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11 CONCLUSIONS, RECOMMENDATIONS AND WAY FORWARD

11.1 Need for the project

It is concluded that, as per the discussion in Chapter 4 of this report, the need for additional base-load electricity capacity in South Africa is required to meet the projected long term 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, early 2008 and frequent occurrences recently in 2014 and 2015) the country's reserve is still below the ideal of 15%. It is furthermore concluded that there is a need for a portion of the 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 (by early 2015 one unit was connected to the grid already) and Kusile coal-fired power stations, the return to service of previously mothballed coal fired power stations and the Ingula pumped storage scheme. This leaves around 25 000 MW deficit, which must be generated from other energy sources. There are a number of energy sources available to South Africa, renewable energies, gas and nuclear. However, the only generation alternatives that can provide a reliable and sufficient base load generating capacity are coal-fired and nuclear electricity generation in South Africa currently.

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 and risk exposure of coal as a sole base load energy source. Eskom has indicated its intention is to reduce the utilities' relative CO₂ footprint until 2025, and thereafter to continually reduce absolute emissions in support of national and global targets. Nuclear power is the only large-scale energy source for base load electricity generation 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 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 two alternative sites considered in this Final EIR. Any further nuclear power station located at any of the two currently considered alternative sites, will be subject to a new EIA process.

11.2 Alternatives

11.2.1 Site alternative

It is concluded that both sites are environmentally acceptable for the construction and operation of 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 are effectively implemented. It is important to remember that none of the specialist assessments identified fatal flaws at any of the remaining sites, and both the proposed sites remain viable sites for nuclear power station development, either for Nuclear 1, which is now proposed, or for some future power station. As such, the site selected is the one that provides the greatest immediate return from an electricity supply and economic development point of view. Thyspunt will strengthen the eastern grid and help create a generation center along the east coast.

11.2.2 Generation alternatives

It is concluded that nuclear generation is a necessary part of the South African energy mix (as per the approved IRP 2010). 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.

11.2.3 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.

11.2.4 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 both of the alternative sites and use of such resources by the power station would compromise other existing users of such resources. It is therefore recommended that water supply through desalination should be used for construction and operation at the alternative sites. Groundwater will be used only for a short period up to the point when the desalination unit is in operation.

11.2.5 Utilisation of abstracted groundwater

It is concluded that the disposal of abstracted groundwater to the sea is the most feasible option at the alternative sites. However, based on the amount of available space of low environmental sensitivity on the sites it may be possible to allow for some storage of groundwater for other uses on site.

11.2.6 Disposal of brine

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.

11.2.7 Intake of seawater

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

11.2.8 Release of cooling water and effluent

It is concluded that offshore deep outlets are required at the Duynefontein site. 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.

11.2.9 Management of spoil

Based on the findings of the oceanographic modelling (Prestedge et al. 2009) and the marine impact assessment (Appendix E15), it is proposed that as much as possible fine spoil must be disposed of in the marine environment, according to the recommendations of the marine sediment study and the marine biology study. The recommendations of these studies with regards to the distance offshore and pumping rates must be strictly adhered to. The remainder, which cannot be pumped to sea, must be used for activities like levelling of the HV Yard to the greatest extent possible, to avoid the need to dispose of spoil in discard dumps on land (applicable to Thyspunt only). A recommendation is also made that the disposal of spoil

to the beaches of St. Francis Bay be investigated as this could be used to address the current problem of beach loss and mitigate spawning ground loss related to chokka squid.

11.2.10 No-go alternative

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

11.2.11 Additional power stations per site

The area of the footprint assessed in this EIA makes provision for the potential future expansion of the power station, should this be environmentally or technically feasible at that stage. It is estimated that the total footprint required for Nuclear-1 (4 000 MW) (this application) is 200 to 280 hectares and the current application for Environmental Authorisation is therefore for 4 000 MW only. If it were to be considered to add nuclear units or an entirely new power station, such additions would be subject to a separate EIA process.

It must be emphasized that the current application is for a single nuclear power station of two to three units with a total installed capacity not exceeding 4 000 MWe. The cumulative impacts of any additional nuclear power stations or additional nuclear units on a particular site (if authorised) would have to be confirmed in a new EIA process prior to any further development. If it were to be considered to add nuclear units or an entirely new power station, such additions would be subject to a separate EIA process.

11.2.12 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 the current Nuclear-1 application for Environmental Authorisation.

11.3 Key mitigation measures and conditions of authorisation

The findings of the technical specialist studies undertaken within this EIA provide an assessment of both the environmental 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 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 with particular importance to the 200 m setback corridor along the coastline. This is of specific relevance to the areas where disturbance will occur along the coastline such as the establishment of beach wells, inlet and outlet pipes etc.

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.

11.3.1 **All sites**

The following key mitigation measures are recommended and are common to both of the alternative sites:

- An environmental monitoring committee must be established to act as a liaison channel between Eskom, the authorities and I&APs.
- 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 225 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.
- The remaining portion of the site that is not developed needs to be managed as a de facto conservation area. Upon decommissioning of the nuclear power station, Eskom should continue to manage the site as a conservation area and should an opportunity arise for an agreement to be reached with an appropriate formal conservation body (e.g. SanParks or the relevant provincial conservation body), Eskom should enter negotiations with 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 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.
- Should the proposed NPS be authorised then it is proposed that a condition of authorisation be the development of a Social Impact Management Plan (SIMP) which highlights key social vulnerabilities and gives a detailed review of the social circumstances that unfolded at the applicant's other current mega-projects namely Ingula, Medupi and Kusile. The plan must be managed through the environmental monitoring committee.
- 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 prior to construction.

11.3.2 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. A dune botanical specialist should be consulted to confirm that the final position of the power station is outside of the transverse dune field.

11.3.3 Thyspunt

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

- Wetland mitigation measures that must be taken include the following key measures:
 - 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.
- A recommendation is also made that the disposal of spoil to the beaches of St. Francis Bay be investigated as this could be used to address the current problem of beach loss and mitigate spawning ground loss related to chokka squid.

11.4 Way forward

As previously stated in this Final EIR, the NNR is mandated by the National Nuclear Regulator Act, 1999 (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 Final Environmental Impact Assessment Report has been distributed for comment to all registered I&APs) for a period of 60 calendar days. All comments on the document must be submitted directly to the Department and copied to the EAP. All comments on the document will be considered before a decision on the Application for Environmental Authorisation is made. All registered I&APs will be notified of the decision by the Department and both the Applicant and I&APs will be afforded an opportunity to appeal the decision.

Should the DEA authorise the proposed nuclear power station, it must be authorised strictly according to the conditions indicated in this Final EIR. 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.