

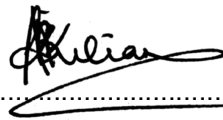
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CHAPTER 3: OVERVIEW OF PLANNED ACTIVITIES

Eskom Thyspunt SSR Chapter 3 Overview of Planned Activities, Rev 0b

Author declaration:

I declare that appropriate diligence and quality assurance was applied in the compilation of this report. As such I am confident in the results here described and the conclusions drawn.



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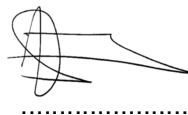
I declare that this report has undergone independent peer review by myself, that comments were addressed to my satisfaction, and that as such, it is considered fit for publication.



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AMENDMENT RECORD			
Rev	Draft	Date	Description
0	-	April 2015	New chapter
0a		January 2025	Chapter updated in line with NNR review comments and to align to the latest template on structure and layout of Site Safety Reports.
0b		March 2026	Chapter updated to address NNR review comments.

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EXECUTIVE SUMMARY

The site is located in the Eastern Cape between the towns of Humansdorp (north), St. Francis Bay (east) and Oyster Bay (west) with no current development beyond a few houses and an Eskom office/workshop, i.e. it is a greenfield site.

Eskom envisages the construction of a nuclear installation(s) at the site with planned generating capacity of 4 000 MWe (13 200 MWth), and an eventual total site capacity of up to 10 000 MWe (c. 33 000 MWth). Since the design of the planned nuclear installation(s) had not been selected during this SSR development the design features are based on a plant parameter envelope approach.

Furthermore, this chapter presents:

- a general overview of the planned facilities and activities during the nuclear installation lifetime;
- the generic layout and proposed enveloping footprint for the site.

This information serves as a basis for the development of the subsequent chapters and sections of this SSR.

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3 OVERVIEW OF PLANNED ACTIVITIES AT THE SITE

3.1 Purpose and Scope

The purpose of this chapter is to present:

- a statement on the proposed use of the site;
- a conceptual layout of the site.

This chapter also aims at introducing the currently available technical information to be used in support of site establishment and the conduct of early site activities.

As the design of the planned nuclear installation(s) had not been selected during this Site Safety Report (SSR) development, this chapter presents:

- a general overview of the planned facilities and activities during the nuclear installation lifetime;
- the generic layout and proposed enveloping footprint for the site.

This information serves as a basis for the development of the subsequent chapters and sections of this SSR. Details on the auxiliary systems for the planned nuclear installation(s), spent fuel and waste management, as well as waste disposal, are outside the scope of this chapter and this SSR and will be dealt with in the Safety Analysis Report (SAR).

3.2 Regulatory Framework

The description of the planned activities on the site was developed on the basis of the current national legal and regulatory framework presented in **Chapter 2** (Legal and Regulatory Basis) and more specifically:

- the National Nuclear Regulator (NNR) Act 47 of 1999 (Republic of South Africa, 1999) as amended (Republic of South Africa, 2024), which applies to the site evaluation, design, construction, operation, decontamination, decommissioning and closure of any nuclear installation.
- R.927: The Regulations on Licensing of Sites for New Nuclear Installations (Department of Energy, 2011) that requires:

“A statement as to the proposed use of the site in terms of the range of technologies and plant designs being considered for the nuclear installation(s) and use of the site, including where appropriate the maximum thermal power, general design characteristics such as the engineered safety features of the nuclear installation(s) included as safety measures against the hazardous consequences of postulated

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events, and the layout on the site.”

- R.388: Regulations in Terms of Section 36, Read with Section 47 of the Act (Department of Minerals and Energy, 2006), Sections 2.4 Licensing and 3.3 Prior Safety Assessment.
- RG-0011: Interim Guidance for the Siting of Nuclear Facilities (National Nuclear Regulator, 2016).

3.3 Site Description

The site is located at the coast with no current development beyond a few houses and an Eskom office/workshop, i.e. it is a greenfield site. It covered an area of about 3975.9 ha in 2024 (Eskom-owned land), possibly expanding to about 5 478 ha with additional land acquisition to allow for, *inter alia*, access roads. The site is comprised of rocky promontories and headlands interspersed with sandy beaches and vegetated and unvegetated dunes.

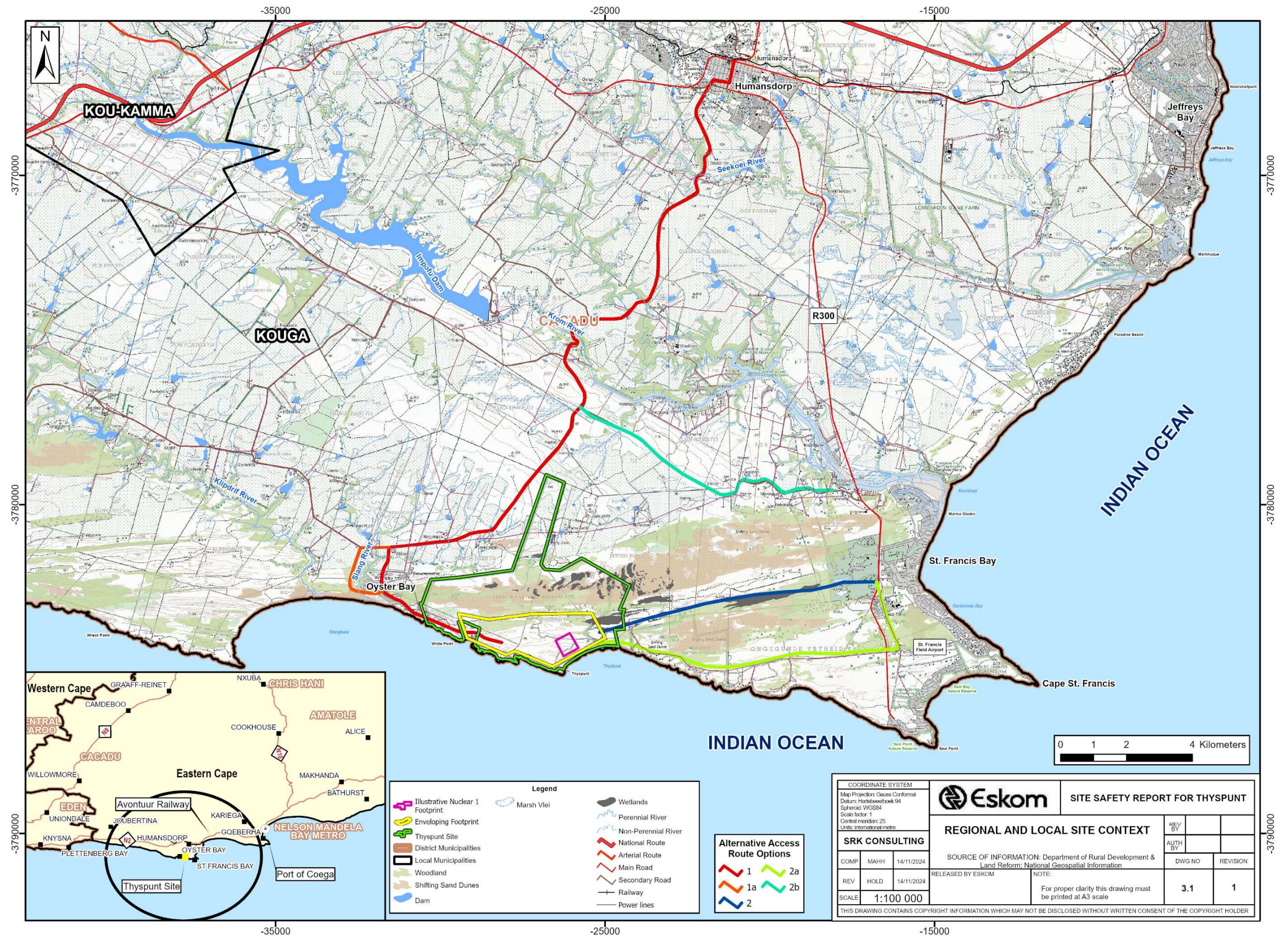
The site is situated in the Eastern Cape between the towns of Humansdorp (north), St. Francis Bay (east) and Oyster Bay (west) as presented in **Drawing 3.1** (details are presented in **Chapter 4**, Site Investigation Approach and **Chapter 5**, Site Characteristics). The large urban areas of Gqeberha¹ and Kariega² are located partly within the 80 km radius of the site. The 80 km radius covers the local municipal area of Kouga and parts of those of Kou-Kamma, Baviaans, Eastern Cape District Management Area 10 and Nelson Mandela Bay.

A conservation workshop is located on the site close to the western property boundary. No other infrastructure exists on the site except three houses situated along the coast and two houses situated near the Langefonteinlei wetland. Access on the site is via a main dirt track from the western boundary gate and a track from the northeastern gate. Proposed alternative access route options to the site are shown in **Drawing 3.3**.

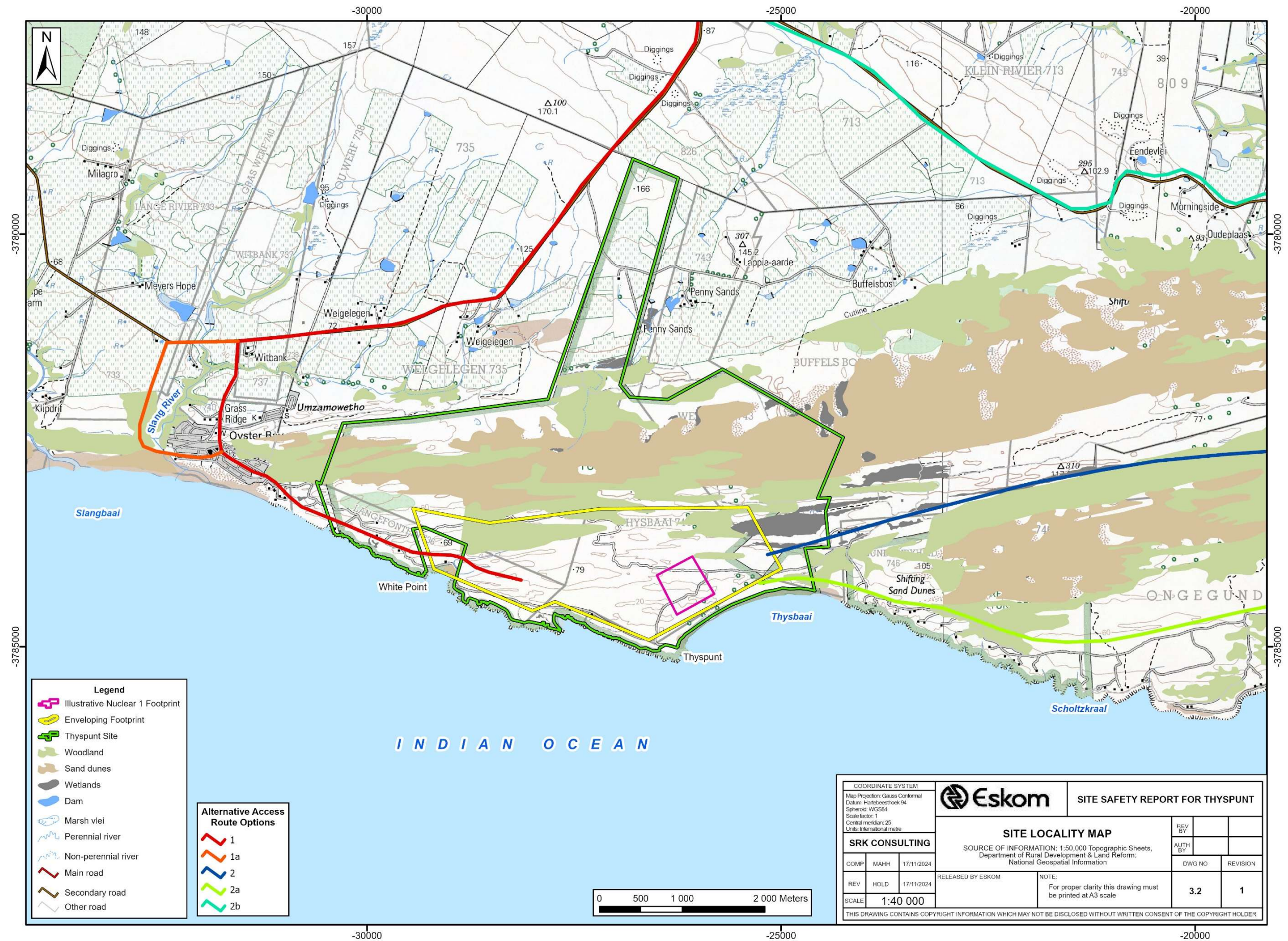
Drawing 3.2 shows more detail on the site location with respect to the surrounding towns and geographical features. The boundaries of the site (*circa* 2008), which represents the owner controlled area, and other site aspects are presented in **Drawing 3.3**. The original farm names of the properties making up the site are shown in boxes in **Drawing 3.2** and are further discussed in **Section 5.1** (Geography and Site Location).

¹ Formerly known as Port Elizabeth

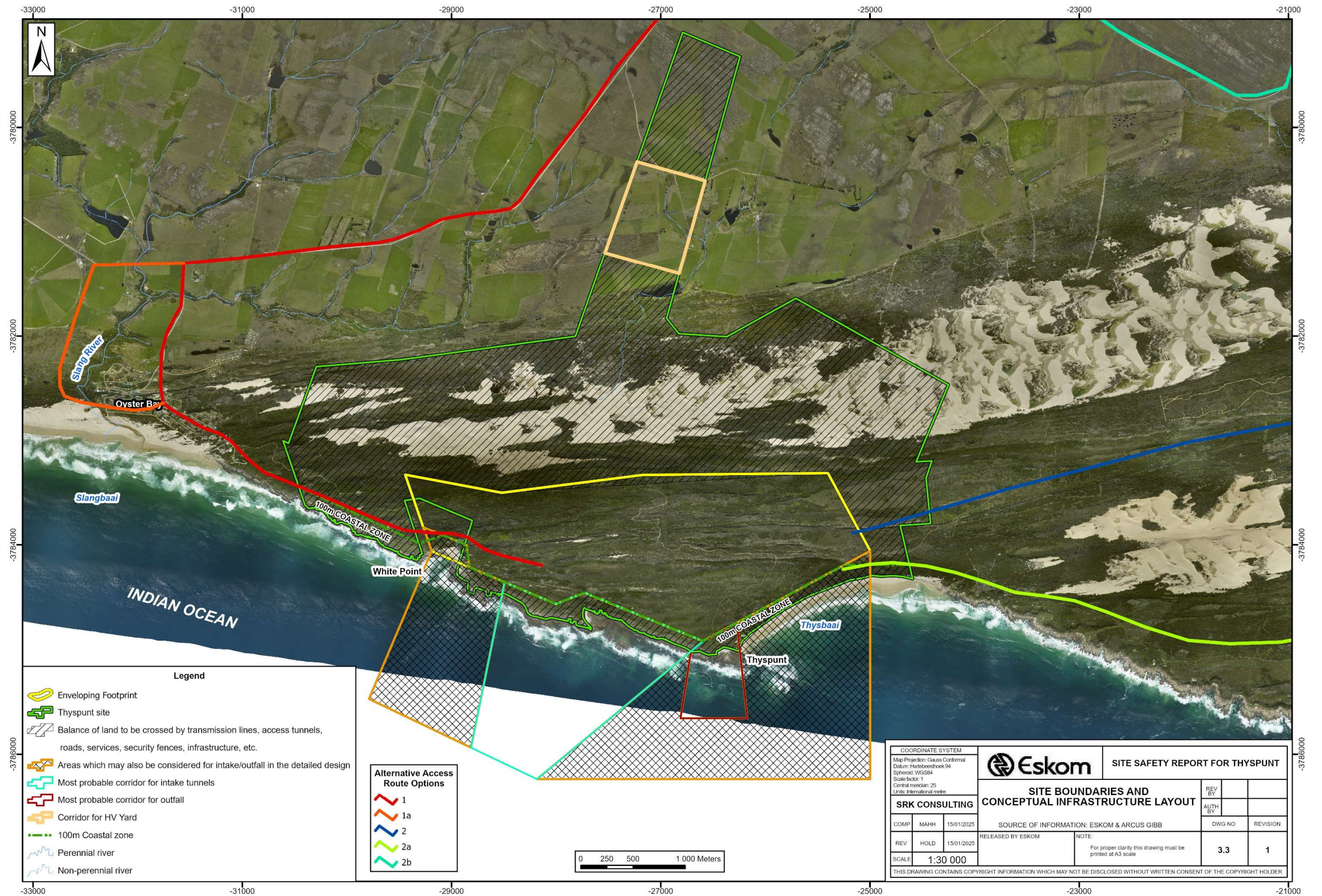
² Formerly known as Uitenhage



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3.4 Planned Activities

The construction of a nuclear installation(s) at the site with planned capacity of up to 4 000 MWe (13 200 MWth) is envisaged, and an eventual total site capacity of up to a maximum power of approximately 10 000 MWe (33 000 MWth), assuming a nominal 33 per cent efficiency. The number and design of the reactors are still to be determined but they will be of the Pressurised Water Reactor type.

The phases in the lifetime of nuclear power plants are siting, design construction, commissioning, operation and decommissioning. **Figure 3.1** illustrates approximate time intervals for various site lifecycle phases. This SSR represents the final stage of the site evaluation phase.

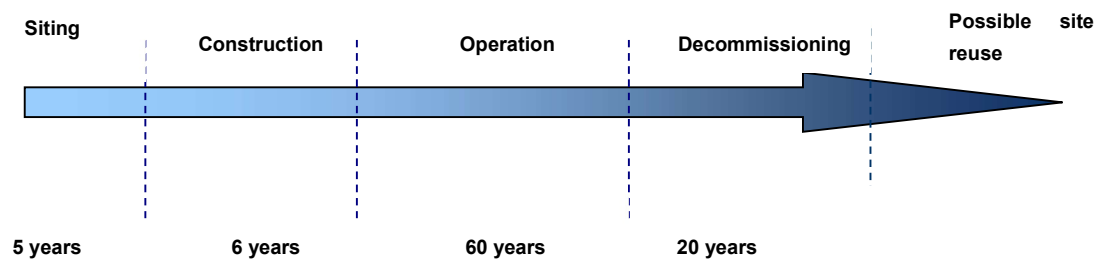
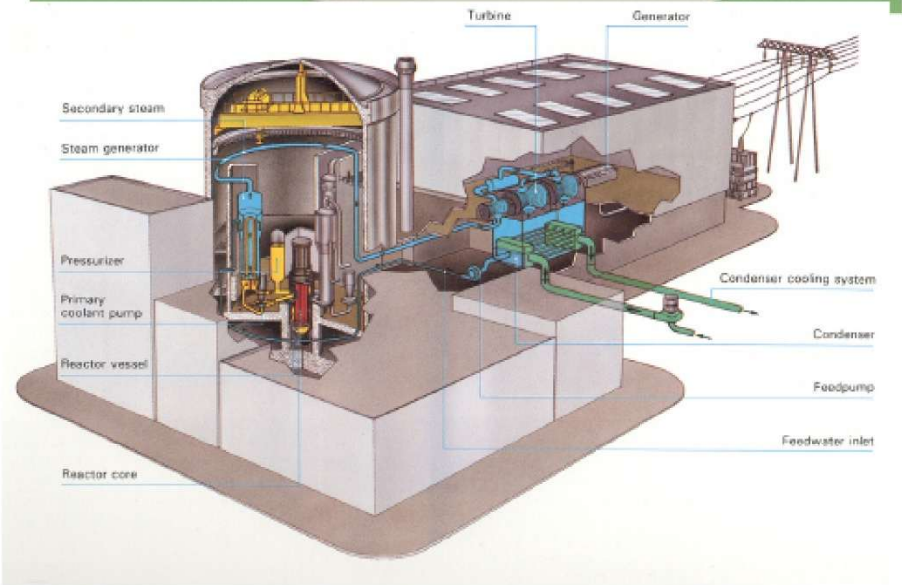
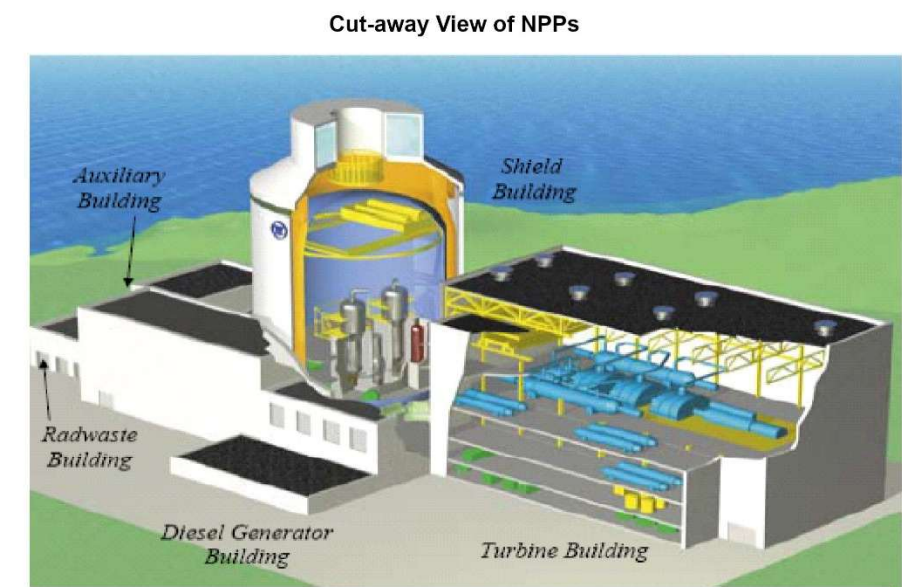
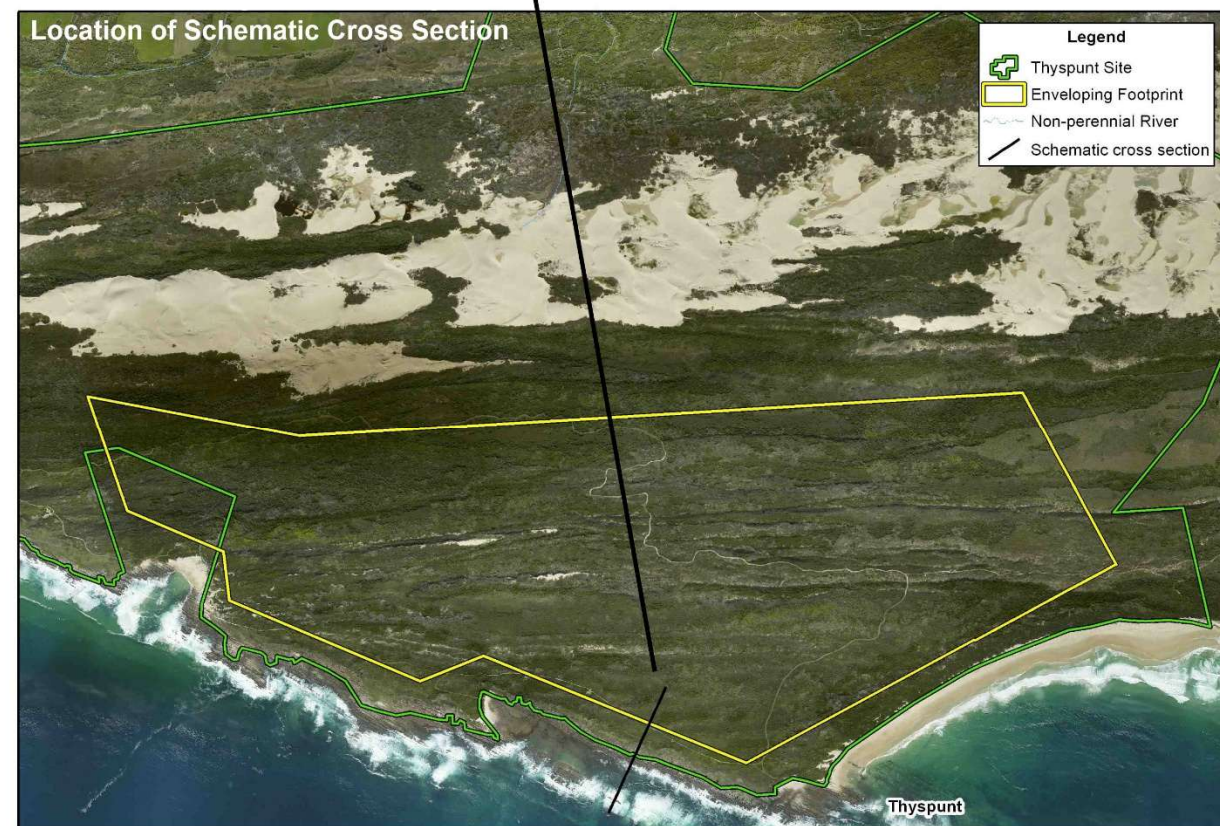
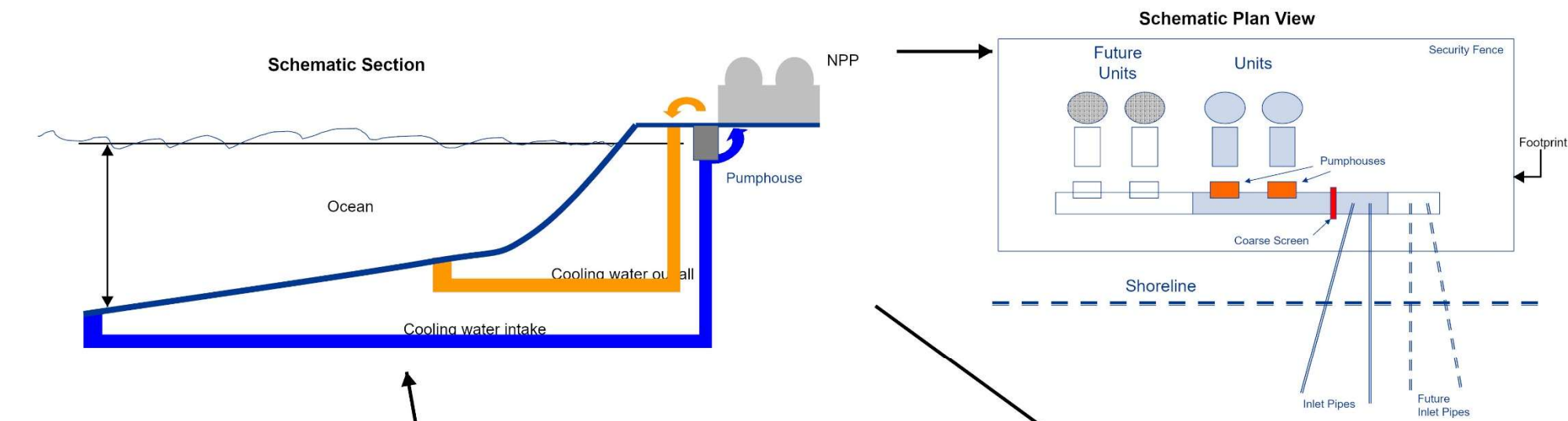


Figure 3.1
Planned Site Lifecycle Phases

On the basis of the available information about the site characteristics and preliminary design considerations, a provisional enveloping footprint area has been selected (see **Drawing 3.3**). This is the area within which the reactor and other buildings will be established. The actual size of the footprint area will be confirmed during the detailed design phase of the project. The enveloping footprint at the site is envisaged to house the main reactor buildings and their auxiliary services which will depend on the selected design and supporting infrastructure (see **Drawing 3.4** – all illustrations are schematic and do not imply any preferred reactor selection or placement). Long-term storage of spent fuel would be accommodated on site in accordance with the practice at Koeberg Nuclear Power Station.



COORDINATE SYSTEM Map Projection: Gauss Conformal Datum: Hartbeesthoek 94 Spheroid: WGS84 Scale factor: 1 Central meridian: 25 Units: International metre				Eskom				SITE SAFETY REPORT FOR THYSPUNT			
SRK CONSULTING				SCHEMATIC LAYOUT OF A NUCLEAR INSTALLATION				REV			
COMP	MAHH	15/01/2025		SOURCE OF INFORMATION:				AUTH			
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THIS DRAWING CONTAINS COPYRIGHT INFORMATION WHICH MAY NOT BE DISCLOSED WITHOUT WRITTEN CONSENT OF THE COPYRIGHT HOLDER											

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Once the nuclear installation design is selected a detailed description of all systems of the nuclear installation(s) and their location at the site will be presented in an updated SSR and the SAR.

Auxiliary installations will include, *inter alia*, a desalination plant (see **Section 5.12**, Water Supply), a waste water treatment plant, water storage reservoirs (see **Section 5.12**) and a tall meteorological mast (see **Section 5.8**, Meteorology) or alternative meteorological measurement instrumentation.

3.5 Design Features of Future Nuclear Installations

Eskom has not decided on a preferred supplier for the nuclear build programme and therefore detailed descriptions of the proposed plant are not yet available, however this SSR has been completed using a plant parameter envelope (refer to (**Eskom, 2024**)), while its associated enveloping source terms are given in **Chapter 7** and source terms for severe accidents and postulated reference accidents are given in **Chapter 8**.

Salient features of the design that Eskom may seek to procure when a decision is made to build a new nuclear installation, are (GIBB, 2017):

- a standardised design for the type of plant to expedite licensing, reduce capital cost, and reduce construction time;
- a simple and robust design, making the plant easier to operate and less vulnerable to operational upsets;
- high availability and longer operating life than current operating reactors – typically in excess of 60 years;
- reduced possibility of core melt accidents;
- higher containment integrity;
- minimal effect on the environment;
- higher burn-up to optimise fuel use and reduce the amount of waste;
- burnable absorbers to extend fuel operating cycle.

These features are characteristic of current PWR technologies (also known as Generation 3 and 3+ designs). Generation 3 and 3+ reactors have utilised industry experience over the past few decades, and several improvements have been incorporated in their designs. These designs incorporate improved fuel technology, have superior thermal efficiency,

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have significantly enhanced safety systems (including passive nuclear safety) and have standardised designs for reduced maintenance. All reactor types meeting the above requirements will be considered through the nuclear procurement process. Generation 3 and 3+ designs currently understood to be in the market include (but are not limited to) the Westinghouse AP1000, Korean APR1400, Framatome's EPR and Rosatom's VVER1000.

3.6 Management of Uncertainties

At present the main uncertainties related to the planned activities at the site are related to the following:

- design of the reactors;
- number of reactors (minimum of two);
- site layout and nuclear installation(s) footprint;
- size of the emergency planning zones;
- lifetime of the nuclear installation(s) and the site.

These uncertainties are addressed through evaluation of different scenarios, a range of reactor types, consideration of an enveloping footprint, application of a conservative approach to the development of the Plant Parameter Envelope (Eskom, 2024) and envisaged review and revision of this SSR.

3.7 Management System

The overview of the planned activities at the site was developed in line with the overall management system for this SSR (presented in detail in **Chapter 10**, Management System). The compliance of this chapter with the relevant regulatory requirements is summarised in **Table 3.1** (see also **Section 3.2** above).

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Table 3.1
Regulatory Compliance Matrix

Act/Regulation	Section/Regulation	Requirement/Issue	Section/Chapter in the SSR
National Nuclear Regulator Act, 1999 (Republic of South Africa, 1999) as amended by the National Nuclear Regulator Amendment Act, 2024 (Republic of South Africa, 2024)	Section 2(1) (a)	Site authorisation to construct and operate nuclear installations.	The whole SSR, including <u>Chapter 3</u>
	Section 5(1)	Provision for the protection of persons, property and the environment against the harmful effects of radiation associated with facilities.	The whole SSR, including <u>Chapter 3</u> .
Regulations R.927 on Licensing of Sites for New Nuclear Installations (Department of Energy, 2011)	Regulation 4(1)	Factors relating to all nuclear installations in the vicinity.	The whole SSR, including <u>Chapter 3</u>
	Regulation 4(2)	The proposed NI and characteristics must reflect an acceptably low probability of postulated events.	<u>Chapter 3</u>
	Regulation 4(3)	Site location and engineered safety features must ensure an acceptably low risk of public exposure.	<u>Chapter 3</u>

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	Regulation 5(2)	SSR to include a statement as to the proposed use of the site in terms of the scope of technologies being considered for the nuclear installation and use on the site	<u>Section 3.4</u>
Government Regulation R.338 (Department of Minerals and Energy, 2006)	Section 2.4	Licensing	<u>Section 3.4</u>
	Section 3.3	Prior safety assessment	<u>Section 3.4</u>
RG-0011: Interim Guidance for the Siting of Nuclear Facilities (National Nuclear Regulator, 2016)	Section 6.3	Discrete demarcation of nuclear facilities	<u>Section 3.5</u>
	Section 10.2	Show through illustrations: a) Layout of site structures; i) Culverts; j) Vital equipment; m) Intake structure; n) Protected area boundary; and o) Owner-controlled area and protected area vehicle checkpoints".	<u>Section 3.5</u>

This chapter is the basis for all subsequent chapters/sections of this SSR and therefore has a link with all of them and some overlap, e.g. **Chapter 9**, Physical Protection and Security).

3.8 Conclusions

This chapter presented a general overview of existing and planned facilities and a generic layout and proposed enveloping footprint. Since Eskom has not selected a reactor design to be constructed on the site, a set of bounding plant parameters, referred to as the plant parameter envelope was used to establish the suitability of the site.

This information serves as a basis for the development of the subsequent chapters and sections of this SSR.

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3.9

References

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5. National Nuclear Regulator, 2016. *Interim Guidance for Siting of Nuclear Facilities, RG-0011*. s.l.:National Nuclear Regulator.
6. Republic of South Africa, 1999. *National Nuclear Regulator Act No. 47 of 1999*. Pretoria: Government Gazette.
7. Republic of South Africa, 2024. *National Nuclear Regulator Amendment Act (Act No. 26 of 2024)*. Pretoria: Government Gazette.