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SECTION 5.1: GEOGRAPHY AND SITE LOCATION

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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.

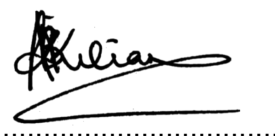


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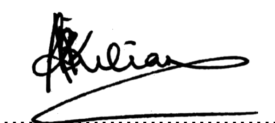
I declare that this report has undergone independent peer review by myself, that comments were addressed to my satisfaction, and that as such, it is considered fit for publication.



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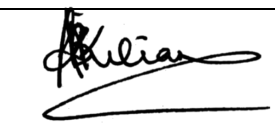
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AMENDMENT RECORD			
Rev	Draft	Date	Description
0		2015	New section developed
1		September 2021	Section updated to reflect the latest information on Geography and Site Locations, and to align the section with the latest template on structure and layout of Site Safety Reports.
1a		March 2024	Update section 5.1 drawings.

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EXECUTIVE SUMMARY

The Duynefontyn site (“the site”) covers an area of 3 038 ha, and is located approximately 25 km north of Cape Town. The existing Koeberg nuclear power station, comprised of two three-loop Pressurised Water Reactor (PWR) units, is located on the southern portion of the site. Towards the west of the site is the Atlantic Ocean, and the area inland is comprised of a dune field which is mainly vegetated.

South of the site is the town Duynefontein and to the southwest is the town Atlantis. The nearest major airport to the site is Cape Town International Airport and the Cape Town Harbour is the largest commercial harbour in the area. The R27 national route, known as the West Coast Road, runs in a north-south to northwest direction on the eastern boundary of the site. Tared access road leads from the R27 to the site and an alternative access route is via the township of Duynefontein to the south.

The Berg Water Management Area provides water to the site, and there are no water imports from outside of this area. Water is supplied to the residential areas of Bloubergstrand, Melkbosstrand, Van Riebeeckstrand and Duynefontein via pipelines from the Vöelvllei Dam, which is situated approximately 12.5 km southwest of Tulbagh.

There are 3 major aquifers in the area, namely the Atlantis, Cape Flats and Table Mountain Group aquifers. The Atlantis Aquifer, one of the most studied aquifers in South Africa, supplies groundwater to Atlantis.

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5.1 GEOGRAPHY AND SITE LOCATION

5.1.1 Introduction

This section of this Site Safety Report (SSR) provides geo-referenced information on the location of the site and the surrounding environment. The site boundaries, exclusion area, existing site layout and future developments planned, location of transport routes, topography and major physiographic features, are all indicated, using geo-referenced area maps. It forms a link with **Chapter 1** (Introduction) and **Chapter 3** (Overview of Planned Activities) and provides more detail on the site and its surrounds.

5.1.2 Regulatory Framework

The description of the site location and geography is based on the up-to-date site specific information to ensure compliance with the legal and regulatory requirements for nuclear installations. These are listed in **Chapter 2** (Legal and Regulatory Basis). However, **Section 5.1** deals only with the geographical setting of the site.

5.1.3 Approach to Evaluation

The area subject to evaluation and broad description in this section comprises that within an 80 km radius of the site centroid, a point used for Geographical Information Systems referencing for data requiring sectoral or distance calculations (see Subsection 5.1.6).

Sources of information included published topographic, geological and hydrogeological maps, air photographs and satellite images and the results from the investigations presented in **Sections 5.3** to **5.15**. Further information on planned activities is given in **Chapter 3**.

5.1.4 Purpose and Scope

The purpose of this chapter is to present:

- a description of the regional geography of the site;
- the site location and its description.

For the purposes of this Site Safety Report (SSR), “the site” includes the area currently occupied by Koeberg Nuclear Power Station (KNPS), which is situated on Cape Farm Duynefontyn No. 1552, as well as the

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adjacent farm Kleine Springfontyn 33. The whole of the Eskom property (excluding within Access Control Point (ACP) 1 – where KNPS is located) is managed as a nature reserve, all of which covers an area of circa 3 038 ha.

5.1.5 Regional Geography

The site is 3 038 ha in extent and falls within the Cape Metropolitan Area (CMA), which covers an area of 2 159 km², in the south western portion of the Western Cape Province. It is located on the West Coast approximately 25 km north of Cape Town, the largest nearby metropolitan area and falls within the City of Cape Town Municipality. All places and infrastructure discussed below are shown in **Drawing D-5.1.1**.

The site is bounded to the west by the Atlantic Ocean. The sandy shoreline is oriented northwest-southeast and comprises a wave-cut platform. The landform inland for a distance of up to 10 km is comprised of a dune field which is mainly vegetated. Two main areas of non-vegetated, mobile dunes occur, one covering the central part of the enveloping footprint and the other to the northeast of the site, the so-called Witzand area (see also **Sections 5.11**, Geohydrology, and **5.15**, Geotechnical Characterisation). These dunes are labelled as *Shifting Sand Dunes* on the 1:50 000 scale topographic map of the area.

The highest point of the dune field is approximately 6 km from the coastline and has an elevation of 124.4 m above mean sea level (m amsl). The coastal plain undulates between approximately 20 to 60 m amsl with a terrace approximately 20 m above the mainly sandy shore.

The site adjoins the dormitory town of Duynfontein to the south and is 8 km southwest of Atlantis (distances measured from the site centroid to nearest town boundary). The R27 national route, known as the West Coast Road, runs in a north-south to northwest direction on the eastern boundary of the site. A tarred access road leads from the R27 to the existing KNPS and an alternative access route is via the township of Duynfontein to the south.

The other main local municipalities making up the 80 km radius area are Drakenstein, Swartland and Stellenbosch, with partial coverage of the Witzenberg, Breede Valley, Saldanha Bay, Overstrand and Theewaterskloof local municipalities. The main towns within these municipalities are Paarl, Malmesbury, Stellenbosch, Tulbagh, Langebaan and Grabouw (no major towns within the 80 km radius in the

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Breede, Overstrand or Theewaterskloof local municipalities).

The land within the 5 km radius of the site is predominantly covered by shrubland (strandveld and fynbos), fallow land, urban development, smallholdings, sand dunes, recreational areas and the existing KNPS on the site. The 5 to 10 km band reflects the first intensive agricultural use between the northeast and southeast segments. Cultivated land, large portions of which lay fallow at the time the survey was conducted in May and June of 2020, is dominant in this area with wheat, fodder crops and dairy farming being the main agricultural products (see **Section 5.5**, Land and Water Use). Also present in this zone is the Atlantis industrial area north-northeast and the Melkbosstrand residential area on the coast to the south. Shrubland (mainly strandveld and to a lesser extent fynbos) covers most of the northern portion of the area and the extreme southern part (south of Melkbosstrand), where it is conserved in the Blaauwberg Conservation Area.

There are no rivers on the site itself but there are ecologically important wetlands present to the south of the KNPS and on the northern part of the enveloping footprint for the new nuclear installations indicated in Drawing D-5.1.2 (see **Section 5.3** (Ecology) and **Section 5.11** (Geohydrology)). Koeberg Nature Reserve, which is 3 000 ha in area, is contained within the site boundaries.

The nearest major airport to the site is Cape Town International Airport, which is located 36 km to the south-southeast. Other main airfields are Stellenbosch (50 km southeast) and Fisantekraal (31 km east-southeast) (see **Section 5.7**, Nearby Transportation, Industrial And Military Facilities). Smaller airfields are indicated in Drawing D-5.1.1.

There are two main railway lines (and various branch lines) within the 80 km radius area (see **Section 5.7**), viz:

- the line to Namaqualand which runs approximately 24 km east of the site;
- the main line between Cape Town and Johannesburg/Pretoria, which runs through Worcester.

The Port of Cape Town (26 km south) is the largest commercial harbour in the site region. The Port of Saldanha is located just outside of the 80 km radius but is likely to become a port of entry for power station components. It is the deepest and largest natural port in South Africa.

The site falls within the Berg Water Management Area and there are no imports of water from outside of this area (see **Section 5.12**, Water

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Supply). Major dams situated within the area include, Vöelvrei, Wemmershoek, and Steenbras dams.

The City of Cape Town (CCT) supplies water to the local residential areas of Bloubergstrand, Melkbosstrand, Van Riebeeckstrand and Duynfontein via various pipelines from the Vöelvrei Dam which is situated approximately 12.5 km southwest of Tulbagh. Water is treated and pumped to the 40 000 m³ capacity Melkbos Reservoir, located on the farm Blaauwberg, which supplies the Melkbos/Blaauwberg area with water. The water gravitates along a 700 mm diameter fibre cement pipe to a valve chamber northeast of the Melkbosstrand/M14 intersection. This reservoir supplies the KNPS with water.

Three major aquifers occur in the area, the Atlantis (see **Sections 5.11** and **5.12**), Cape Flats and Table Mountain Group aquifers. The former two are composed mainly of unconsolidated sands while the latter is predominantly composed of sandstone.

The Atlantis Aquifer and is one of the most studied aquifers in South Africa. Atlantis is supplied with groundwater abstracted from two wellfields tapping the Atlantis Aquifer, managed by the CCT: Bulk Water Supply. The Silwerstroom Wellfield is located approximately 12 km north of the site centroid and the Witzand Wellfield approximately 6 km to the north. Approximately 5 Mm³/a are abstracted from the Atlantis wellfields.

The Aquarius Wellfield, also tapping the Atlantis Aquifer and owned by Eskom, is located on the site approximately 6 km northeast of the site centroid. The wellfield is not presently utilised for the KNPS because of water quality issues, however, groundwater is pumped to feed a dam near the Nature Conservation offices for game and bird watering and irrigation purposes.

There is a crude oil pipeline running between Saldanha and the Astron Refinery in Milnerton. The pipeline follows the West Coast Road (R27) in the vicinity of the site and then its alignment changes eastward along Brakkefontein Road towards the railway line, then southward along Potsdam Road (M5) and across Blaauwberg Road (M14) into the Astron Refinery.

The Ankerlig Open Cycle Gas Turbine (OCGT) power station in Atlantis (approximately 10 km, NE) was commissioned in 2007 and is diesel powered. The OCGT power station is used during peak periods and to supply electricity in emergency situations into the Eskom National Grid (see **Section 5.7**).

There are no wind farms located in the site vicinity. One wind farm is

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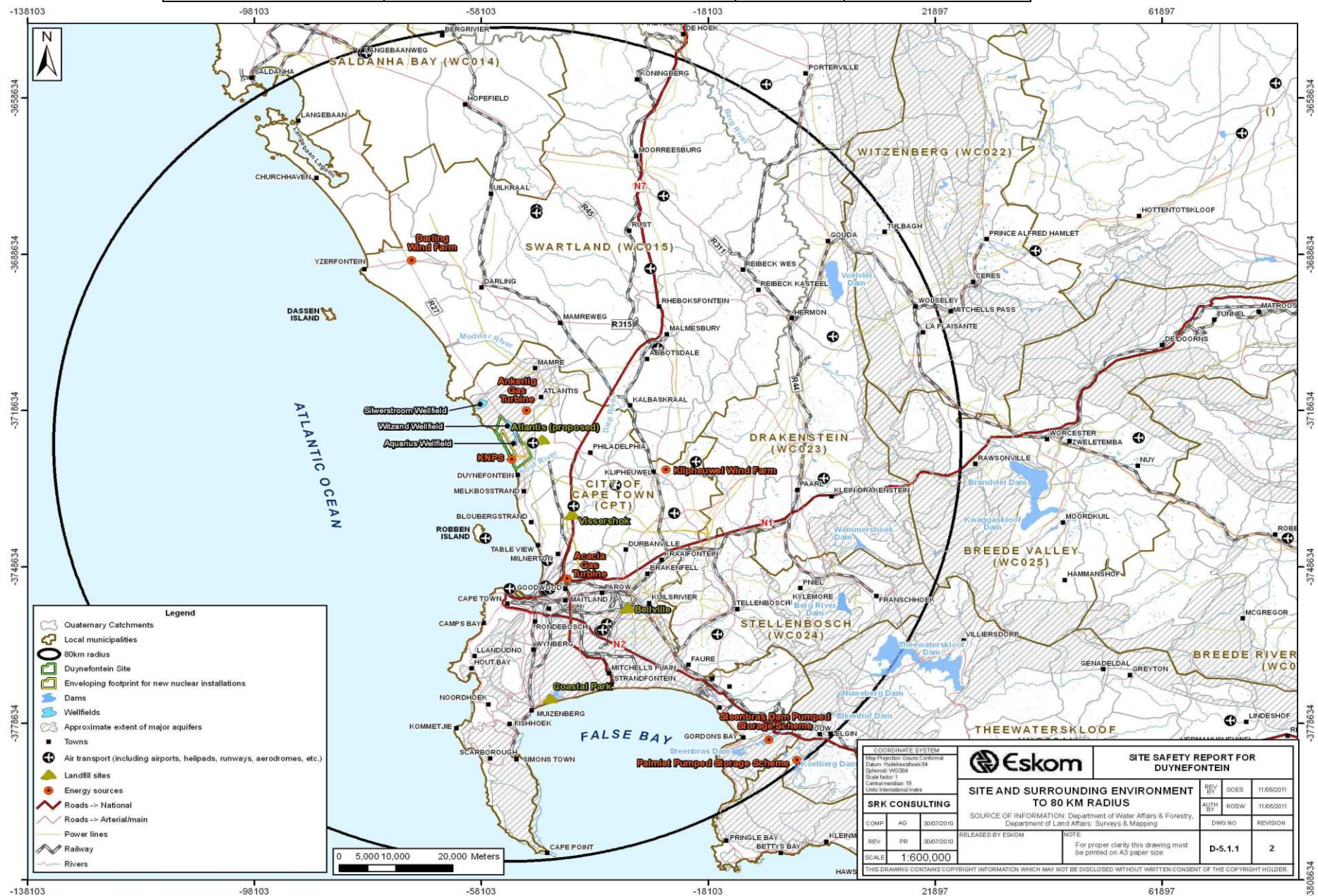
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planned to be located partly in the site vicinity, northwest of Atlantis, with a total generating capacity of 52 MWe. The nearest wind farm to the site is the Darling wind farm (43 km north northwest), which produces 5.2 MWe.

A 400 kV power line connects the area to the national grid and the main source of electricity in Mpumalanga, with the KNPS feeding electricity into the grid for local use and export back up the grid system, depending on demand.

There are a number of quarries located to the east of the N7, of which four are presently active. These quarries supply the main source of building materials for the Cape Town region. Sand mining activities take place north of Dassenberg Drive, near Atlantis. Smaller brickworks are dispersed throughout the area between Bloubergstrand and Kalbaskraal (the nearest being 7.6 km northeast) and at Fisantekraal, north of Durbanville. The only quarry situated in the site vicinity, located on the Ou Skip Road, east of Melkbosstrand (3.4 km south-southeast), is no longer operational. There are various landfill sites in the area, such as the Vissershok site (15 km southeast), the Bellville South site (35 km southeast), and the Muizenberg site (46 km south). A landfill site is planned within the site vicinity, south of Atlantis (7 km northeast), and a regional landfill site is also planned near Kalbaskraal (23 km east).

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5.1.6 Site Location and Description

The site boundaries and existing/possible access routes are shown in **Drawing D-5.1.2**. The following access routes are either existing or proposed (Eskom, 2008):

- existing access road from the R27;
- existing access road from Otto Du Plessis Drive;
- from the R27 – existing but needs upgrading and not currently in use. Will access the new nuclear installation terrace from the south;
- from the R27 – existing but needs upgrading and is not currently in use. Will access the new nuclear installation terrace from the north;
- the existing north-south site road connects all of the above roads but will need upgrading beyond the intersection with the eastern access road to the KNPS.

The site comprises the following farms or portions thereof, which are all owned by Eskom:

- Coastal Strip Farm 1375: 37.06 ha;
- R/E Duynefontyn 34: 1 257.39 ha;
- R/E Kleine Springfontyn 33: 1 590.29;
- Kleine Springfontyn No 33/Portion 6: 51.70 ha;
- Witzand No 2/Portion 5: 101.57 ha.

These farms and the boundaries of the owner-controlled area are shown in **Drawing D-5.1.2**.

The existing KNPS is located on the southern portion of the site. It comprises of two pressurised water reactors and their turbine generators and associated plant, with a combined power output of 5 550 MW_{th} (Eskom, 2016a).

The site centroid is defined by the coordinates X: -52727.4000 and Y: -3727966.6500. Details on site security are given in **Chapter 9** (Physical Protection and Security) but the main additional points related to geography and site location are (see **Drawing D-5.1.1**):

- Access is controlled to all areas within the owner controlled boundary.
- There is a 2 km exclusion zone seawards from the site parallel to the

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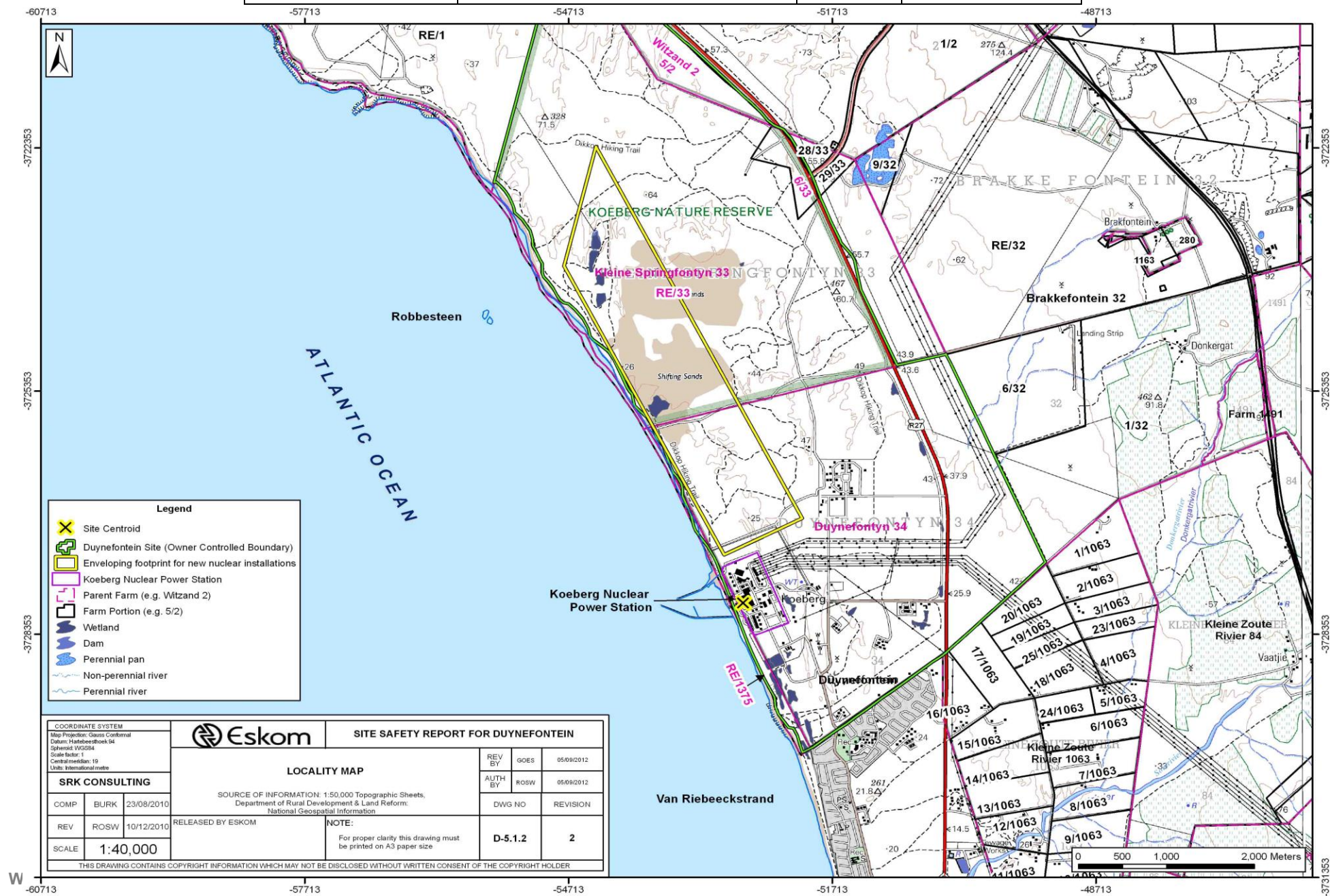
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coast.

- There is a 750 m height restriction on airspace over the owner controlled area.

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5.1.7 Management of Uncertainties

The uncertainties associated with the data presented in this section includes, e.g. land ownership, plant type or reactor footprint.

These uncertainties are addressed through evaluation of different scenarios, a range of PWR reactor designs, and the consideration of an enveloping footprint.

5.1.8 Management System

This geography and site location section mainly draws from other SSR sections/data and the measures taken to ensure quality of data so obtained shall be cross-referenced from the relevant sections, i.e. **Sections 5.3 to 5.15**.

5.1.9 References

1. Eskom, 2008. *Nuclear Newbuild: Main Road Access to Sites*. Johannesburg: s.n.
2. Eskom, 2016a. *Duynefontein Site Safety Report*, Cape Town: Koeberg Operating Unit.
3. NSS, 2006. *Koeberg Nuclear Power Station Site Safety Report*. Cape Town: s.n.

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