of NEMA, as per Government Notices R386 and R387 of April 2006, contain a schedule of activities that may have substantial detrimental effects on the environment and which require authorisation from the competent environmental authority.

The nature of the proposed project includes activities listed in these schedules. The primary triggers are (according to R387):

*The construction of facilities or infrastructure, including associated structures or infrastructure, for:*

*1(a) the generation of electricity where –*

- the electricity output is 20 megawatts or more; or*
- the elements of the facility cover a combined area in excess of 1 hectare.*

*1(g) The use, recycling, handling, treatment, storage or final disposal of hazardous waste;*

*1(h) the manufacturing, storage or testing of explosives, including ammunition, but excluding licensed retail outlets and the legal end use of such explosives;*

*1(n) the transfer of 20 000 cubic metres or more water between water catchments or impoundments per day*

Given the fact that the study area is located in both Limpopo and Mpumalanga Provinces and the fact that the applicant is Eskom, a State Owned Enterprise, the provincial environmental departments are required in terms of the NEMA Regulations to refer the matter to the national department, i.e. the Department of Environmental affairs & Tourism (DEAT). Hence, DEAT is the competent decision-making authority for this EIA process.

The proposed project may entail various other actions that would also be construed as scheduled activities in terms of Regulation 387 and thus require authorisation. These include:



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;*
6. *The construction of a dam where the highest part of the dam wall, as measured from the outside toe of the wall to the highest part of the wall, is 5 metres or higher or where the high water mark of the dam covers an area of 10 hectares or more;*

Other activities listed in terms of Regulation 386 include:

- 1(m). *Any purpose in the one in ten year flood line of a river or stream, or within 32 metres from the bank of a river or stream where the flood line is unknown, excluding purposes associated with existing residential use, but including canals; channels; bridges; dams; and weirs;*
- 1(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. R. 387 of 2006;*
- 1(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;*
- 1(p). *The temporary storage of hazardous waste;*
- 1(s). *The treatment of effluent, wastewater or sewage with an annual throughput capacity of more than 2 000 cubic metres but less than 15 000 cubic meters;*
4. *The dredging, excavation, infilling, removal or moving of soil, sand or rock exceeding 5 cubic metres from a river, tidal lagoon, tidal river, lake, in-stream dam, floodplain or wetland;*
5. *The removal or damaging of indigenous vegetation of more than 10 square metres within a distance of 100 metres inland of the high-water mark of the sea;*
7. *The above ground storage of a dangerous good, including petrol, diesel, liquid petroleum gas or paraffin, in containers with a combined capacity of more than 30 cubic metres but less than 1 000 cubic metres at any one location or site;*
8. *Reconnaissance, prospecting, mining or retention operations as provided for in the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002), in respect of such permissions, rights, permits and renewals thereof;*
9. *In relation to permissions, rights, permits and renewals granted in terms of 8 above, or any other similar right granted in terms of previous mineral or mining legislation, the undertaking of any prospecting or mining related*

- activating or operation within a prospecting, retention or mining area, as defined in terms of section 1 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002);*
12. *The transformation or removal of indigenous vegetation of 3 hectares or more or of any size where the transformation or removal would occur within a critically endangered or an endangered ecosystem listed in terms of section 52 of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004);*
  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;*
  17. *Phased activities where any one phase of the activity may be below a threshold specified in this Schedule but where a combination of the phases, including expansions or extensions, will exceed a specified threshold*

It is thus clear that the proposed project includes activities listed under Regulations 386 and 387, which has the effect that a Scoping and EIA Application, as prescribed in Regulations 27 to 36 (Scoping and EIA Process – Regulation 387) of the Environmental Impact Assessment Regulations (Regulation 385), will have to be submitted by the applicant.

While other approvals (e.g. DME approval for borrow pits to provide material for the construction of access roads) are likely to be required for this development, construction can only proceed if an environmental approval is granted according to the NEMA regulations. This study is therefore in accordance with Chapter 5 of the NEMA.

All other potential environmental permitting requirements that are potentially applicable to the project including national, provincial and/or local legislation are listed in Appendix B. Specific legal requirements will be expanded upon within the EIA phase of the project.

### **1.3.2 The Constitution of South Africa**

The Constitution of South Africa (No. 108 of 1996) states that everyone has a right to a non-threatening environment and requires that reasonable measures are applied to protect the environment. This protection encompasses preventing pollution and promoting conservation and environmentally sustainable development. These principles are embraced in NEMA and given further expression.

### **1.3.3 Legal requirements in terms of other Acts**

In addition to the NEMA and the Constitution, the following Acts may have some bearing on the proposed activities:

- The National Heritage Resources Act (No. 25 of 1999): The proposed SPSS and associated infrastructure is to comprise certain activities (e.g. changing the nature of a site exceeding 5 000 m<sup>2</sup>) that require authorisation in terms of this Act. The requirements of the National Heritage Resources Act will be addressed as an element of this study. Section 38 (8) of the Act states that if heritage considerations are taken into account as part of an application process undertaken in terms of the ECA, there is no need to undertake a separate application in terms of the national Heritage Resources Act. This is also applicable to applications in terms of NEMA. The Limpopo and Mpumalanga offices of the South African Heritage Resource Agency (SAHRA) will be provided with all relevant documentation, since they have a statutory role to play in the decision-making process, acting as commenting authorities.
- The National Water Act (No. 36 of 1998): Comment will be sought from the Department of Water Affairs and Forestry (DWA), which will then be forwarded to DEAT to consider during their decision-making process. Section 22 (1) of the Act stipulates the conditions under which water use is permitted. Cognisance of these conditions, and any approvals that may be required in terms of these conditions, will be taken as part of the broader project planning and fall outside the scope of this EIA.
- The Minerals and Petroleum Resources Development Act (No. 28 of 2002): Comment will be sought from DME, which will then be forwarded to DEAT to consider during their decision-making process. In order to mine borrow pits to provide material for roads, Eskom will need to apply to DME for a Mining Permit, though it is not at this stage certain whether borrow pits will need to be established as part of this project – should commercial sources of the required material be available, use will be made of these instead of establishing borrow pits. Should borrow pits be required, this application will be made independently of the current EIA process.
- The Air Pollution Prevention Act (No. 45 of 1965): As the proposed activities would entail emissions to the atmosphere, particularly during the construction phase, this Act requires that a permit application be submitted to the Chief Air Pollution Control Officer (CAPCO) by Eskom. However, this Act is scheduled to be entirely replaced by the National Environmental Management: Air Quality Act (see below).

- National Environmental Management: Air Quality Act (No. 39 of 2004): This Act was promulgated in February 2005 but has but has not yet fully come into force. It aims to reform current air quality law and provide national standards regulating the monitoring, management and control of air quality, while at the same time promoting justifiable economic and social development. It requires that Eskom applies for an atmospheric emissions licence. However, in the transition period before this Act is completely enacted, Eskom can apply for a registration certificate in terms of the Air Pollution Prevention Act (see above).

#### **1.4 Environmental Study Requirements**

The environmental studies will follow a two-phased approach in accordance with the EIA Regulations (2006):

- Phase 1: Environmental Scoping Study
- Phase 2: Environmental Impact Assessment (EIA)

This Environmental Scoping Study identifies and evaluates potential environmental impacts associated with all aspects of the proposed project. In terms of the EIA Regulations, *feasible* alternatives have been evaluated within this Scoping Study, which drew on the findings of the ESI as conducted by BKS (refer to Chapter 2 and Chapters 6 to 8). Recommendations regarding a feasible preferred site for the development, as well as further studies required within the EIA phase of the project have been made (refer to Chapter 8).