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1 INTRODUCTION

1.1 Project background

GIBB (Pty) Ltd (hereafter referred to as GIBB) was appointed by Eskom Holdings (SOC) Ltd (hereafter referred to as Eskom) to undertake the Environmental Impact Assessment (EIA) and compile an Environmental Management Plan (EMP) for the construction, operation and decommissioning of the proposed Nuclear-1 power station and associated infrastructure. There are three alternative sites under consideration (refer to **Figure 1-2- Figure 1-5**) that are located in the Northern, Eastern and Western Cape Provinces of South Africa.

In terms of the National Environmental Management Act, 1998 (Act 107 of 1998) (NEMA), section 24C(2), the Department of Environmental Affairs (DEA) is the competent authority as the application for Environmental Authorisation is being applied for by a statutory body (Eskom). As such the DEA must consider and decide on this application in respect of the activities applied for.

In many countries, including South Africa, economic growth and social needs are resulting in substantially greater energy demands, in spite of accelerated energy efficiency advancements. As a result, the increase in demand for power must be met by installing new capacity. Eskom is South Africa's primary power producer and supplier.

To optimally meet the total demand for electricity, it is necessary to have both base-load^{1,2} power stations and peak-load³ power stations in operation. Base-load power stations provide a continuous power supply throughout the day, while peaking power stations (e.g. pumped storage schemes) can typically only supply power during the morning and afternoon peaks. Nuclear and coal-fired power stations are the most feasible options available to South Africa to supply base-load generation capacity. In certain countries gas fired power stations and hydro-stations (including imported hydro) can also be considered as base-load stations, but due to the high price of gas and the limited supply of hydro in South Africa, these are not feasible options (refer to chapter 5).

In terms of the gazetted Integrated Resource Plan (IRP) 2010⁴, South Africa needs to install an additional 40,000 Mega Watt (MW) of generation capacity by 2025, of which the IRP 2010 mandates that 9,600 MW must be nuclear and 11,400 MW must be from renewable sources. Eskom thus proposes, as part of a range of initiatives to increase electricity energy generation mandated by the IRP 2010, to construct and operate the proposed Nuclear-1 nuclear power station with a maximum generation capacity of 4,000 MW. This will be the first of a number of proposed new nuclear power stations to meet the IRP's goal of 9,600 MW of nuclear generation. The current application is for the first of these power stations, which may be located at one of three alternative sites, namely Dwynefontein and Bantamsklip (both in the Western Cape) or Thyspunt (in the Eastern Cape). Locality maps of these sites are shown in **Figure 1-1.** Two alternative sites in the Northern Cape were scoped out in the Scoping Phase of this EIA.

Further detail on the IRP is provided in Chapter 6. Nuclear power generation is part of the mix of the proposed balanced scenario in the approved IRP 2010, together with renewable technologies and imports. Eskom is pursuing nuclear electricity generation as one of a number of generation options, and is in parallel pursuing other options (including renewable energy such as concentrated solar power and wind), as part of the mix of generation technologies.

¹ Power station technology designed specifically to generate electricity continuously for all hours of the day and night

² See Text Box 1

³ Power station technology designed specifically to generate electricity during periods of high demand for electricity, normally on weekdays from 07:00 to 09:00 and 18:00 to 20:00

⁴ See Chapter 4 for a discussion on the IRP 2010

Of the additional 40,000 MW of generation capacity required, 9,565 MW of base load coal and 1,333 MW of pumped storage is already under construction. Further, as of June 2013, more than 80% of the units of the previously mothballed power stations (Komati, Camden and Grootvlei) have been returned to service. Camden, and Grootvlei have been fully commissioned and only one unit still needs to be commissioned at the Komati power station.

Text Box 1: Base load

*Electricity generating units can be classified as **base-load, mid-merit or peaking units**.*

Baseload (or baseload demand):

This is the minimum amount of power that a power generator must make available to its customers, or the amount of power required to meet minimum demands based on reasonable expectations of customer requirements 24 hours per day, every day of the year. Industrial plants, mines, hospitals, and residential customers all contribute to base load needs.

A baseload power plant or base load power station

A baseload power station is an energy plant devoted to the production of baseload supply. Base load plants are usually large steam generating plants that cannot be started and stopped quickly or ramped up and down quickly. Since these are some of the least costly plants to operate, they are usually loaded or dispatched close to their maximum power level. Baseload plants produce energy at a constant rate, usually at a low cost relative to other production facilities available to the system. These plants typically run at all times of the year except in the case of repairs or scheduled maintenance. Examples of baseload plants using non-renewable fuels include nuclear and coal-fired plants. Among the renewable energy sources, hydroelectric, geothermal, biogas and biomass can provide baseload power, but due to the relatively low capacity of these plants compared to coal-fired and nuclear powered plants, and the lack of reliability of supply (e.g. in the case of wind and solar), these plants are seldom used to supply the majority of base load power.

The most cost-effective base load plants are large plants (e.g. nuclear and coal-fired) that provide a majority of the power used by a grid. Base load plants are expensive to build but relatively cheap to operate, whilst peaking plants are relatively cheap to build but expensive to operate.

Mid-merit and peaking units

When the demand exceeds the base-load, the mid-merit units come online. Typically mid-merit units come online in the morning as electricity demand begins to grow and go off-line at night when the demand drops off. Examples in South Africa include the small coal fired stations such as Grootvlei and Komati.

Peaking units are turned on rarely in order to meet the peak load. Examples in South Africa include Open Cycle Gas Turbines (OCGT) and pumped storage

This document is a Revised Draft Environmental Impact Report (EIR) Version 2, which documents the Environmental Impact Assessment (EIA) process that has been undertaken to assess the environmental impacts of the proposed Nuclear-1 power station at any one of the three alternative sites indicated above. In terms of the NEMA and associated EIA regulations (Government Notice Numbers R 385, 386 and 387 of 2006 and R 543, 545 and 546 of 2010 and R982, 983, 984, and 985 of 2014), the proposed development triggers a number of listed activities, which require environmental authorisation before they can proceed.

For the proposed power station the two primary listed activities in terms of Government Notice No. R 387 of 2006 are:⁵

- *(1a) The construction of facilities or infrastructure, including associated structures or infrastructure, for the generation of electricity where the energy generation is greater than 20 Megawatts and the facility exceeds an area of one hectare; and*
- *(1b) The construction of facilities or infrastructure, including associated structures or infrastructure, for nuclear reaction including the production, enrichment, processing, reprocessing storage or disposal of nuclear fuels, radioactive products and waste.*

The transitional provisions of the 2010 EIA Regulations (Regulation 76 of Government Notice No. R 543 of 2010) specify that an application that has been commenced in terms of the 2006 EIA regulations must continue according to the requirements of the 2006 regulations, as if these regulations had not been repealed. Thus, the EIA process is being continued under the provisions of the 2006 EIA regulations. However, the listed activities in terms of the 2010 and 2014 EIA regulations are also being considered in this EIA. The DEA is mandated to authorise listed activities under the 2010 and 2014 EIA regulations in an EIA process commenced under the 2006 EIA regulations, provided that the impacts of the 2010 and 2014 listed activities are assessed in the EIA process.

The EIA process was undertaken in accordance with:

- the requirements of sections 24 and 24D of the NEMA, as read with Government Notices R 385 (Regulations 27-36), R386 and R387 of the NEMA;
- the guidelines provided by the Integrated Environmental Management (IEM) Information Series; and
- Department of Environmental Affairs and Tourism⁶ (DEAT) Guidelines for the Public Participation and the application of the EIA Regulations (DEAT 2006); and
- Various guidelines of the Western Cape Department of Environmental Affairs and Development Planning (DEA&DP).

1.2 Assessment of radiological impacts

In addition to the environmental authorisation in terms of NEMA, the proposed nuclear power station requires another key authorisation from the National Nuclear Regulator (NNR) prior to construction. Furthermore, many other authorisations from various departments, such as the Department of Mineral Resources, the Department of Water Affairs (DWA), the Department of Environment Affairs (DEA), provincial environmental authorities and the South African Heritage Resources Agency, as well as other regulatory authorities such as the National Energy Regulator of South Africa (NERSA) are required prior to construction. The processes associated with the range of legal requirements are documented in Chapter 6 of this report.

The National Nuclear Regulator Act, 1999 (Act No. 47 of 1999) (NNRA) provides for the protection of persons, property and the environment against nuclear damage and mandates

⁵ An analysis of all applicable listed activities is provided in Chapter 6.

⁶ Now Department of Environmental Affairs (DEA)

the NNR to exercise regulatory control related to safety. In terms of Section 20 of the NNRA, no person may site, construct, operate, decontaminate or decommission a nuclear installation, except under the authority of a nuclear installation licence. Section 21 of the NNRA makes provision for a person wishing to engage in any of these activities to apply to the Chief Executive Officer of the NNR for such a licence. However, in terms of the Constitution of the Republic of South Africa, 1996 (Act No. 108 of 1996) ("the Constitution") and the NEMA, the DEA has a responsibility for decision-making regarding the potential impacts of the power station on the environment, even though these impacts are likely to include those relating to certain aspects of the radiological hazards associated with the facility.

In recognition of the dual but distinct responsibility with respect to the assessment of radiation issues, a co-operative agreement (Appendix B4) concluded between the DEA and the NNR was gazetted on 18 July 2008. One of the main purposes of this agreement is to "prevent unnecessary and unavoidable duplication of effort" between the NNR and DEA. The NNR authorisation process applies specifically to issues of nuclear and radiation safety related to the siting, design, construction, operation and decommissioning of nuclear installations. Furthermore, the Director General of the DEA issued a statement in January 2009 (Appendix B4) to further clarify the purpose of the agreement. The statement indicates that nuclear safety, radiation and radiology "are better placed within the regulatory process of the NNRA and that consideration of the same issues in an EIA process will result in unnecessary and avoidable duplication."

In recognition of this agreement, the approach in the EIA, up to and including the Revised Draft EIR that was released for public comment in 2011, was that "Site Safety Reports" prepared as part of the authorisation process for nuclear licensing are included as appendices in the draft EIR, but that radiological issues will not be assessed in detail in the EIA. However, in recognition of requirements in the NEMA, associated legislation such as the Promotion of Administrative Justice Act, 2000 (Act No. 3 of 2000) and other legal precedents that require the consideration of all relevant socio-economic factors in an EIA process, an assessment of radiological impacts of the proposed power station is included in the current version of the EIR. Although this approach of including an assessment of the radiological impacts of the proposed power station results in a risk of duplication between the EIA and the NNR licensing processes, the risk to the EIA in terms of possible appeals, based on the exclusion of substantive issues such as health issues from the EIA process, is regarded as greater than the risk of duplication. The current version of the EIR therefore departs substantially from the approach in the previous versions of the EIR in terms of the consideration of radiological impacts.

In this context, it must be mentioned that the approaches of the EIA process and the NNR licensing process differ substantially. The focus of the EIA process is to assess the potential impacts of radiological releases (including normal operational releases and upset conditions). However, the focus of the NNR licensing process is to demonstrate beyond reasonable doubt that defence-in-depth measures (multiple, redundant, and independent layers of safety systems) employed in the proposed power station design and operation are sufficient to reduce the probability of a failure leading to core meltdown or a failure of reactor containment to acceptable and highly-unlikely levels. Thus, the EIA process focuses on the consequences of radioactive releases. The NNR licensing process also focuses on consequences but is also designed to reduce the probability of such releases.

⁷ The Emergency Response Assessment, Site Access Control Report and Human Health Risk Assessment

1.3 Summary of the Environmental Authorisation process for the proposed nuclear power station

The EIA process as legislated by the NEMA EIA Regulations governed by the NEMA is indicated in **Figure 1-1**. The environmental authorisation process is the responsibility of the DEA, with the relevant provincial environmental authorities serving as commenting authorities. The Eastern Cape Department of Economic Affairs Environment and Tourism (DEAE&T) and Western Cape Department of Environment Affairs and Development Planning (DEA&DP) are required to review the Environmental Impact Reports (EIRs) and provide comments and recommendations to the DEA.

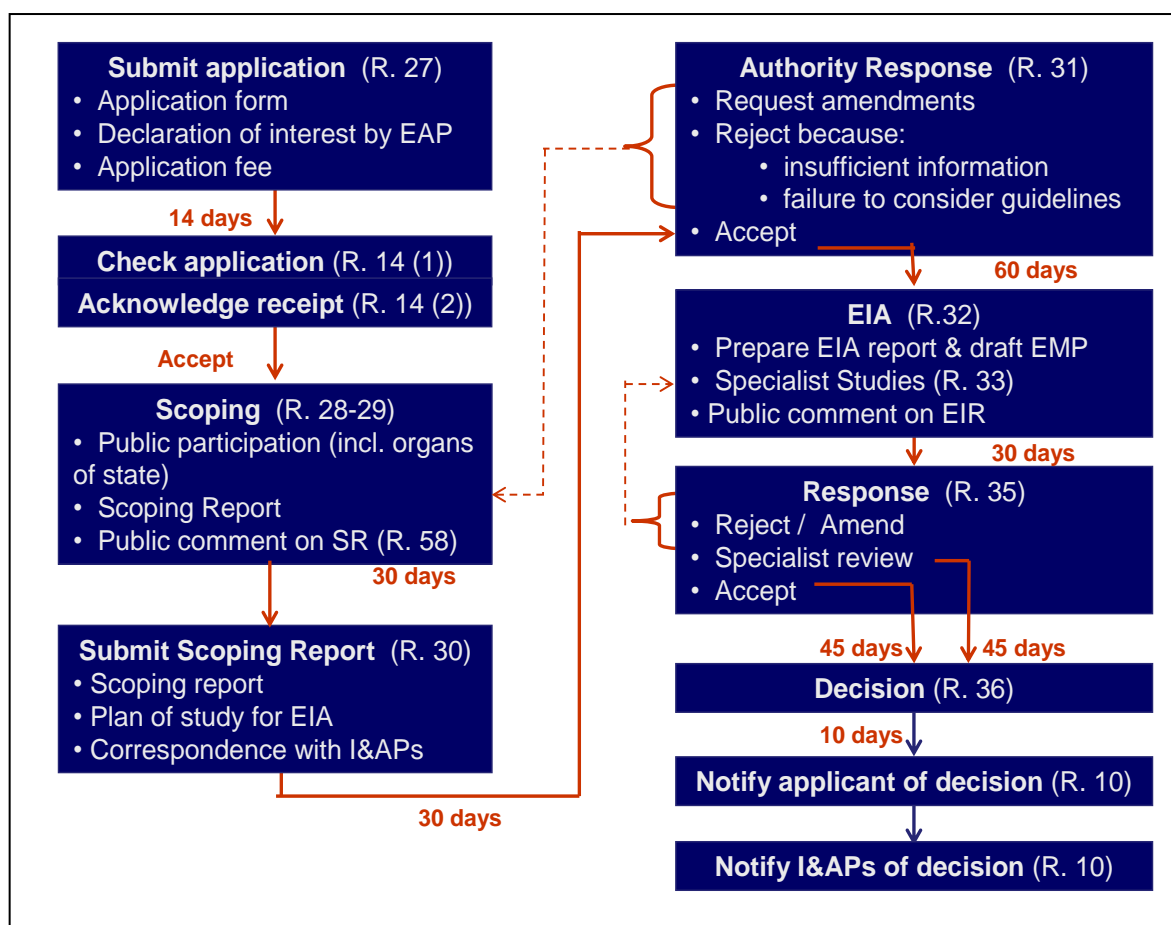


Figure 1-1: EIA Process as prescribed by the NEMA 2006 EIA Regulations (R refers to Regulation numbers)

The details of the EIA process for the power station and associated infrastructure are outlined below.

1.3.1 Original application for a nuclear power station

The original application⁸ submitted to the then DEAT in May 2007, and the amended application dated July 2008, was an application to commence with an EIA process for the proposed construction, operation and decommissioning of a single nuclear power station, referred to as “Nuclear-1”. During the Scoping Phase of the environmental authorisation process, five sites were assessed as alternative sites and were compared in order to identify a single preferred site for the location of Nuclear-1.

The Scoping Phase of the EIA highlighted that two alternative sites i.e. Brazil and Schulpfontein, would not constitute reasonable and / or feasible site alternatives for Nuclear-1 based on limited local demand and the lack of existing electricity transmission corridors associated with these sites, coupled with the severe time constraints associated with Nuclear-1’s development. Eskom Transmission Planning Division performed high level studies of the integration into the South African electricity supply system of a large power station at each of the five coastal sites (**Appendix E28**). These studies included an assessment of the contribution to the transmission network stability, the contribution of the electricity supply to and the distance from the major load centres, the transmission infrastructure that would be required and the time required for the integration at each of the respective sites.

Thus, Brazil and Schulpfontein have been excluded from further consideration in the EIA Phase⁹ of the EIA process. However, the Scoping Report explicitly stated that the exclusion of Brazil and Schulpfontein from the EIA Phase did not preclude Brazil and Schulpfontein from the development of power stations in future.

DEA’s comments on the Final Scoping Report, dated 19 November 2008 (**Appendix B2**), accepted the recommendation to exclude Brazil and Schulpfontein from further assessment during this EIA Phase of the EIA.

It has always been Eskom’s intention to prepare for more than one nuclear power station. It was stated from the onset of the EIA process that all original five sites identified during the Nuclear Site Investigation Programme (NISIP) will be considered for the development of power stations, as far as they are deemed feasible by the EIA process. This is part of the long-term power generation strategy for South Africa. Although the initial application for a nuclear power station was for a single site, during 2009 Eskom announced its intention to amend the application in order to apply for authorisation of for three sites (Duynefontein, Bantamsklip and Thyspunt). The rationale for a combined application for all three sites was based on Eskom’s decision to pursue its strategy to develop a fleet of nuclear power stations on the sites identified through the Nuclear Site Investigation Programme. The intention to submit a combined application was based on the probable amendment of the EIA regulations¹⁰, which was expected to be promulgated in late 2009 and was eventually promulgated in June 2010.

After due consideration, Eskom decided not to pursue an application for the construction of more than one nuclear power station in this EIA. **This application is therefore progressing as per the original application for authorisation of a single site.** However, in line with the IRP’s requirement for 9,600 MW of nuclear generated electricity, an application for additional

⁸ The submission of an application to the competent authority is the first step in the EIA process. The application is made in order to register the project with the competent authority and obtain permission to proceed with the EIA process.

⁹ “EIA Phase” has been used interchangeably with “Impact Assessment Phase” throughout this document and in the Issues and Response Reports (IRRs).

¹⁰ Section 15(2) of the proposed amendments to the EIA regulations stated: “If an applicant intends undertaking more than one activity of the same type at different locations within the area of jurisdiction of the competent authority, different applications in respect of the locations must be submitted, but the competent authority may, at the written request of the applicant, grant permission for the submission of a single application in respect of all those activities, whether or not the application is submitted on one or more application forms.”

nuclear power stations may be submitted by Eskom soon after the submission of the Final Environmental Impact Report for Nuclear-1.

The potential roll out dates of the planned nuclear power stations will be based on the authorisations granted, national electricity demand forecast, availability of funding and lead times of vendors.

1.3.2 Scoping Phase

(a) Objectives and process

The objectives of the Scoping Phase were to:

- Identify the important characteristics of the affected environment;
- Identify the issues and potential impacts of the project on the biophysical and socio-economic environment and associated mitigation measures;
- Ensure that feasible alternatives are identified and selected for further assessment;
- Focussing the EIA Phase on the identified feasible alternatives and significant issues;

The Scoping Report was compiled in accordance with the following content requirements:

- Details and expertise of the Environmental Assessment Practitioner (EAP) undertaking the EIA process;
- A description of the proposed locations for the activity along with all applicable alternatives;
- A description of the environment that may be affected by the activity and the manner in which the physical, biological, social, economic and cultural aspects of the environment may be affected by the proposed project;
- Identification of all relevant legislation and guidelines that have been considered for the project;
- Description of the environmental issues and potential impacts, including cumulative impacts that have been identified;
- Description of the methodology to be adopted in assessing the environmental impacts, including any specialist studies that will be undertaken;
- Providing an outline of the Public Participation Process (PPP) that has been undertaken for the project; and
- Providing a Plan of Study (PoS) for EIA.

(b) Key environmental impacts identification

The EIA project team, comprising GIBB (as lead consultants) and specialists, undertook site inspections to each of the sites in order to obtain an overview of the potential risks and key impacts associated with the proposed power station. Risks and key impacts associated with the construction, operational and decommissioning phases were identified in consultation with the comments received from Interested and Affected Parties (I&APs), and included the following key issues:

- Geological and geotechnical suitability;
- Depth of water table and associated dewatering requirements as well as the implications for surrounding and downstream water users;
- Source of water supply for construction and operations of the nuclear power station;
- Disturbance and disruption of terrestrial ecological processes such as loss of habitat and associated flora and fauna.
- The disruption of faunal migration patterns between the coast and inland as well as mobile dunes;
- Marine ecology disturbance through requirements for cooling water, the potential for

- desalination and activities associated with the disposal of brine;
- Health, safety and security of the site as well as limitations on surrounding land use;
- Changes to community structures through the influx of workers and associated infrastructural requirements;
- Change in tourism activities;
- Visual disturbance;
- Loss of heritage and cultural resources;
- Loss of high potential agricultural soils;
- Wind-generated dust;
- Construction of required facilities and infrastructure associated with accessibility to the site, transport and integration of the generated power into the networks;
- Security; and
- Waste handling and management.

Potential positive impacts identified during the process included:

- Improved generation capacity in the Cape region and South Africa as a whole, which could stimulate much-needed local economic growth and reduce current power shortages;
- Potential establishment of formal conservation areas on Eskom-owned land;
- Significantly lower Green House Gas (GHG) emissions when compared with that of coal-fired power stations; and
- Direct economic injection into the local economies.

The significance of the potential impacts identified during the Scoping Phase, has been assessed during the detailed assessment phase of the EIA process, and documented in Chapters 10 and 11 of this Revised Draft EIR Version 2.

In addition, the Scoping Phase highlighted a range of alternatives for the proposed project. These were taken forward for further consideration in the EIA Phase, as documented in Chapter 5 of this Revised Draft EIR Version 2.

(c) Public review of the Scoping Report

All registered I&APs were advised of the availability of the Draft Scoping Report (DSR) and were provided with an opportunity to review and submit comments on the report. An extensive set of public open days was held to enable I&APs to discuss the findings of the DSR with the Environmental Assessment Practitioners (EAPs).

(d) Finalisation and submission of the Scoping Report

I&AP comments were integrated into an updated Issues and Response Report (IRR) and the Final Scoping Report (FSR). The FSR and Plan of Study for EIA were submitted to the DEA and the Northern, Eastern and Western Cape provincial environmental authorities for consideration. The FSR was also made available to the public for information purposes. The DEA approved the Final Scoping Report on 19 November 2008 (**Appendix B2**) in accordance with regulation 31(1)(a) of the EIA regulations.

(e) Revised Plan of Study for EIA

Section 31(1)(b) of the EIA regulations states that the competent authority must consider a Scoping Report and in writing, *“request the EAP to make such amendments to the report or the plan of study for environmental impact assessment as the competent authority may require”*. Accordingly, DEA requested that the Plan of Study for EIA be revised. The Plan of Study for EIA was revised accordingly by incorporating DEA’s comments. The revised Plan of Study was placed in the public domain for a period of 30 calendar days for I&APs to review the document and provide comments.

In addition the revised Plan of Study for EIA served as a mechanism to communicate Eskom's intention to amend the original application for environmental authorisation submitted to the DEA in May 2007 (which application was again amended in July 2008) to apply for all three sites. As indicated in Section 1.2.1, such a combined application is no longer being pursued and the application has reverted back to an application for a single site.

1.3.3 Impact Assessment Phase

The purpose of the EIA Phase of an EIA is as follows (DEAT 2005):

- Address issues that were raised during the Scoping Phase;
- Assess alternatives to the proposed activity in a comparative manner;
- Assess all identified impacts and determine the significance of each impact; and
- Formulate mitigation measures.

Comprehensive specialist studies were undertaken during the EIA Phase of the EIA process. These specialist studies provided an in-depth understanding of the potential positive and negative impacts of the proposed development on the social, biophysical and economic facets of the environment. Terms of Reference for specialist studies were formulated taking cognisance of comments received during the public participation process to date. Specialists were required to assess and rate potential impacts in terms of a rigorous and standardised assessment methodology, in order to ensure that potential environmental impacts have been adequately investigated and that any relevant shortcomings and / or gaps can be addressed. This includes consideration of uncertainty in predicting impacts and potential cumulative effects. Specialists were also required to consider and recommend appropriate mitigation measures in the light of their likely effectiveness and practicality.

The findings of the specialist studies have been integrated and evaluated in the Revised Draft EIR and Revised Draft Environmental Management Programme (EMP). The Draft EIR was provided for public comment on 6 March 2010, and based on requests received from I&APs, the comment period was progressively extended to 30 June 2010, providing a total comment period of 116 calendar days. A number of public interactions were held during the comment period on the Draft EIR (Refer to Chapter 7).

1.3.4 Review of Revised Draft EIR and Revised Draft EIR Version 2

During the above-mentioned comment period, the EIA team made a decision, based on requests from I&APs, to review certain specialist studies and provide a Revised Draft EIR (Version 2) for public comment, prior to submission of the Final EIR to the DEA for decision-making. **Subsequent to the release of the Revised Draft EIR in 2011, further amendments were made to the specialist studies and the EIR and a Revised Draft EIR Version 2 has therefore been prepared for public comment.**

1.4 The Final Environmental Impact Report

The Final EIR and EMP are the last documents to be submitted in terms of the EIA process and it is intended to provide a summary of the key findings of the EIA Phase of the EIA, including the specialist studies which were undertaken. Regulation 32 of Government Notice No. R. 385 of 2006 requires the inclusion of the following within an EIR:

- Details of –
 - the EAP who compiled the report; and
 - the expertise of the EAP to carry out an environmental impact assessment;
- A detailed description of the proposed activity;

- 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 –
 - a linear activity, a description of the route of the activity; or
 - an ocean-based activity, the coordinates where the activity is to be undertaken;
- A description of the environment that may be affected by 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;
- Details of the public participation process conducted in terms of subregulation (1), including –
 - steps undertaken in accordance with the plan of study;
 - a list of persons, organisations and organs of state that were registered as interested and affected parties;
 - a summary of comments received from, and a summary of issues raised by registered interested and affected parties, the date of receipt of these comments and the response of the EAP to those comments; and
 - copies of any representations, objections and comments received from registered interested and affected parties;
- A description of the need and desirability of the proposed activity and identified potential alternatives to the proposed activity, including advantages and disadvantages that the proposed activity or alternatives may have on the environment and the community that may be affected by the activity;
- An indication of the methodology used in determining the significance of potential environmental impacts;
- A description and comparative assessment of all alternatives identified during the environmental impact assessment process;
- A summary of the findings and recommendations of any specialist report or report on a specialised process;
- A description of all environmental issues that were identified during the environmental impact assessment process, an assessment of the significance of each issue and an indication of the extent to which the issue could be addressed by the adoption of mitigation measures;
- An assessment of each identified potentially significant impact, including –
 - cumulative impacts;
 - the nature of the impact;
 - the extent and duration of the impact;
 - the probability of the impact occurring;
 - the degree to which the impact can be reversed;
 - the degree to which the impact may cause irreplaceable loss of resources; and
 - the degree to which the impact can be mitigated;
- A description of any assumptions, uncertainties and gaps in knowledge;
- An opinion as to whether the activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation;
- An environmental impact statement which contains –
 - a summary of the key findings of the environmental impact assessment; and
 - a comparative assessment of the positive and negative implications of the proposed activity and identified alternatives;
- A draft environmental management plan that complies with regulation 34;
- Copies of any specialist reports and reports on specialised processes complying with regulation 33; and
- Any specific information that may be required by the competent authority.

In addition, there are a number of other requirements that this EIR must address:

- The EIA Regulations Guideline Document (DEAT 2006); and
- The DEA&DP guidelines on specialist studies.

The above requirements are addressed in the relevant Chapters and Appendices of this report.

1.5 Assumptions and limitations of the EIA

The key assumptions and limitations (i.e. uncertainties and gaps in knowledge) relevant to the EIA Phase are discussed below.

1.5.1 Assumptions

The following assumptions are relevant to the study:

- The need and desirability for the Nuclear Power station is adequately defined by the current IRP. If the future IRP does not include the option for nuclear power as a result of a change in demand patterns and supply options then the need and desirability will fall away;
- That the NPS will be financially feasible taking into account the risks associated with the technology including the possibility of a core meltdown.
- Where the word “Duynefontein” is used in the main documents or any and all attachments to the EIR it is understood that the farm Duynefontyn No. 1552 situated in the City of Cape Town, Cape Division, Western Cape Province is referred to.
- At the time of compiling the EIR, Eskom and the South African Government had not yet decided on a vendor for the supply of nuclear power station plant type. Thus, an “envelope” of data (consistent dataset- Appendix C- of the EIR) was used to model the impacts of the proposed power station. This envelope includes the highest (or lowest were applicable) possible values for various aspects for a range of different nuclear technology vendors. It is assumed that the design specifications of the proposed plant by the approved vendor will conform to the “envelope”. If any of chosen vendor’s power station characteristics fall outside of the specified envelope, it may have to be re-assessed from an environmental point of view (depending on the degree of variance). Therefore whatever vendor is selected, the design will comply with or better the defined design envelope. If the vendor cannot meet the performance defined in the design envelope then a reassessment of potential impacts will be required.
- It has been assumed that mitigation measures identified in this EIR, the EMP and in specialist studies will be effectively implemented and continual improvement in environmental outcomes through methodology, technology etc. will be implemented.
- It is assumed that should authorisation be granted for the construction, operation and decommissioning of a nuclear power station on any of the alternative sites, Eskom will manage access to the power station site. It is further assumed that Eskom will manage the remainder of the site assessed in this EIA (i.e. outside the identified footprint per site), as well as any additional land purchased or managed by Eskom (e.g. servitudes purchased over adjoining land) for conservation purposes.
- It is assumed that the NNR (being mandated by the NNRA) will respond to Eskom’s formal application for a nuclear installation license for the siting, construction, operation, decontamination and decommissioning of the proposed nuclear power station and that the proposed nuclear power station construction will not commence before this license is obtained. Therefore the NPS will not continue without meeting the required safety case as defined by the NNR.
- It is assumed that the NNR is adequately resourced and staffed to undertake the safety case evaluation competently.
- It is assumed that the operators of the NPS will be adequately trained and resourced to ensure safe operation of the NPS and that every measure will be taken in the design to reduce operator error.
- As advised by the DEA and in terms of the Constitution of the Republic of South Africa (Act No. 108 of 1996) and the NEMA, it is assumed that the DEA is responsible for assessing the potential impacts of the power station on the environment. It is further assumed that in recognition of the dual but distinct responsibility with respect to the assessment of radiation hazards, the DEA, is the lead authority on environmental matters and the NNR is the decision-making authority with respect to radiological issues. It is further understood that the DEA and the NNR will work in close collaboration on the assessment of radiological matters with respect to Nuclear-1.

- Any infrastructure not specified in this EIR and the Application Form (and its revision) fall outside the scope of the application for authorisation.
- Authorisations other than the EIA authorisation (e.g. water use licenses, authorisations for heritage site excavations as well as additional authorisations in terms of, amongst others, Sections 27, 35, 36 and 38 of the National Heritage Resources Act, 1999 (Act 25 of 1999), borrow pit authorisations, licenses for the removal of protected trees and other plans, etc.) falls outside the scope of this application. The Applicant will apply for these authorisations through separate processes.
- The EMP is regarded as a dynamic document and will be kept updated by the Applicant as new information becomes available.
- Since the Nuclear-1 Draft EIR was provided for public comment, it has been announced that the plans for the Pebble Med Modular Reactor Demonstration Power Plant (PBMR DPP) at Koeberg have been abandoned. Any references to the PBMR and possible cumulative impacts of Koeberg and Nuclear-1 at the Duynefontein site with the proposed PBMR DPP that were found in the Draft EIR have therefore been removed from the EIR
- Comments of commenting authorities (the Western Cape Department of Environmental Affairs and Development Planning and the Eastern Cape Department of Economic Affairs Environment and Tourism) were not included in the Draft EIR, but have been included in the Revised Draft EIR and the Revised Draft EIR Version 2.
- It is assumed, based on information provided by the Eskom engineering team, that the proposal for piped offshore disposal of spoil is technically feasible. Should this not be the case, then a re-assessment of the impacts of spoil disposal proposals would be required.
- It is assumed that the figures provided by Eskom in the Consistent Dataset are accurate. This assumption applies particularly to the volumes of spoil to be disposed at each of the alternative sites and to the cooling water intake and outlet pipes, since these are critical factors that will determine the nature and significance of impacts on oceanographic conditions and marine organisms.
- In the event of inconsistencies between the Consistent Dataset (Appendix C) and any other data, the Consistent Dataset will be regarded to be accurate.
- The executive summaries of all specialist reports, as well as the executive summary of the EIR, have been translated from English into Xhosa and Afrikaans. In the event of any inconsistencies in meaning between the versions, the English version must be considered as the master copy.
- The content of all reports is accurate on the date of completion of these reports, unless otherwise stated.
- The review of the Nuclear Sites Investigation Programme (NSIP) undertaken during the Scoping phase of this Scoping and EIA process was based on the NSIP Summary Reports. As stated in this review (an addendum to the Scoping Report), it was not the intention of this review to identify possible shortcomings or opportunities that might occur in the technical reports that have been prepared for Phases 1, 2 or 3 of the NSIP or as a result of changing circumstances in the country since the 1980s. Rather, the purpose was to understand the process by which the then five sites were identified and thus to understand whether the process by which these sites were identified as preferred sites for nuclear development could be regarded as reasonable and feasible for the Nuclear-1 EIA. As such, the purpose was also to understand what information was available in the NSIP reports and what additional technical information needed to be generated during the EIA. During the Scoping process, it was confirmed that there are no fatal flaws at any of the sites and that the Western Cape and Eastern Cape sites could be regarded as reasonable and feasible for the Nuclear-1 EIA.

1.5.2 **Limitations**

The following limitations are relevant to the study:

- The initial application was for a single site (one of three alternative sites). During the course of 2009, Eskom announced its intention to apply for a combined authorisation for the construction, operation and decommissioning of a nuclear power station on all three alternative sites, based on the changes to the EIA legislation. However, at the time of writing, such amendments had not yet been promulgated and the application has therefore reverted to the original application for authorisation of a single site. Such changes in approach may be

confusing to members of the public. The changes in approach to the application are explained in this Chapter.

- As a result of the timing of the Applicant's request to continue with the EIA Phase in 2009, the commencement of fieldwork for specialist studies has in some instances been undertaken outside of the ideal season sampling season. In such cases, additional fieldwork in the appropriate season has been commissioned to ensure adequate confidence in the specialist's predictions. For example, additional invertebrate monitoring in both wet and dry seasons has taken place at all three sites and on-going groundwater monitoring was conducted since 2010 to confirm the linkage between groundwater levels and wetlands at all three sites. On-going future studies have been and will continue to be commissioned by Eskom to add to the technical knowledge-base.
- Potential costs associated with the design and construction of a structure that would be able to withstand seismic hazard has not been included in the economic impact assessment (Appendix E17).
- Limitations as documented by technical specialists in Appendices E2 to E36, but not listed here separately.
- It is assumed that the NNR will accept Eskom's proposal, adopted from the European Utility Requirements (EUR) for new reactor designs, for emergency planning zones (EPZs) of 800 m and 3 km for the Protective Action Zone (PAZ) and the Urgent Protective Zone (UPZ), respectively. Should this not be the case, a re-assessment of the impacts in relevant specialist studies and in the EIR may need to be undertaken.
- The proposed PAZ of 800 m around the proposed power station places limitations on the degree to which the power station footprint can be moved around on the site to adapt to the site's environmental sensitivities. The power station may not be any closer than 800 m from a public road. This may place restrictions especially at the Bantamsklip site, where the public road (the R43) is very close (but outside) the EPZ of the reactors.
- It is a requirement of Section 32(2)(e)(iv) of the EIA regulations (Government Notice No. R 385 of 2006) that the EIR must include copies of any representations, objections and comments received from registered Interested and Affected Parties (I&APs). In this instance, all such representations, objections and comments are included verbatim in the Issues and Response Reports (IRRs) appended to this Report. Inclusion of the original written comments as appendices to the report is impractical due to the volume of these documents. Therefore, these documents will be made available for viewing on request, if required.
- The Seismic Risk Assessment is based on the current state of knowledge and the relevant loading code of practice¹¹ for buildings currently in use without making provision for results of the Senior Seismic Hazard Analysis Committee (SSHAC) investigations for a Site Safety Report as required by the NNR. The SSHAC investigations are required to define the seismic hazard at the sites at very low probabilities of expedience required for licensing by the NNR were as the loading code of practice is based on a recurrence interval of 500 years.

1.6 Way forward

The Final EIR will be submitted to the Department of Environmental Affairs and be 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 afford an opportunity to appeal the decision.

¹¹ From the National Building Regulations and Building Standards Act 103 of 1977

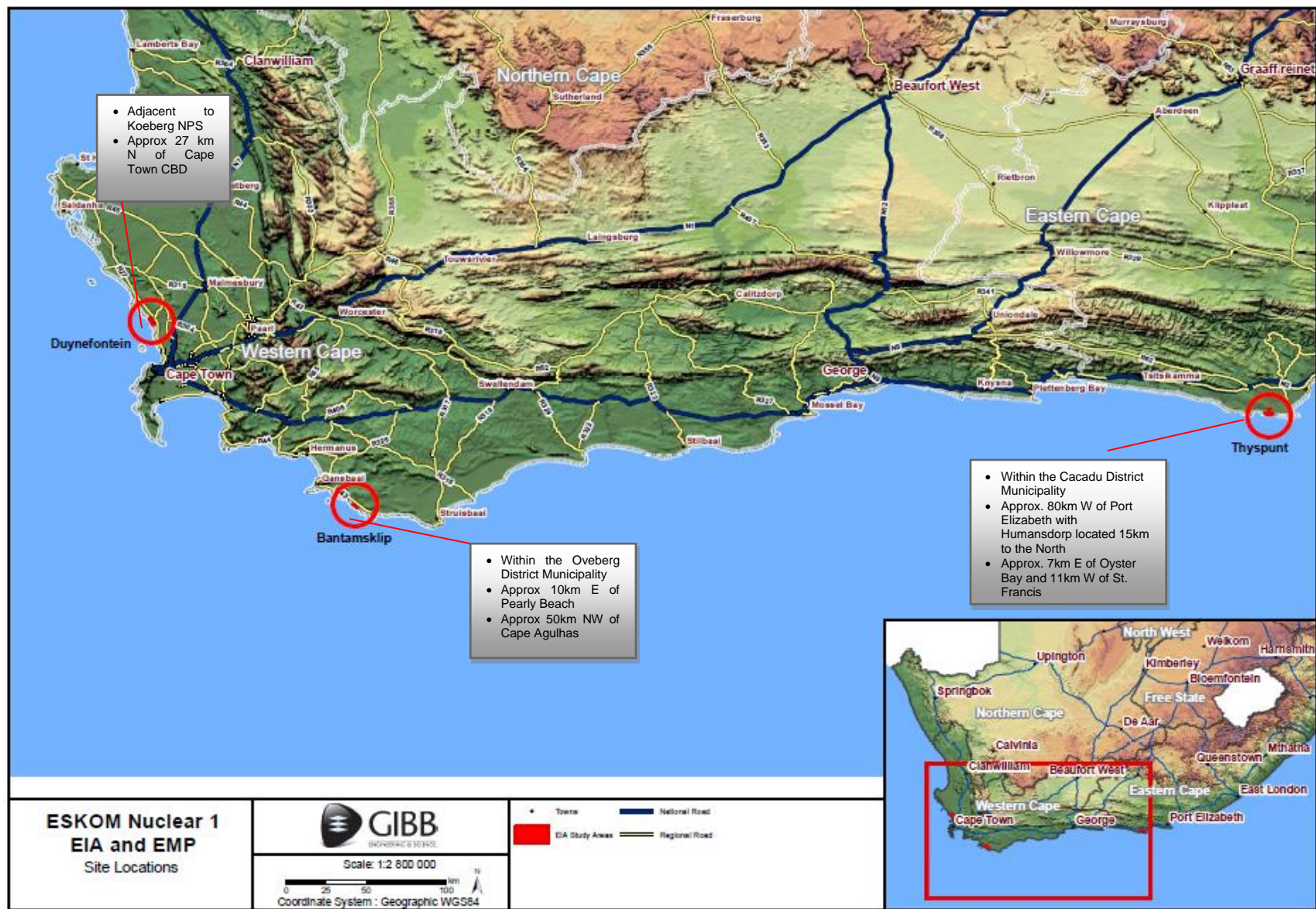


Figure 1-2: Alternative site locations for Nuclear-1 considered during the EIA phase

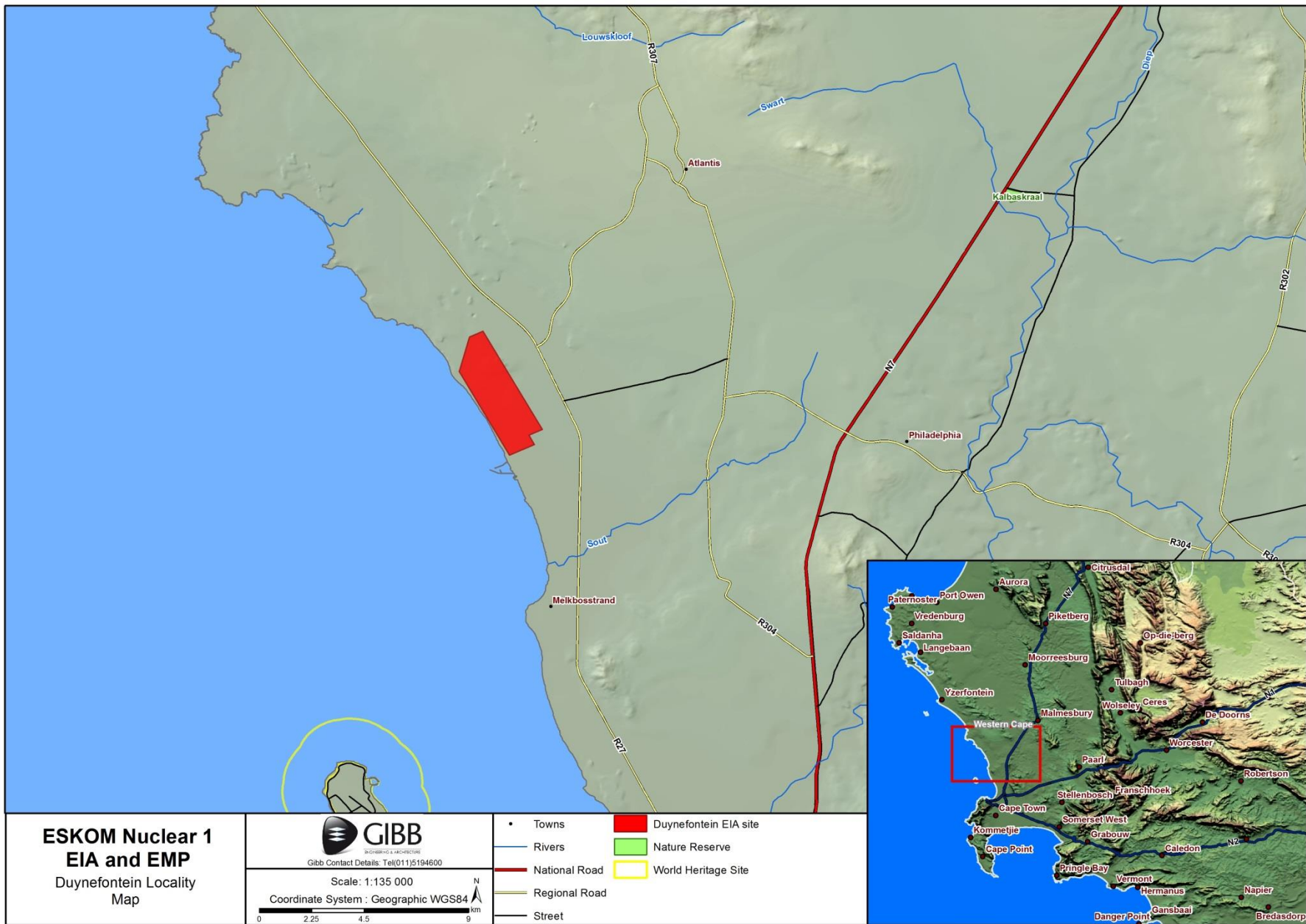


Figure 1-3: Duynefontein Locality Map

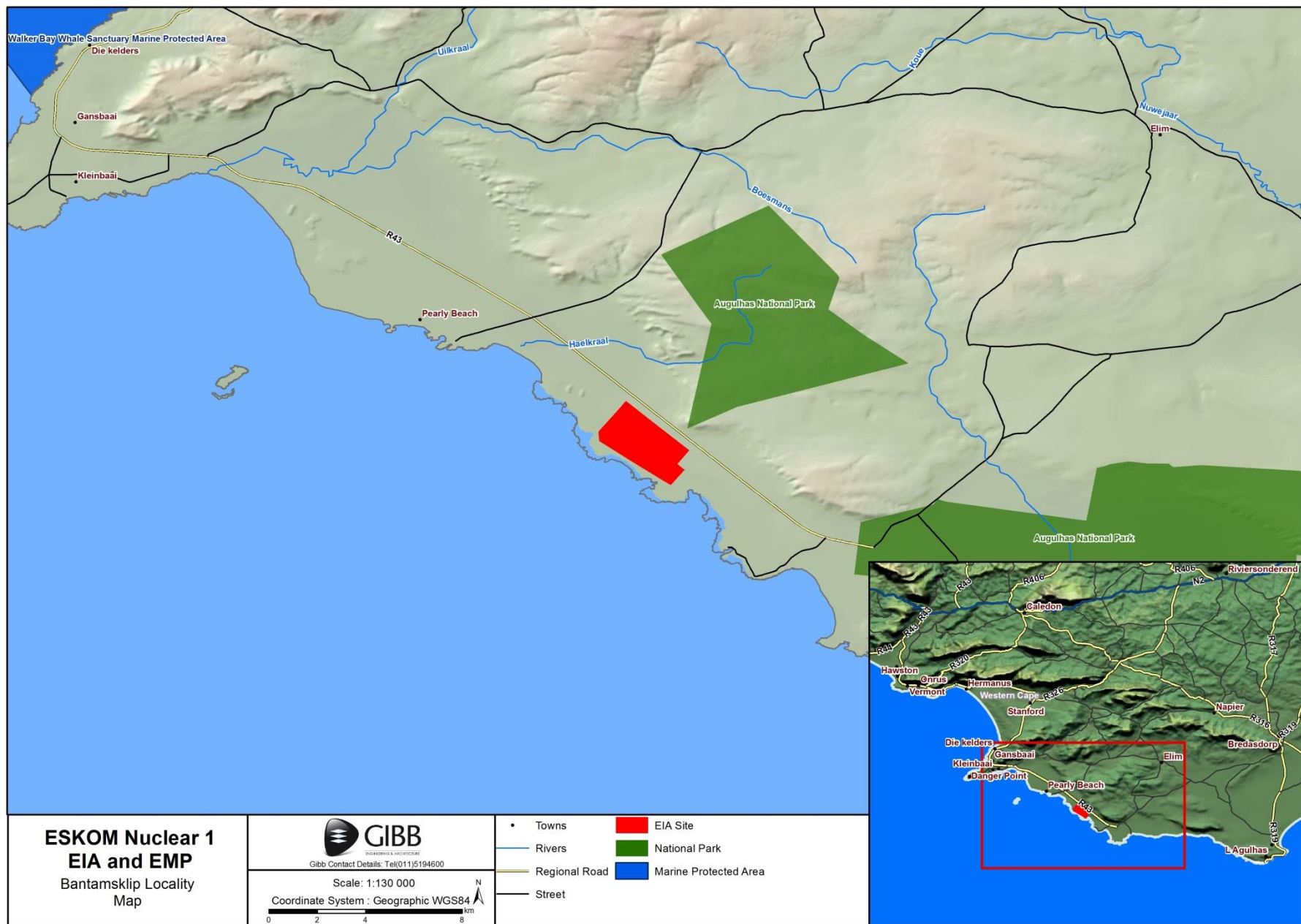


Figure 1-4: Bantamsklip Locality Map

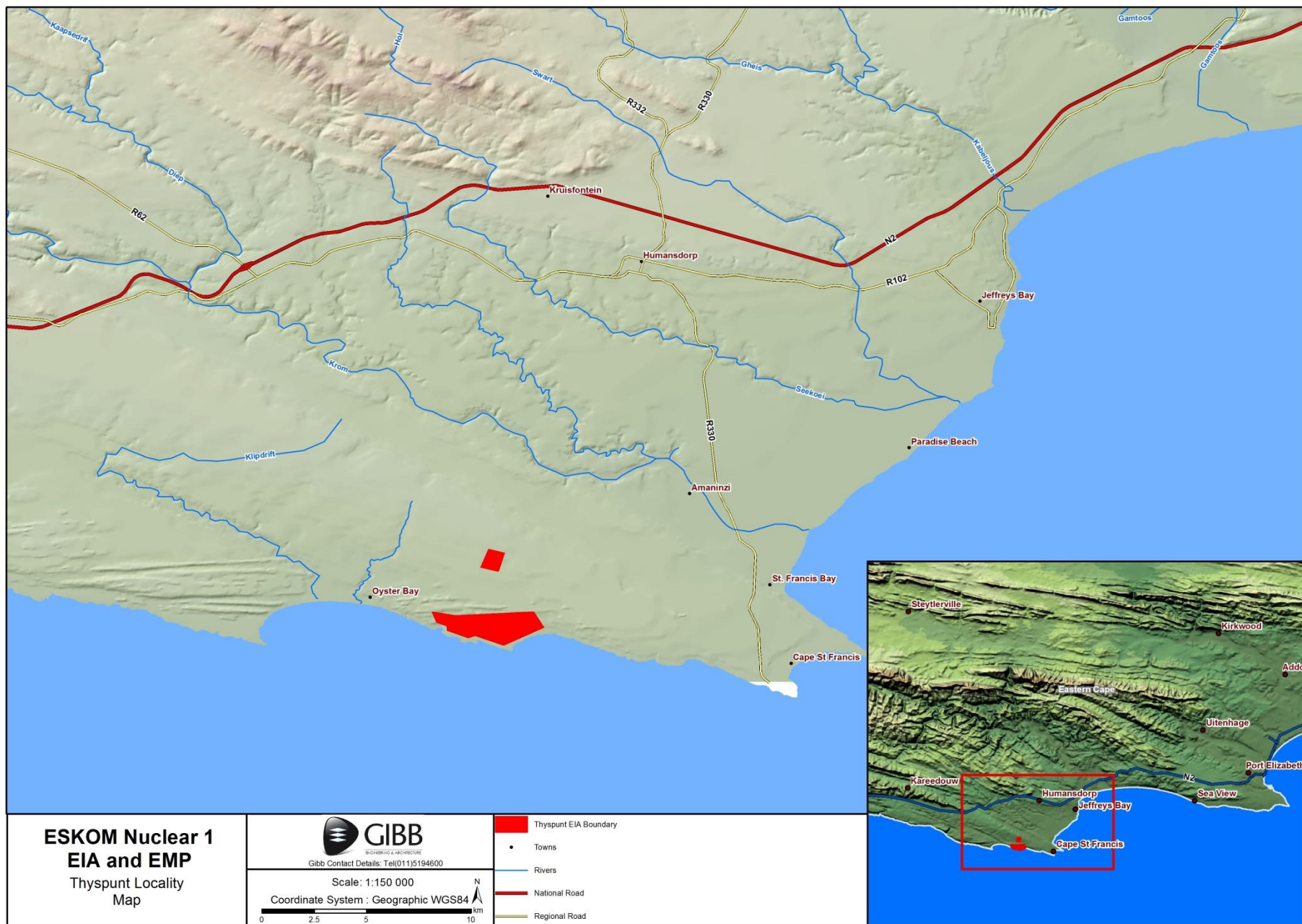


Figure 1-5: Thyspunt Locality Map