

## 10. CONCLUSIONS, RECOMMENDATIONS AND WAY FORWARD

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### 10.1 Need for the project

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***It is concluded that*** the need for additional base-load electricity capacity in South Africa is ***required to meet the growing demand. This need is firstly based on the*** reserve margin (the difference between maximum generating capacity and demand), ***which*** has been steadily declining over the last decade, and in spite of the current stable conditions (after load shedding in late 2007 and early 2008), the country's reserve is still below the ideal ***of 15%.*** ***Secondly, a*** continuing ***increase*** in electricity demand indicates that South Africa ***will*** need an additional 40 000 MW of new generation capacity by 2025. ***It is furthermore concluded there is a need for a portion of that base load generation to be nuclear power. The Integrated Resource Plan, accepted by the South African Cabinet in 2011, indicates the need for an additional 9 600 MW of nuclear power.***

Of ***the additional 40 000 MW required by 2025***, 12 476 MW is already under construction in the form of the Medupi and Kusile coal-fired power stations, the return to service of coal fired power stations and the Ingula pumped storage scheme. This leaves around 25 000 MW, which must be generated from additional sources. There are a number of sources available to South Africa, including demand side management, renewable energy and base-load power generation. ***However, the only generation alternatives that can provide a reliable and sufficient base load*** generating capacity are coal-fired and nuclear electricity generation.

South Africa is already heavily reliant on coal-fired electricity generation, and needs to limit its reliance on coal in order to reduce its greenhouse gas emissions. Eskom has indicated its intention is to reduce the utilities' relative CO<sub>2</sub> footprint until 2025, and thereafter to continually reduce absolute emissions in support of national and global targets. ***Nuclear power is the only large-scale source of base load that can contribute to this reduction.*** In life-cycle terms, nuclear power releases approximately the same amount of greenhouse gases as renewable power ***technologies*** such as wind and solar power. Nuclear power will therefore form an important part of Eskom's strategy to increase base load generation capacity and to reduce its greenhouse gas emissions.

Although it ***is Eskom's stated*** intention is to construct more than one nuclear power station, this EIA ***application*** is for a single power station of a maximum capacity of 4 000 MW ***at one of the three alternative sites considered in this EIA. Any further nuclear power station located at any of the three currently considered alternative sites, will be subject to a new EIA process.***

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### 10.2 Alternatives

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#### 10.2.1 Site alternative

***Provided that the SAHRA deems that the potential impacts on heritage resources at the Thyspunt site are acceptable it is concluded that all three sites are environmentally acceptable for a nuclear power station. The Thyspunt site is considered the preferred site and it is recommended that it be authorised by the DEA (with conditions) for Nuclear-1. Eskom must ensure that the required mitigation measures, particularly with regards to the mitigation of heritage impacts are effectively implemented. The pending authorisation from the SAHRA for test excavations at Thyspunt, as well as the findings of the test excavation, are critical in this regard. It is therefore recommended that this***

*additional excavation (once approved by SAHRA) must commence as soon as possible and that the results thereof must inform the development of the Thyspunt site.*

#### **10.2.2 Generation alternatives**

*It is concluded that nuclear generation is a necessary part of the South African energy mix and that it is not reasonable to conclude that another technological alternative for base load power generation should be recommended instead of nuclear electricity generation. This conclusion does not preclude the development of renewable energy technologies and it is recommended that Eskom should continue to pursue both nuclear generation and renewable generation in parallel, as is the case currently.*

#### **10.2.3 Modes of transport during construction**

*It is recommended that road transport should be the only solution for the transports of heavy loads from the harbours for Duynefontein and Thyspunt. It is concluded that transport by barge to the Bantamsklip site is rejected as an alternative, as it would result in unacceptable high impacts on the sensitive coastline.*

#### **10.2.4 Fresh water supply alternative**

*It is concluded that sufficient surface water or groundwater resources for construction and operation of the power station are not available at any of the three alternative sites and use of such resources by the power station would compromise other existing users of such resources. It is recommended that water supply through desalination should be used for construction and operation at all three alternative sites. Groundwater will be used only for a short period up to the point when the desalination unit is in operation.*

#### **10.2.5 Utilisation of abstracted groundwater**

*It is concluded that the disposal of abstracted groundwater to the sea is the only feasible option at all three alternative sites.*

#### **10.2.6 Disposal of brine**

*It is concluded that the disposal of brine directly into the sea is acceptable for the construction phase only. It is recommended that brine should be co-disposed into the sea with cooling water during the operational phase and that it should be disposed into the surf zone (as per the recommendations of the marine specialist) during the construction phase to maximise mixing and dilution.*

#### **10.2.7 Intake of seawater**

*It is concluded that tunneled intake structures for cooling water are environmentally acceptable for all three alternative sites.*

#### **10.2.8 Release of cooling water and effluent**

*It is concluded that offshore deep outlets are required at the Bantamsklip and Duynefontein sites. This is particularly important at Bantamsklip in order to mitigate impacts on abalone. It is further concluded that a shallow (5 m deep) nearshore release point for cooling water is environmentally acceptable at Thyspunt, as it would not result in significant impacts on chokka squid.*

#### **10.2.9 Management of spoil**

*It is recommended that spoil should be pumped to offshore marine disposal sites at all three alternative sites. It is recommended that the distances from shore and the pumping rates must comply with the recommendations of the Marine Impact*

*Assessment (Appendix E15). Any surplus spoil can be used for filling or other construction activities on the site or it could be sold commercially, provided that the transport of the spoil on site does not result in additional secondary impacts. It is recommended that the transport of spoil to the HV Yard at Thyspunt by conveyor belt should not be authorised.*

#### 10.2.10 No-go alternative

*It is concluded that the no-go alternative is not feasible and reasonable and this alternative is not recommended.*

#### 10.2.11 Additional power stations per site

*It is concluded, based on the ecologically and other sensitive areas on each of the alternative sites, that no further power stations beyond Nuclear-1 should be developed on any of the alternative sites identified for Nuclear-1. The available suitable areas for the power station footprints, based on current knowledge, are not sufficient for expansion of a nuclear power station beyond the current application for 4 000 MW. Nuclear power stations beyond Nuclear-1 may be built on the remaining sites, providing that the necessary EIA is undertaken and that authorisation is obtained.*

#### 10.2.12 Coega as an alternative site

*It is concluded, as indicated in Chapter 5 of this EIR, that Coega cannot be regarded as a feasible and reasonable alternative for Nuclear-1.*

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### 10.3 Key mitigation measures and conditions of authorisation

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The findings of the technical specialist studies undertaken within this EIA provide an assessment of both the benefits and potential negative impacts anticipated as a result of the proposed project. Collectively the specialists agreed that there are no environmental fatal flaws at any of the three alternative sites that should prevent the proposed project from proceeding, provided that the recommended mitigation and management measures are implemented.

It is imperative that the recommendations for mitigation contained in this EIR, the specialist studies and the Environmental Management Plan (EMP) be strictly implemented. The mitigation measures for botanical impacts, vertebrate and invertebrate fauna, wetlands and heritage resources are particularly important. Mitigation of heritage impacts particularly will require the work of a site-specific team dedicated to excavations over a period of several **months** prior to the onset of construction. It will also be important to involve qualified and experienced botanical, vertebrate **fauna**, invertebrate **fauna**, dune geomorphology and heritage specialists **to fine-tune the location of the power station on the site**.

In order to achieve appropriate environmental management standards and ensure that the findings of the environmental studies are implemented through practical measures, the recommendations from this EIA have been included within an EMP (in compliance with the NEMA Regulation 34) which has been included in **Appendix F**. This EMP should form part of the contract with the contractors appointed to construct the proposed nuclear power station and ancillary infrastructure. The document should be used to ensure compliance with environmental specifications and management measures during all phases of the proposed project. The implementation of this EMP for all life cycle phases (i.e. construction, operation and decommissioning) is essential.

The EMP is a dynamic document and as new information becomes available over time, or as lessons are learnt in the implementation of the EMP's recommendations, the EMP must be updated.

### **10.3.1 All sites**

*The following key mitigation measures are recommended and are common to all three of the alternative sites:*

- *An environmental monitoring committee must be established to act as a liaison channel between Eskom, the authorities and I&APs. The Terms of Reference for such a body are specified in the Environmental Management Programme.*
- *A “walk down” assessment, involving competent and experienced specialists must be undertaken prior to construction to ensure that the placement of the power station and associated infrastructure (including access roads, transmission lines and the HV Yard) are placed optimally to prevent and mitigate key environmental impacts.*
- *The layout of the proposed power station and HV Yard must not extend outside the identified recommended footprint of 174 ha at Thyspunt). Strictly no clearance of vegetation or development of access roads (besides those that have already been assessed in this EIA) may occur outside these recommended footprints.*
- *Rehabilitation must be implemented in a phased manner directly after construction.*
- *A vegetation search and rescue and relocation plan, an alien and fire management plan along with a Rehabilitation Plan (based on the specification provided in the annexure to the specialists report) is to be finalised during the final design stage prior to construction.*
- *Construction of the power station is subject to Eskom's acquisition of a number of other authorisations. No construction may commence before all applicable authorisations have been obtained. Authorisation from the SAHRA for test excavations of the central portion of the recommended footprint at Thyspunt is critical in this regard. If, and when, this authorisation is given and the excavation undertaken the results need to be provided to the SAHRA and their decision obtained and forwarded to the DEA to informing their final decision.*
- *Recommended further monitoring with respect to invertebrate species needs to continue on all alternatives sites, in line with the recommendations of the Invertebrate Assessment (Appendix E 14) and Eskom's consequent Terms of Reference for the monitoring,*
- *The remaining portion of the site that is not developed needs to be managed as a de facto nature reserve, Upon decommissioning of the nuclear power station, an agreement could be reached with an appropriate formal conservation body (e.g. SanParks or the relevant provincial conservation body) for transfer of the site to such a body.*
- *Various baseline monitoring programmes (e.g. terrestrial vertebrate fauna and marine monitoring), as specified in the respective specialist reports, must be implemented well before the start of construction to ensure that pre- and post-construction environmental conditions can be compared.*
- *Eskom must ensure that the EMP is updated with any relevant conditions of authorisation. This includes conditions imposed by other authorities such as the SAHRA, the Department of Water Affairs, local authorities, etc.*
- *An independent Environmental Control Officer (ECO) must be appointed to monitor Eskom and the contractor's adherence to the construction EMP and to report non-compliance to the DEA.*
- *The recommendations of the Marine Assessment (Appendix E15) and Oceanographic Assessment (Appendix E16) must be strictly followed with respect to the depth and pumping rates for marine spoil disposal.*
- *A 200 m buffer strip from the high water mark must be strictly observed at the site. No development or clearing, apart from limited temporary access roads to the beach for construction of the marine infrastructure, may be allowed within*

*this buffer zone. The placement of such access roads must be determined in consultation with a team comprising an experienced and competent heritage practitioner, botanist, faunal specialist and invertebrate specialist.*

- *Eskom must enter into negotiations with local authorities and other relevant authorities well before the start of construction to identify how it can be ensured that municipal services are capable of providing sufficient capacity for the expected influx of people into the affected area. Agreement must be reached between Eskom and these bodies on the apportionment of financial responsibility for infrastructure upgrades.*

### **10.3.2 Duynefontein**

*The following key mitigation measures are recommended at the Duynefontein site:*

- *Mitigation for heritage resources needs to be focused on the excavation of paleontological resources in the excavation of the proposed power station.*
- *The power station footprint must be placed to the east of the transverse mobile dunefield. Additional site investigations by a team of competent and experienced biophysical specialists may be necessary to ensure that a suitable position outside the transverse dunefield is confirmed.*

### **10.3.3 Bantamsklip**

*The following key mitigation measures are recommended at the Bantamsklip site:*

- *None of the site north of the R43 may be developed.*
- *Mitigation of impacts on heritage sites is an absolute priority at this site. In order to achieve effective mitigation, the following conditions need to be in place:*
  - *A suitably qualified and experienced heritage impact assessment practitioner must compile a comprehensive heritage mitigation plan for the site.*
  - *Eskom must make the necessary resources available to give effect to the mitigation plan. Steps that may need to be taken include the development of the necessary resources in South Africa through support for academic institutions, or the importation of heritage excavation resources if the resources are not available in South Africa.*
  - *On-site curation and interpretation facilities need to be provided and sufficient resources need to be provided for the ongoing maintenance of these facilities throughout the operational life span of the proposed power station.*
  - *Excavation in an area needs to be complete prior to the commencement of clearing for construction purposes. In this respect, the construction of the power station could be phased to happen in parallel to excavations, but it must be ensured that excavation is complete before construction starts.*
- *Mitigation of impacts on marine organisms must be followed strictly in order to ensure that impacts on abalone are avoided. This specifically includes the depth and rate of outflow of the warmed cooling water pipeline.*
- *Declaration of a marine exclusion zone is key for the protection of abalone.*
- *The power station footprint must strictly avoid limestone areas on the site.*

### **10.3.4 Thyspunt**

*The following key mitigation measures are recommended at the Thyspunt site:*

- *Mitigation of impacts on heritage sites is a priority at this site. In order to achieve effective mitigation, the following conditions need to be in place:*

- *A suitably qualified and experienced heritage impact assessment practitioner must conduct excavations in the central portion of the power station footprint and along the routes of the proposed access roads in order to confirm the significance of the heritage resources in the areas where sampling was not possible during the initial investigation.*
- *Pending SAHRA's acceptance of the findings of these excavations, a comprehensive heritage mitigation plan must be drawn up by the appointed heritage specialist.*
- *Eskom must make the necessary resources available to give effect to this mitigation plan. Steps that may need to be taken include the development of the necessary resources in South Africa through support for academic institutions, or the importation of heritage excavation personnel if the resources are not available in South Africa.*
- *On-site curation and interpretation facilities need to be provided and sufficient resources need to be provided for the ongoing maintenance of these facilities throughout the operational life span of the proposed power station.*
- *Excavation in an area needs to be complete prior to the commencement of clearing for construction purposes. In this respect, the construction of the power station could be phased to happen in parallel to excavations, but it must be ensured that excavation is complete before construction starts.*
- *Wetland mitigation measures that must be taken include the following key measures:*
  - *Properties currently outside the Eskom-owned areas as specified by the wetlands specialist need to be acquired by Eskom for incorporation into the conserved area of the Eskom property. The acquisition of the Langefonteinvelei wetland is critical in this respect.*
  - *A suitable hydrological cut off wall must be installed prior to groundwater drawdown to ensure that the impacts of groundwater drawdown on wetlands are mitigated.*
  - *Monitoring of groundwater levels must continue through the construction phase in order to determine the effectiveness of mitigation measures.*
- *No development (apart from the construction of the transmission lines between the power station and the HV Yard) is allowed within the Oyster Bay mobile dunefield. Construction of pylons and stringing of lines must be undertaken by helicopter (provided that safety considerations allow this). No permanent access roads may be constructed through the dunefield, and access for maintenance purposes during operation of the power station must be done with lightweight vehicles.*
- *Access to the site by Ultra Heavy and Heavy Vehicles should be by way of an access road developed around Humansdorp. No access for these vehicles must be allowed through the Humansdorp Central Business District.*

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## 10.4 Way forward

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As previously stated in this **Revised** Draft EIR, the NNR is mandated by the National Nuclear Regulator Act (NNRA, Act No. 47 of 1999) to provide for the protection of persons, property and the environment against nuclear damage through the establishment of safety standards and regulatory practices. In accordance with Section 21 of the NNRA, Eskom is required to submit a formal application to the NNR for a nuclear installation license for the siting, construction, operation, decontamination and decommissioning of a nuclear power station. The Act makes provision for the NNR Board to arrange for public hearings pertaining to health, safety and environmental issues related to the specific application.

In terms of the Constitution of the Republic of South Africa (Act No. 108 of 1996) and the National Environmental Management Act, the DEA is responsible for assessing the impacts of the power station on the environment. In recognition of the dual but distinct responsibility with respect to the assessment of radiation hazards, the NNR and the DEA have signed a co-operative agreement in which it is agreed that the DEA, the lead authority on environmental matters, and NNR will work in close collaboration on the assessment of nuclear-related matters. With respect to this EIA, specialist studies relating to radiological issues have been included for information **and will assist the DEA in decision-making based on input from the NNR.**

This **Revised** Draft EIR has been distributed for comment to all registered I&APs for **comment**. A number of public interactions will be held during the comment period on the **Revised** Draft EIR (see **Appendix D** for adverts and letters advising registered stakeholders of the Public Meetings, as well as invitations to the Key Stakeholder Meetings). All comments on the document will be considered by Arcus GIBB and a response thereto will be provided in a revised Issues and Response Report (IRR), prior to submission of the Final EIR to the DEA for decision-making.

It is anticipated that Eastern Cape **DEAET** and the Western Cape **DEA&DP**, as well as the NNR (amongst other Government Departments), would provide comment to the DEA on the adequacy of the Final EIR. The DEA will consider these comments prior to making a decision on the acceptability of the proposed Nuclear-1 project. All I&APs will be notified of the availability of the Final EIR for information purposes, as well as of the DEA's decision.

***Should the DEA authorise the proposed nuclear power station, it is recommended that it be authorised strictly according to the conditions as indicated above and according to the requirements of the EMP. Should some of the required mitigation measures not be implemented prior to the start of construction, as recommended (e.g. the conditions with respect to excavation of archaeological and palaeontological sites), then construction should not be allowed to commence.***

***Should there be any substantive changes to the design of the proposed power station after submission of the Final EIR to the DEA for decision-making, a re-assessment of the environmental impacts may be required. The assumptions with respect to technical details of the power station (as detailed in the Consistent Dataset – Appendix C) are key in this respect. Once a nuclear power station vendor has been identified, it must be confirmed that the specifications of the power station continue to conform to the Consistent Dataset, which acted as the basis for this EIA process. It is recommended Eskom must provide such confirmation to the DEA well prior to construction of the power station.***