ENVIRONMENTAL IMPACT ASSESSMENT FOR THE PROPOSED NUCLEAR POWER STATION ('NUCLEAR 1') AND ASSOCIATED INFRASTRUCTURE

Visual Impact Assessment

August 2010




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5 August 2010

DECLARATION OF INDEPENDENCE

I, Alan Cave, as duly authorised representative of Bapela Cave Klapwijk CC hereby confirm my independence as a specialist and declare that neither I nor Bapela Cave Klapwijk CC have any interest, be it business, financial, personal or other, in any proposed activity, application or appeal in respect of which Arcus GIBB was appointed as environmental assessment practitioner in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), other than fair remuneration for worked performed, specifically in connection with the Environmental Impact Assessment for the proposed conventional nuclear power station ('Nuclear 1'). I further declare that I am confident in the results of the studies undertaken and conclusions drawn as a result of it – as is described in my attached report.

_____

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TITLE	**:**	Environmental Impact Assessment for the Proposed ***Nuclear Power Station ('Nuclear-1') and Associated Infrastructure*** Visual Impact Assessment for the sites known as Thyspunt, Bantamsklip and Duynefontein
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EXECUTIVE SUMMARY

Eskom intends building new nuclear power stations on all three sites. One site is located on a coastal promontory known as Thyspunt between Oyster Bay and Cape St. Francis, approximately 70 km south-east of Port Elizabeth. The second site is located near Bantamsklip between Pearly Beach and Quoin Point on the southern western Cape coast east of Gansbaai and the third is Duynefontein located north and adjacent to the Koeberg Nuclear Power Station (NPS), due west of the Town of Atlantis on the Western Cape Coast.

This report evaluates the potential visual impact of the Nuclear Power Station on the surrounding natural and human-modified environment of each site.

Visual risk sources for all three sites relate primarily to the increase in visual intrusion of the Nuclear Power Station as an entity and in combination with ancillary elements such as the construction offices, sheds, access roads, switch yards, transmission lines, masts and spoil dumps. At Duynefontein site the visual risk sources relate primarily to the increase in visual intrusion in combination with Koeberg Nuclear Power Station adjacent to the southern boundary of the site and the proposed Pebble Bed Modular Reactor Demonstration Power Plant adjacent on the southern side of Koeberg. The additional risks for each site have been identified as the accommodation of the large volume of excavated material, the alteration of areas surrounding the site during construction and the new access roads for the Thyspunt site specifically.

Each ***site*** is discussed and rated according to the visual criteria of visibility from roads and the general surrounding landscape, the possible visual intrusion on landscape character and sense of place and the visual association with the new transmission lines. The visual impact of the transmission lines are the subject of a separate EIA; viz. the Transmission EIA.

Each ***site*** is assessed according to a set of rating criteria set for visual intrusion and visibility impact. The finding is that the Thyspunt NPS, Bantamsklip NPS and Duynefontein NPS have an intensity of visual intrusion that is rated as significant, particularly the night scene.

Using set criteria the visual impact is assessed for each of the NPS sites.

The conclusion drawn is that the Thyspunt Nuclear Power Station, Bantamsklip Nuclear Power Station and Duynefontein Nuclear Power Station will exert a significant visual impact on the existing visual condition and character of the local setting within a radius of 5 km. The meteorological and radio masts will be clearly visible on a cloudless day from at least 10 km away. The red light on top of the 120m high meteorological mast will be visible at night from beyond 10 km. The climatic conditions will influence the masts' visibility as cloudy or misty conditions can almost totally obscure these elements. Particular visual aspects that relate to site are as follows:

<u>Thyspunt</u>
The visibility is contained along the coast by east-west orientated dune fields. This limits the visual exposure of the Thyspunt NPS to the towns of Oyster Bay and Cape St. Francis.

The main aspect that influenced the above conclusion is the presence of the visually dominant Thyspunt NPS and the associated transmission lines and buildings, all of

which are visible to some degree from within a 10 km radius of the site, but mainly along the coastal edge. This is due to the landform that includes vegetated and moving dunes that trend east-west, almost parallel to the coastline and the extended visibility at night due to intense illumination of that site. However the general existing coastal night scene is disturbed by the intense incandescent lights on the 'chokka' boats as they fish for squid near the shore. The light intensity varies according to the season for chokka fishing. The visual intrusion on the landscape character will be increased by the HV Yard, the transmission lines and proposed northern access road that all become visually prominent in the panhandle of the property north of the high sand dune.

Bantamsklip

The main aspect that influenced the above conclusion is the presence of the visually dominant Bantamsklip NPS and the associated transmission lines and buildings, all of which are visible to some degree from within a 10 km radius of the site. This is due to the landform that slopes towards the coastline and the prominent seaward location of the site on a coastal terrace. This visibility will be extended at night by the illumination of the plant.

Duynefontein

The finding is that the Duynefontein NPS has an intensity of visual intrusion that is rated as significant, particularly at night. This in association with the scale and proximity of the Koeberg NPS and possible future Pebble Bed Modular Reactor Demonstration Power Plant (PBMR DPP) will as a group extend the existing visual impact of Koeberg NPS on the surrounding landscape and communities.

The visually dominant Duynefontein NPS and the associated infrastructure will be visible to some degree from within a 10 km radius of the site. This is due to the landform that slopes gently towards the coastline and the extended visibility at night due to illumination of that site.

The cumulative visual impact of three large power generating facilities within 3 km of the coast will have a high visual intrusion on views, visual character and visual quality.

The new ***Opened*** Cycle Gas Turbine Power Station is comple***ted*** in Atlantis, approximately 10 km inland from the proposed site. This add another large scale structure to the regional landscape.

Ancillary structures and features were also assessed for their influence on the visual sense of place and their visual intrusion. These elements are the meteorological mast (120m) and the radio mast (95m), the transmission lines within the EIA corridor, the spoil and rock dumps and the access roads to the site from the provincial road.

The findings are:

- the masts will be visible from further away than for the NPS, particularly at night, due to the flashing red light at the top. The mast will be slender, which will reduce its visual intrusion;

- the transmission lines within the EIA corridor will add to the visual intrusion of the project by their height and number;

- the access roads for Bantamsklip and Duynefontein will have negligible visual intrusion on the sense of place;

- the roads for Thyspunt will have the most negative impact on the sense of place, with the northern route identified as having the least negative impact as a result of it being visually integrated with the highly visible transmission lines,2 x 400kV out and 1 x 132kV line in, as well as the HV Yard;

- the spoil dumps are very large and have been considered to be placed within the EIA corridor. This position will result in the dumps being dominant visually within this area and can serve as large screens of the NPS in views from the provincial roads.

The following Generic Mitigation measures are proposed to reduce the visual impact of the NPS.

- Colour
  It is recommended that a light blue-grey is used for the large structures (namely the Turbine-Generator Building), with the stack (chimney) a very light grey. The NPS is a concrete structure, which will have a light grey colour. A darker band around the large structures will reduce their vertical scale. The masts should be a grey colour which will be the result of their galvanised finish. However this may be in conflict with the regulatory requirements that they are red and white bands.

- Screens
  Temporary screens in the form of shade cloth on fences around the construction site, working areas and lay-down areas must be used to obstruct views of most of the construction elements at the level of the fence.

  Earth berms of significant proportions must be created along the site boundary nearest to sensitive land uses, e.g. residential areas and roads, to screen portions of the structures. However, consideration should be given to the associated impacts caused during their construction and stabilisation, such as dust, noise, rehabilitation and the destruction of existing coastal flora. A thorough assessment should be carried out on site before any decision is made regarding a screen berm. This is necessary in the context of possible residential land uses in the coastal area east of the Thyspunt NPS site and west of Cape St. Francis, as well as east of Bantamsklip NPS, which may result from the extension of the R43 to link with Bredasdorp.

- Lighting
  The lighting of the structures and areas within the NPS site should be designed by a suitably experienced person with the objective to reduce “light spill”. Aspects to be incorporated will be down lighting, lighting colour, extent of necessary illumination, light fittings that direct the light and elimination of the visible light source.

- Spoil dumps
  Large spoil dumps must be integrated into the selected setting by varying their form and side slopes to fit the scale of existing landforms. In addition their re-vegetation with typical indigenous species of the surrounding landscape is essential to create a visual fit of the dump’s elements to the existing landscape character.

A Landscape Architect should be appointed to the design team to advise on the visual integration of the project on a detailed level during the phases of design and construction and operation.

The dilemma of placing a new large scale facility in an area that is relatively undisturbed and remote or near build-up areas to reduce the visual intrusion intensity remains. The question is whether to increase, but contain the visual impact locally or to visually impact another (already impacted) location, but not to the same degree.

The conclusion is that the NPS on any of the three sites will have a high visual impact on the character and sense of place of the existing setting. However, with attention to detailed aspects of all mitigation measures proposed, the visual impacts can be reduced. To achieve this considerable effort will need to be spent on this aspect during the site design and construction stage of the project.

ENVIRONMENTAL IMPACT ASSESSMENT FOR THE PROPOSED NUCLEAR POWER STATION ('NUCLEAR 1') AND ASSOCIATED INFRASTRUCTURE

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ABBREVIATIONS

DEA	**Department of Environmental Affairs (previously Department of Environmental Affairs and Tourism)**
NPS	**Nuclear Power Station**
DTM	**Digital Terrain Model**
NEMA	**National Environmental Management Act, 1998 (Act No, 107 of 1998)**
EMP	**Environmental Management Programme**
EIA	**Environmental Impact Assessment**
GIS	**Geographic Information System**
amsl	**Above mean sea level**

GLOSSARY

Critical visual viewpoints
The actual points from where a viewer sees the landscape or the proposed alteration where the impact will be significant due to the change in landform, a colour contrast or a large structure.

Cone of view
The angle of view that a person can see from looking straight ahead that excludes peripheral vision. This angle is approximately 45 degrees.

Mitigation
Any action taken or not taken in order to avoid, minimise, rectify, reduce, eliminate, or compensate for actual or potential adverse visual impacts.

Scenic value
Degree of visual quality resulting from the level of variety, harmony and contrast among the basic visual elements.

Sense of place
The unique character of a place, whether natural, rural or urban. It is allocated to a place or area through cognitive experience by the user.

Viewshed
The theoretical area within which an observer is likely to see a specific structure or area in the landscape. It is generated from a digital terrain model (DTM) made up of 3D contour lines of the landform. Intervening objects, structures or vegetation will modify the viewshed at ground level.

Visual character
The overall impression of a landscape created by the order of the patterns composing it; the visual elements of these patterns are the form, line, colour and texture of the landscape's components. Their interrelationships are described in terms of dominance, scale, diversity and continuity. This characteristic is also associated with land use.

Visual impact
The degree of scenic quality change that result from an activity. Negative visual impacts affect the environmental quality by disrupting the harmony, diversity or character of the elements.

Visual intrusion
The nature of intrusion of an object on the visual quality of the environment in terms of its ability to be absorbed into the landscape elements or contrast with the landscape surrounds.

Visual quality
Evaluation by viewers of the visible components of the natural, cultural or impacted environment that compose a particular scene. It is defined in terms of natural harmony, cultural order and coherence.

Visually sensitive areas
Areas in the landscape from where the visual impact is readily or excessively encountered.

1 INTRODUCTION

1.1 Background

In accordance with the requirements of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) and the associated promulgated EIA regulations, the proposed Nuclear Power Station (NPS) due to its scale, extent and expected general impact on the natural and social environments is subject to an EIA process.

Three possible sites have been identified following intensive studies by others. These sites are known as Thyspunt (Thyspunt NPS), Bantamsklip (Bantamsklip NPS) and Duynefontein (Duynefontein NPS).

The Thyspunt NPS is located on the southern Western Cape Coast between Oyster Bay and Cape St. Francis, 20 km south of the town of Humansdorp and approximately 50 km west of Port Elizabeth. Refer to **Figure 1.1.**

The Bantamsklip NPS is located on the southern Western Cape Coast between Pearly Beach and Quoin Point. Refer to **Figure 1.2**.

The Duynefontein NPS is located on the western Western Cape Coast due west of Atlantis and 2 km north of the existing Koeberg Power Station at Melkbosstrand. Refer to **Figure 1.3.**

This visual impact assessment forms part of the Environmental Impact Report (EIR) that will be produced by Arcus GIBB, the principal environmental consultants on the project.

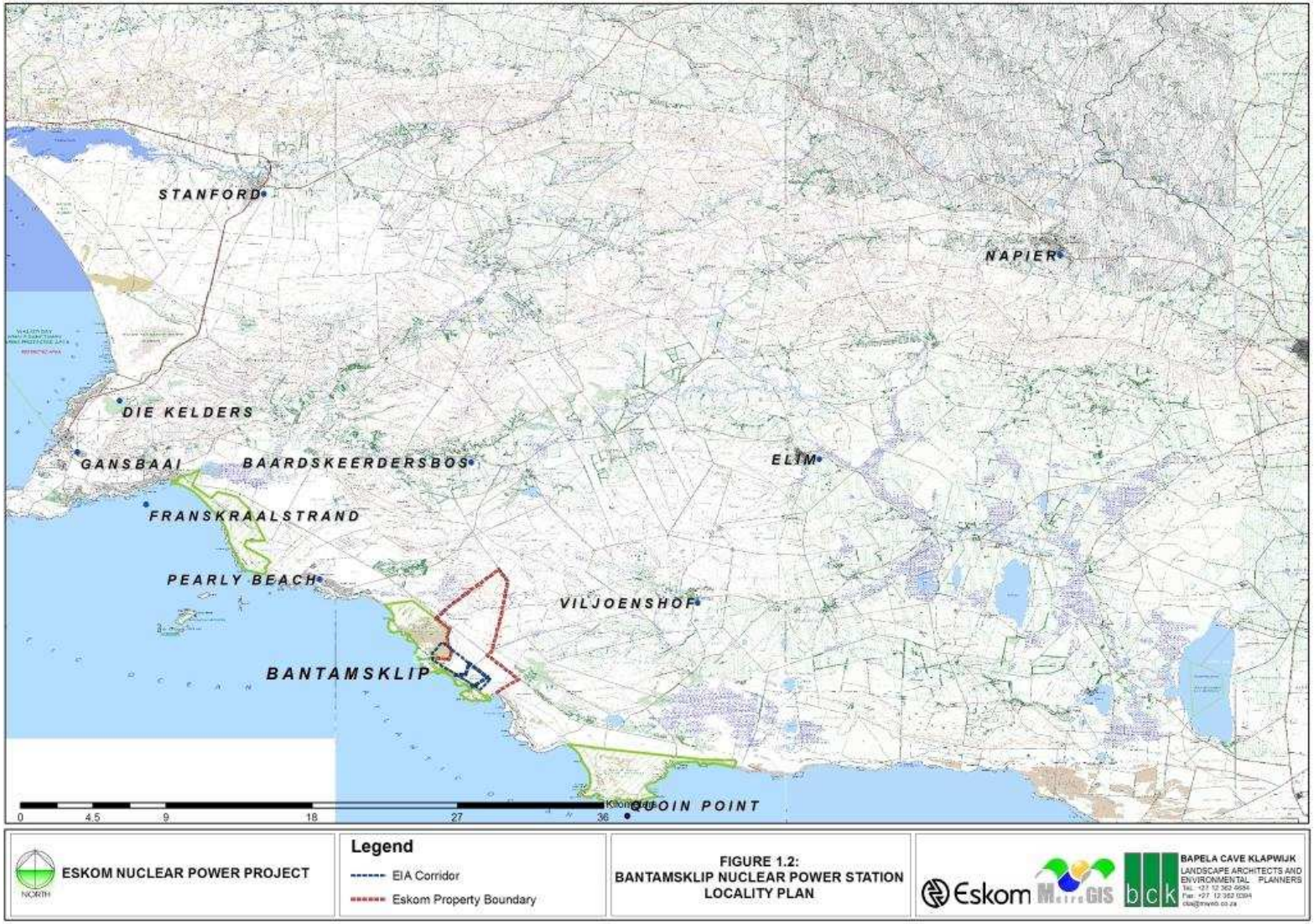
1.1.1 Objectives of this Report

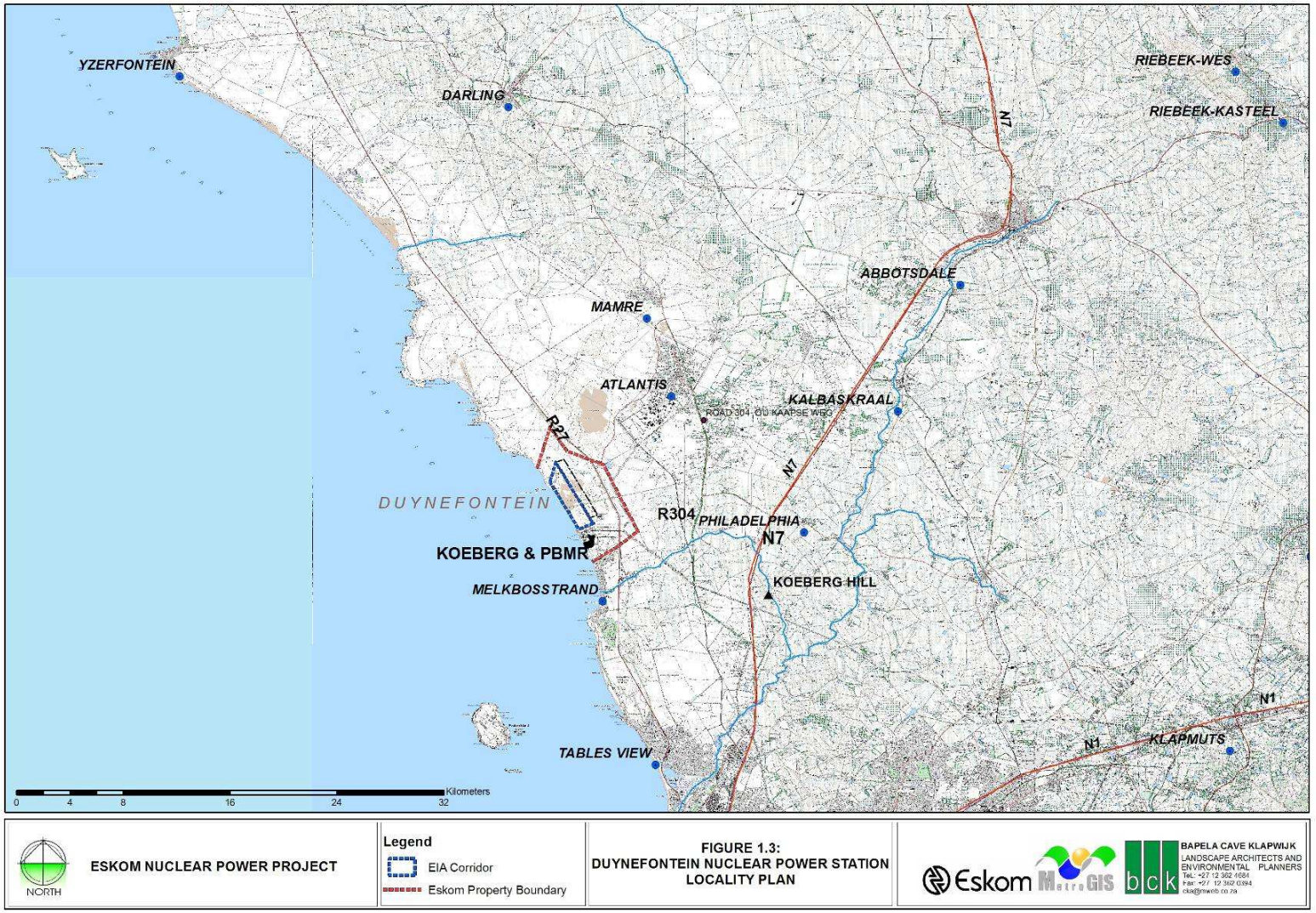
The objective of this report is to assess the potential visual impact of the NPS and associated infrastructure on the existing surrounding natural and socio-economic environment for the construction, operation and decommissioning stages of the project.

In order to comply with this objective, this study will:

- Describe the visual character of the site by evaluating components such as topography and current land use activities. This will record the status quo of the visual environment;
- Identify elements of particular visual quality that could be affected by the proposed project;
- Describe and evaluate the visual impacts of the individual components of the proposed project from identified critical areas and view fields;
- Determine the extent of the visibility of the project from surrounding areas as well as the night time effect caused by the lighting of the site;


HANKEY
WESTON
GAMTOOS
KAREEDOUW
KRUISFONTEIN
CLARKSON
HUMANSDORP
JEFFREYS BAY
OESTERBAAI
SEA VISTA
THYSPUNT
CAPE St. FRANCIS
0 3 6 12 18 24 Kilometers
ESKOM NUCLEAR POWER PROJECT
Legend
EIA Corridor
Eskom Property Boundary
FIGURE 1.1:
THYSPUNT NUCLEAR POWER STATION
LOCALITY PLAN
BAPELA CAVE KLAPWIJK
LANDSCAPE ARCHITECTS AND
ENVIRONMENTAL PLANNERS
bck


STANFORD
NAPIER
DIE KELDERS
GANSBAAI
BAARDSKEERDERSBOS
ELIM
FRANSKRAALSTRAND
PEARLY BEACH
VILJOENSHOF
BANTAMSKLIP
QUOIN POINT
0
4.5
9
18
27
36
Kilometers
ESKOM NUCLEAR POWER PROJECT
NORTH
Legend
EIA Corridor
Eskom Property Boundary
FIGURE 1.2:
BANTAMSKLIP NUCLEAR POWER STATION
LOCALITY PLAN
Eskom
MetroGIS
bck
BAPELA CAVE KLAPWIJK
LANDSCAPE ARCHITECTS AND
ENVIRONMENTAL PLANNERS


YZERFONTEIN
DARLING
RIEBEEK-WES
RIEBEEK-KASTEEL
N7
ABBOTSDALE
MAMRE
ATLANTIS
KALBASKRAAL
ROAD 304 - OU KAAPSE WEG
R27
N7
DUYNEFONTEIN
R304
PHILADELPHIA
N7
KOEBERG & PBMR
KOEBERG HILL
MELKBOSSTRAND
TABLES VIEW
N1
N1
KLAPMUTS
Kilometers
0
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8
16
24
32
NORTH
ESKOM NUCLEAR POWER PROJECT
Legend
EIA Corridor
Eskom Property Boundary
FIGURE 1.3:
DUYNEFONTEIN NUCLEAR POWER STATION
LOCALITY PLAN
Eskom
MetroGIS
bck
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- ***Recommend mitigation measures to reduce the potential visual impacts generated by the components of the proposed project for inclusion into the EMP.***

1.1.2 The Visual Impact Assessment in Context

The size of the NPS (Reactor and Turbine-Generator Building), the ancillary buildings, masts, temporary lay-down area and construction site and the switch yard will change the visual character and quality of the coastal setting.

The visual change is due to the scale, the height above ground and the lateral extent of the NPS and ancillary buildings and structures. These large and extensive industrial type structures are located in a prominent position on a coastline and will be seen from a distance of 10 km.

The sites of Thyspunt and Bantamsklip are on particularly scenic and relatively remote stretches of coastline. The Duynefontein site is adjacent on the north side of the existing Koeberg Nuclear Plant.

1.2 Study Approach

This report considers the visibility or views of each of the three NPS sites from within a study area radius of approximately 15 km from the site. The visibility of the NPS will be determined by how it will "fit" into the existing landscape form, character and scenic quality. An assessment of the intensity and significance of the visual "fit" is made using defined criteria.

1.2.1 The Study Approach and Method

An overall impression of the setting was obtained during site visits in March and June 2007. A second site visit in March 2008 focused on critical viewpoints, the extent of the ***view shed***, intervening elements or structures which blocks views of the site and the character, scale and visual quality of the setting.

The visual impact of the Koeberg Nuclear Power Station was studied in detail to assess the scale of the structure in the landscape. The effect of distance on visibility and the effect of weather and the night scene was photographed and understood so that meaningful ratings of visual criteria were applied.

Topographical and cadastral maps were used to record radial zones of visual impact by scale using the Koeberg Nuclear Power Station as an existing example of scale. This structure and ancillary features is similar in scale to two power generating units of the proposed power plant.

Radial zones were chosen to include particular land uses and views. These zones were defined as high to low visual impact areas selected on distance and visible scale of the proposed NPS.

The visibility and visual intrusion experienced by viewers in each zone is described and assessed. These zones included residential areas, beach areas, provincial and national roads and defined critical viewpoints.
The visual intrusion ratings of the zones are 0 – 2.5 km (high), 2.5 – 10 km (medium) and > 10 km (low).

The viewshed (the area within which the NPS will be visible) was determined using digital topographic maps analysed by Geographic Information System (GIS) algorithms in Arcview Software Suite. This viewshed was contour based and ground truthed during the site visit.

The visual impact of the NPS was then assessed and rated according to accepted criteria that define intensity, extent and significance of the visual impact.

The visual impact of the existing land use on the surrounding community was compared to that of the potential visual impact of the NPS. The significance of the visual impact difference is discussed in the context of the setting.

The document 'Guideline for involving Visual and Aesthetic Specialists in EIA processes' (Oberholtzer. B and CSIR 2005) has been referred to during this study.

1.2.2 Assumptions

The following assumptions have been made:

- The study area is taken to be within 15 km radius of the site because the visual impact of the project structure beyond this distance is so reduced that it can be considered negligible even if there is a direct line of sight.
- Future electrical substations and transmission lines in the area will significantly alter the visual character of the inland area.
- Motorists' and passengers' view field is predominantly focused forward and therefore vistas beyond the 30° cone of view are no t noticed as much as those within the view cone.
- The bulk excavation stockpile will be used to backfill the area around the Reactor Building and the balance will be removed from site.
- The communities of Oyster Bay and Cape St. Francis near Thyspunt site are more sensitive to the visual impact of the NPS than visitors because these residential areas are established and expanding.
- The communities of Pearly Beach, Franskraal and Quoin Point Nature Reserve near Bantamsklip are more sensitive to the visual impact of the NPS than visitors because these residential areas are established and expanding.
- The communities of Duynefontein (a suburb of Melkbosstrand) and Atlantis are more sensitive to the visual impact of the Duynefontein NPS than visitors because these residential areas are established and expanding.

1.2.3 Limitations of this Study

The purpose of this visual impact assessment study is to identify the visual impact of the NPS in relation to the existing landscape setting. However, while an effort is made to be rigorous and logical in the assessment process, the element of subjectivity does influence the ratings. It has nevertheless been reported in McCool, *et al* (1986) that the opinion of the professional visual impact assessor is more critical than that of the general public.

The position of important or key viewpoints such as farmsteads and homes have not all been visited. The 'ground truthing' of this information would have been time-consuming at this level of investigation. However, the contour-based viewshed provides detail line of site visibility information.

View obstruction by intervening vegetation and structures has not been mapped. Site observations have identified the most significant obstructions to direct views of the NPS.

Access to every property along the coast of Thyspunt was not possible. Properties on the eastern side where the greatest visual impact would be experienced was not possible because most are holiday homes and were gated at the common access road. However access to the property Rebelsrus was granted in May 2010

The NPS sites' locations have been determined by the seismic and geotechnical stability of the base geology. Geotechnical studies along the entire South African Coastline have been carried out over the last 25 years.

A visual simulation of the Thyspunt NPS ***was done using one of a number of difference possible designs.***. An indication of the scale and extent of the layout has been taken from the existing Koeberg Nuclear Power Station and diagrammatic sections that show the scale ***for all the sites***.

The conceptual nature of the design and layout detail available at the time that this report was written, did not enable detailed visual impact mitigation measures to be provided for each site.

In terms of the Guideline for involving Visual and Aesthetic Specialists in EIA Processes, (Oberholzer, B., & CSIR 2005), this scale of development requires a visual simulation of the form in the landscape. This simulation has not been done ***except at Thyspunt site***..

1.2.4 Legal Issues

There are no specific legal requirements regarding visual impact assessment. General legislation pertaining to the environment is contained in the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) and the National Environmental Management: Integrated Coastal Management Act 24 of 2008. The 'Guidelines for the involvement of visual specialists in EIA processes' developed by the Western Cape Department of Environmental Affairs and Development Planning(DEADP) was used as a 'best practice' guideline for this study.

Issues and Comments

NAME & ORGANISATION	ISSUES /COMMENTS	RESPONSE
Ms Elisabeth	• The "high visual	The National Environmental

NAME & ORGANISATION	ISSUES /COMMENTS	RESPONSE
Rautenbach ST FRANCIS CONSERVANCY	intrusion" of a nuclear reactor. How does this fit in with regulations to coastal land-owners and Conservancy members who were not permitted to have electricity poles erected within visibility of the coast?	Management Act (NEMA) was set in place in 1999 in order to ensure the sustainable development of South Africa's natural resources. It encompasses all environmental issues be it ecological, visual or cultural. A set of various activities where identified and listed. When an applicant proposes to undertake a listed activity, an application must be made to the relevant authority on local, provincial or national level. Section 24 of NEMA states that the potential impact on the environment of what are described in that statute as "listed activities" must be considered, investigated, assessed, and reported on to the competent authority charged with granting the relevant environmental authorisation. The erection of electricity poles is contained in listed activity 14 of Government Notice No. R 386 of 2006. An application must be made to the relevant provincial authority, which will take local by-laws and regulations into consideration when reviewing the application. The construction of a Nuclear facility and associated infrastructure is listed in Government Notice No. 387 of 2006. An application was made to the national authority, namely the Department of Environmental Affairs. Should the application for the nuclear facility be granted and the application for electricity poles declined, it may be in the national economic interest to develop the area while local interests may require the preservation of environmental, ecological, visual or cultural integrity of such an area. The assessment and authorisation of each application must be left up to the discretion of the relevant decision-

NAME & ORGANISATION	ISSUES /COMMENTS	RESPONSE
		making authority. Section 20 (1) of the National Environmental Management: Integrated Coastal Management Act of 2008 states that a municipality in whose area coastal access land falls, must control the use of and activities on that land and ensure that the provision and use of coastal access land and associated infrastructure do not cause adverse effects to the environment. According to section 20(2) of the Act, a municipality may make by-laws for the proper implementation of subsection (1).

2 DESCRIPTION OF AFFECTED ENVIRONMENT

2.1 Description of the Project Components

The proposed NPS is made up of the following components:

- Integrated Reactor Buildings and Turbine-Generator Building
  The Turbine-Generator Building is approximately 250 m long, 100 m wide and 55 m high. The reactor buildings are approximately 65 m high with a 15 m tall stack attached to each. Both reactor buildings are constructed of reinforced concrete. The reactor buildings extend for a further 25 m below ground level. The Generator House is in the building immediately adjacent to the Reactor Building. This is a conventional framed structure.

- The Services Building houses the main control room and waste handling and storage system. This building provides controlled access to the Reactor Building.

- An Ancillary Building east of the Reactor Building contains the medium and low voltage switch gear, diesel generators and other operation systems.

- A Cooling Water Plant Building contains water pumps and heat exchangers for the sea water used to cool the condenser.

- An Administration Building.

- The Waste Handling and Hydrogen and Nitrogen Storage Building are adjacent and to the south of the Reactor Building.

- The Temporary (during construction) Contractor's Construction and Lay-down Areas will be accommodated within the 1,5 km site.

- The Lay-down Area will accommodate two warehouses, welding school and offices, rebar fabrication shops, steel fabrication shops, heat treatment shops and extensive lay-down areas for produced and fabricated elements. For the purposes of this study the maximum building height at the lay-down area is taken assumed to be 9 m above ground level.

  This area will be operative for the 8 year duration of the construction contract, and thereafter will be decommissioned and the area rehabilitated.

- The Transmission Line
  The 400kV lines from the NPS will be routed directly inland from the Switch Yard which will be adjacent to the Turbine-Generator Building.

- Two masts, a meteorological mast about 120m in height and a communication mast, about 95m in height.

The visual impact of the NPS on all three sites will depend on the following characteristics of the receiving environment:

- Topography: vegetated dune field above beach terrace in relation to sand or rock shoreline

- Vegetation cover: fynbos / strandveld invaded by Port Jackson, agricultural fields, wetlands
- Land use: agricultural holdings, suburban expansion, conservation areas
- Landscape diversity: a combination of the above but predominantly conservation along the coast
- Landscape character: sense of place, scenic quality, tranquil, dynamic and beach type and condition i.e. rock or sand

The study area broadly comprises two sections, coastal and inland. These areas are generally divided by a band of vegetated or active sand dunes.

2.2 Topography

2.2.1 Thyspunt

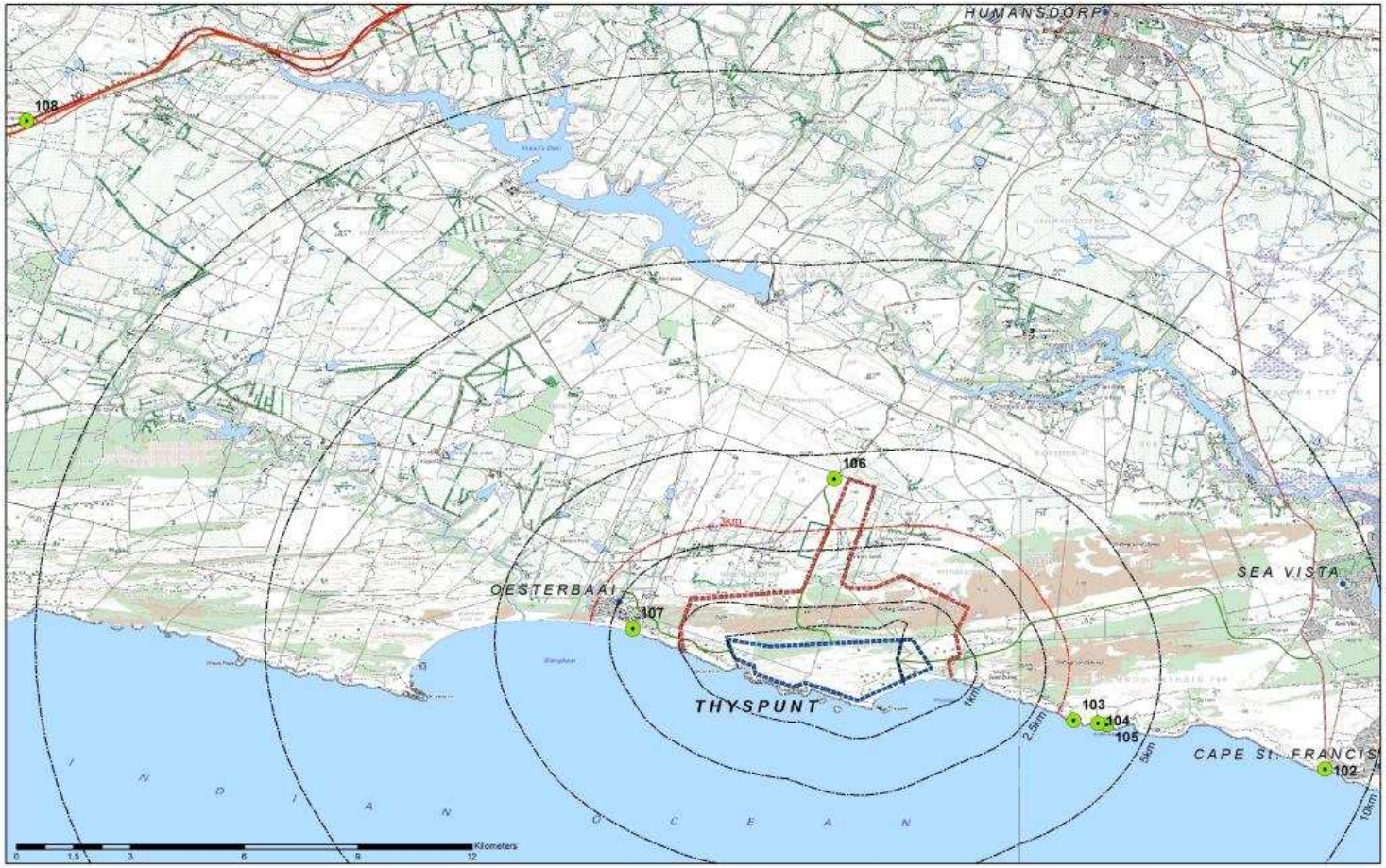
The site is underlain by alternating bands of unconsolidated calcareous Quaternary sands of the Waenhuiskrans Formation and consolidated aeolianite. The rocky shoreline is oriented almost west north-west and east south-east. Further inland, the narrow northern boundary of the site extends into quartzitic sandstone and, for a distance of approximately 3 km, comprises of a vegetated dune field with the washboard form and having the axis east-west as a result of the prevailing winds. Refer to **Figure 2.1.**

The highest portion of the dune field is approximately 2 km from the coastline and has an elevation of about a 100 m, with high points of 111 m and 122 m amsl. The undulating vegetated dunes between this zone and the coastline are approximately 70-80 m amsl, and drop to a terrace 20 m above the rocky shore.

Further inland from the dune field the landform rises evenly to a low hill has its long axis orientated east-west, with a high points of 160 m amsl. This elongated hill is about 6 km inland.

Implications for the Project

The generally east-west orientated dunes and hill screen the views of the site from areas inland.


HUMANSDORP
108
106
3km
OESTERBAAI
107
SEA VISTA
THYSPUNT
1km
2.5km
5km
10km
103
104
105
CAPE ST. FRANCIS
102
I N D I A N O C E A N
0 1.5 3 6 9 12 Kilometers
ESKOM NUCLEAR POWER PROJECT
Legend
Photo Positions
EIA Corridor
3km Exclusion Area
Eskom Property Boundary
FIGURE 2.1:
THYSPUNT NUCLEAR POWER STATION
LOCATION OF PROPOSED
TNPS FACILITIES
BAPELA CAVE KLAPWIJK
LANDSCAPE ARCHITECTS AND
ENVIRONMENTAL PLANNERS
bck

2.2.2 Bantamsklip

The rocky coastline is orientated north-west to south-east between Franskraalstrand (north-west) and Quoin Point (south-east). This is as a result of the Cape Folded Belt geology having hard metamorphosed rock strata that are more resistant to physical and chemical weathering along that coastal section. The orientation of the folding has determined the coastline orientation.

The rock supports a shoreline terrace, approximately 20 m amsl, on which the NPS is proposed to be located.

The site is on this terrace near the local rock promontory known as Bantamsklip. The farm is registered as Hagekraal. This rocky terrace extends landward and is mostly covered by sand that varies in thickness from a few centimetres to 40 m where parallel sand dunes have been formed nearer to the Coast Road R43. This narrow coastal plain rises to a plateau height of approximately 195 m amsl (Carruthers Hill) 2 km inland.

There are three local river and wetland systems within 15 km radius of the site. These drain the southern coastal edge of the plateau.

The Boesmans River and Haelkraal River reach the sea just south of Franskraalstrand and Pearly Beach respectively and the Ratelrivier reaches the sea east of Quoin Point.

Four prominent high points occurring along the southern edge of the plateau. These are Wolfhuiskop (274 m amsl), Hagekraal (212 m amsl), Carruthers Hill (195 m amsl) and Buffelsjagberg (311 m amsl).

Implications for the Project

The sand covered rock terrace rises gently to the steeper slopes of the plateau edge inland. There is no visual screening of the NPS from areas inland or along the coast by larger platforms. This observation is based on landform contours only. However, high roadside vegetation and houses on the beach obscure views towards the site at selected localities.

2.2.3 Duynefontein

The landform rises very gently (1:75 slope) from the coast inland to the N7 over a distance of approximately 15 km. A slightly higher (50 m amsl) landform, possibly a consolidated dune, forms a crescent around the Duynefontein NPS as its centre. This large shallow bowl is evident in the viewshed analysis. Refer to **Figures 3.2.3 and 3.3.3.**

The coastal area between the sea and the R27 is a dune fields with hummock dunes on the landward side of the beach.

Implications for the Project

The low crescent landform provides partial screening of the area beyond the 10 km radial distance from the Duynefontein NPS.

The flat landform / dune field within a 10 km of the site offers no visual screening. This observation is made on the basis of landform only.

2.3 Vegetation

2.3.1 Thyspunt

The site falls within the fynbos biome, and is dominated by South coast dune fynbos and Sand River primary dune community. The site has considerable habitat diversity in the form of a number of contrasting vegetation types, including subtropical forest thicket.

The dune field has been stabilised nearer to the coast by vegetation, both indigenous and exotic. The vegetation on the windward side of the dune is wind-pruned and dense. The vegetation in the "slack", the valley between the dunes, is also relatively dense, but taller than other more exposed vegetation due to these areas being sheltered from the wind.

Implications for the Project

The vegetation affords little variation in height on the exposed seaward side (2-3 m) to make any difference to the visibility of the Nuclear Power Plant. The taller trees in the "slack" have no screening effect, because these are below the dune height.

The vegetation provides no effective screening of the entire NPS. However, it will contribute to partial screening when close to an observer or residence.

2.3.2 Bantamsklip

The dune field on the coastal terrace between the sea and the R43 is covered with vegetation both exotic (Port Jackson Wattle) and indigenous (Strandveld). The former has established dense thickets either side of the R43, while the indigenous plants predominate on the portion of the terrace that is closer to the sea.

The indigenous flora is low, approximately 300 mm to 1 500 mm in height. The Port Jackson shrubs are mostly about 3 m in height.

There are four portions of land that comprise the Walker Bay Forestry Reserve between Franskraalstrand and Quoin Point. The Reserve accounts for approximately 30 % of the area between the R43 and the sea along that stretch of coast (Refer to **Figure 2.2**).

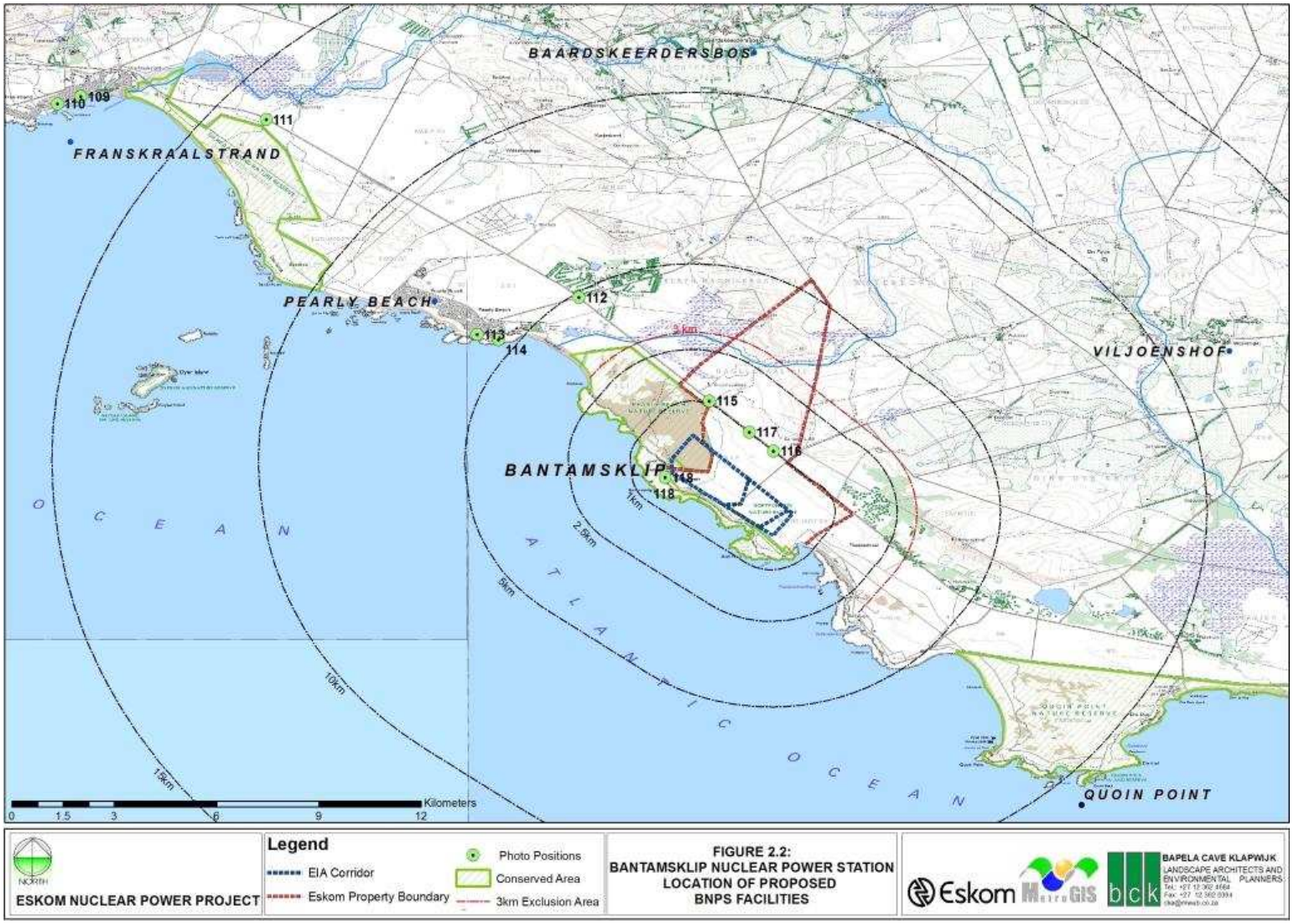
Implications for the Project

The Strandveld vegetation will provide no visual screening of the proposed Bantamsklip NPS. However, the taller Port Jackson thickets can effectively screen most views towards the site from the R43 because of their closeness to the road user.

2.3.3 Duynefontein

The vegetation cover of the general area between the coast and the R27 consists of Strandveld and Duneveld.

Between the R27 and the N7 the vegetation is variable due to agricultural practices. Wetlands occur in the lower areas associated with the Sout River, which flows in a south-westerly direction.


BAARDSKEERDERSBOS
FRANSKRAALSTRAND
PEARLY BEACH
VILJOENSHOF
BANTAMSKLIP
QUOIN POINT
OCEAN
ATLANTIC OCEAN
109
110
111
112
113
114
115
116
117
118
1km
2.5km
5km
10km
15km
3km
Kilometers
0 1.5 3 6 9 12
NORTH
ESKOM NUCLEAR POWER PROJECT
Legend
EIA Corridor
Eskom Property Boundary
Photo Positions
Conserved Area
3km Exclusion Area
FIGURE 2.2:
BANTAMSKLIP NUCLEAR POWER STATION
LOCATION OF PROPOSED
BNPS FACILITIES
Eskom
MetroGIS
bck
BAPELA CAVE KLAPWIJK
LANDSCAPE ARCHITECTS AND
ENVIRONMENTAL PLANNERS

Of particular importance is the historic avenue of bluegum trees which line the Ou Kaapse Weg, the R304.

<u>Implications for the Project</u>

The Strandveld vegetation will provide no visual screening of the proposed Duynefontein NPS. However, the taller Port Jackson thickets can effectively screen most views toward the site from the R27 because of their closeness to the road user.

The bluegum lane along the R304 effectively filters the view westwards to the site for motorists, to the extent that the NPS will be hardly noticed (Refer to Figure 2.3).

2.4 The Sense of Place

2.4.1 Thyspunt

The sense of place of the site and surroundings is predominantly related to the remoteness of the general location and the jagged and narrow solid rock shoreline, which rises relatively steeply to the sand covered rock terrace. This interface between land and sea is rugged and private, as access to the Eskom property is prohibited. Views landward are restricted by the series of parallel vegetated dunes.

The setting offers privacy with a wildness that touches all of the senses, because of its relative remoteness.

<u>Implications for the Project</u>

The sense of place will be altered permanently by the construction and operation of the proposed Thyspunt NPS.

2.4.2 Bantamsklip

The sense of place of the site and surroundings is based on the remoteness of the location relative to communities and the unspoilt coastline, which stretches for kilometres in both directions from the site. The visible natural character of the setting and absence of visible human elements add to the special sense of place.

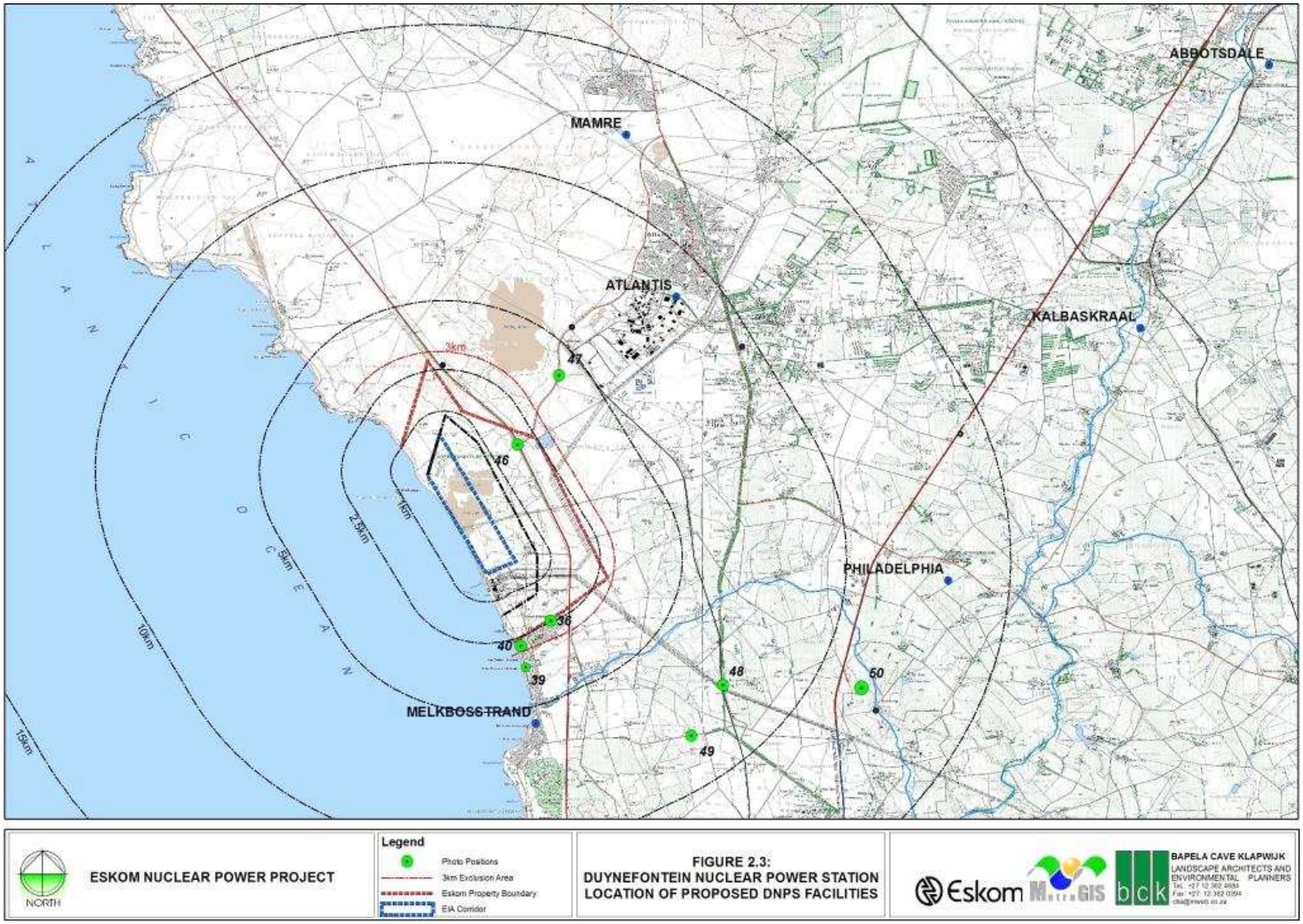
<u>Implications for the Project</u>

The scale of the physical change required of the site and surroundings to accommodate the Bantamsklip NPS will be extensive. It will therefore be very difficult to retain the current ambience and sense of place.

2.4.3 Duynefontein

The sense of place is drawn from the remoteness of the location and the flat dune field. The cold sea water and onshore winds add to the desolation experienced. This

is tempered or downgraded by the visual prominence of the Koeberg NPS 2 km to the south.


ABBOTSDALE
MAMRE
ATLANTIS
KALBASKRAAL
PHILADELPHIA
MELKBOSSTRAND
3km
5km
10km
15km
2.5km
1km
46
47
36
40
39
48
50
49
ATLANTIC OCEAN
NORTH
ESKOM NUCLEAR POWER PROJECT
Legend
Photo Positions
3km Exclusion Area
Eskom Property Boundary
EIA Corridor
FIGURE 2.3:
DUYNEFONTEIN NUCLEAR POWER STATION
LOCATION OF PROPOSED DNPS FACILITIES
Eskom
MetroGIS
bck
BAPELA CAVE KLAPWIJK
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ENVIRONMENTAL PLANNERS

Implications for the Project

The visual presence of the Koeberg NPS has changed the desolate and remote sense of place of the location. The Duynefontein NPS will extend the change northwards along the coast.

2.5 The Character of the Site and Surroundings

2.5.1 Thyspunt

The rocky and varied coastline of that location is backed by a vegetated dune field, which rises to approximately 110 m amsl. The area has an unspoilt natural character. The restricted visual access of the site reinforces the remote natural landscape character.

Implications for the Project

The scale, mass and extent of the proposed Thyspunt NPS development will overwhelm the site's natural character and remote sense of place.

2.5.2 Bantamsklip

The ruggedness of the rocky coast, the stunted coastal vegetation and the exposure to the prevailing easterly winds creates and reinforces a visual character of a wild and untameable landscape.

The remoteness and inaccessibility of the area to the general public reinforces the mysterious and undisturbed ambience of the setting and the forces of nature, in particular the waves breaking over the rocky shoreline.

Implications for the Project

The sheer scale and extent of the proposed Bantamsklip NPS development can overwhelm the site's natural character.

2.5.3 Duynefontein

The landscape character is one of natural bleakness and desolation caused by the wind factor, the shifting sands of the low dune field and the extensive views up and down the coast and inland. The visual dominance of the existing Koeberg NPS 2 km to the south links this edge to an industrial type character.

Implications for the Project

The proposed Duynefontein NPS will extend the industrial character of Koeberg Nuclear Power Station further northwards. This situation will also reinforce the industrial land use of the area as it will visually become linked with Atlantis industrial area to the east.

2.6 Surrounding Land Use

2.6.1 Thyspunt

The land use between the coast and the ridgeline of inland vegetated dunes is primarily nature reserve.

The western edge of the reserve abuts the coastal village of Oyster Bay while the eastern edge borders land that is undeveloped and in private ownership.

This land has a number of private houses, mostly holiday homes which are built near the edge of the consolidated dunes and overlook the rocky sea shore. Refer to **Annexure A Photos 1 & 2**.

It is noted that an application for a township has been lodged on the farm Ongegunde Vryheid east of the site and adjacent to the western town boundary of Cape St. Francis. This property is known as Rocky Coast Farm. The current proposal is for a cluster layout in the vicinity of existing houses. The balance of the area will be a nature reserve.

Implications for the Project

Existing and any new residential densification to the east of the site will expose these houses to direct and partial views of the Thyspunt NPS Plant.

2.6.2 Bantamsklip

The current land use between the coastline and the R43 within a radius of 15 (km) undeveloped and is mostly in its natural state. However, large areas of the vegetation seaward of the R43 have been invaded by the Port Jackson Wattle. There are four areas of the Walker Bay State forest land in this zone. These areas are effectively nature reserves as no commercial tree species have been planted.

The coastal villages of Franskraalstrand (20 km) and Pearly Beach (5 km) are essentially holiday hamlets, although there appears to be a small retired community in each town.

15 km along the coast to the south-east of the site the landscape is natural and undeveloped, apart from a small number of houses, possibly holiday houses, along a short length of coastline just south of Plaatjieskraalbaai.

The area to the north-east of the R43 is mostly natural undeveloped privately-owned farmland.

Implications for the Project

The area surrounding the site is sparsely populated, particularly south-east of the site, towards Quoin Point. The visibility of the proposed Bantamsklip NPS in the landscape will be experienced by the community of Pearly Beach, the largest community within the 15 km study zone apart from other coastal homes.

2.6.3 Duynefontein

The current land use between the coastline and the R27 for a distance of 5 km each side of the site is undeveloped and is mostly in its natural state. However, large areas of the vegetation seaward of the R27 have been invaded by the Port Jackson Wattle. The site is located within the area of the Koeberg Nature Reserve. This area is a popular safe area for walking and is well used by the surrounding communities.

The towns of Atlantis and Melkbosstrand are industrial and holiday focused respectively. The Atlantis industrial zone is between 5 and 10 km from the site and lies west of the residential areas.

Implications for the Project

The area surrounding the site on the north and east is sparsely populated, particularly the north side as this is predominantly dune fields. Duynefontein is presently the closest 5 km, community to the site with some of the surrounding farms on the higher lying ground to the east included within this distance.

2.7 Landscape Diversity

2.7.1 Thyspunt

The diversity of the site and immediate surroundings is made up of the varied rocky coastline and small bays. The latter provide secluded havens in the natural and undisturbed land and sea interface. The dune field is uniformly green and rises in a series of parallel dunes, which give a uniform visual effect. Some holiday homes to the east of the site are visually prominent and out of context as they perch on the edge of the terrace and rocky shore. Refer to **Annexure A Photos 1 & 2.** There is limited vertical diversity in the topography and vegetation inland from the coast.

Implications for the Project

The most visually diverse part of the landscape, the rocky and varied shoreline and almost uniform vegetated dunes can offer no visual absorption at all of the proposed Thyspunt NPS.

The long shore views will be blocked by the large structures of the NPS.

2.7.2 Bantamsklip

The landscape diversity in this setting is determined more by landform than by land use. This is because of the general undeveloped and natural condition of the landscape. The vegetation is uniform in colour, texture and height.

The hills to the north-east of the R43 provide vertical diversity in the landscape. This is in contrast to the generally flat coastal terrace over which the R43 has been routed.

Implications for the Project

Apart from the seaward views, the more diverse and interesting views are along the coastline and inland to the hills and valleys.

The Bantamsklip NPS will never be visually absorbed by background landform or diverse landforms because it will always be viewed in conjunction with views along the coast or with views out to sea from higher ground inland.

The colour form and lighting will determine the extent of the Bantamsklip NPS visual intrusion into scenic views.

2.7.3 Duynefontein

The landscape diversity in this setting is determined more by landform than by land use. This is because of the general undeveloped and natural condition of the landscape. The vegetation is sparse and low in the dune field.

The hills to the north-east of the R27 and east of the N7 provide vertical diversity in the landscape, but at a distance of 15 km from the site. This is in contrast to the generally flat coastal terrace over which the R304 has been routed.

There is little landform variation to provide visual diversity within a 5 km radius.

The views along the coastline are of open sandy beaches with no vertical elements, natural or man-made. There is some vertical diversity inland to the hills.

Implications for the Project

The Duynefontein NPS will not be visually absorbed by background landform or diverse landforms because it will always be included in views along the coast or in views out to sea from higher ground inland.

The colour form and lighting will determine the extent of the Duynefontein NPS visual intrusion into scenic views.

2.8 Climatic Effects on Visibility

2.8.1 Thyspunt

The wet and misty weather in winter is brought onshore by the predominant westerly winds, which have an average wind speed during the months May to September of approximately 21.24 km per hour.

Onshore wind at the sea surface is mostly experienced through October to March, during which time there is increased vertical motion in the waves.

The generally clear summer weather is driven by the predominant easterly winds, which also have an average wind speed of 45 km per hour.

Implications for the Project

The Thyspunt NPS will be less visible during the months of May to September (5 months) than during the months of October to April (7 months) because of the reduced visibility caused by rain, mist and overcast conditions.

The on-site lighting will extend the area of visibility at night of the Thyspunt NPS. During the misty winter season, due to the diffusion of the light by moisture, the light glow will be visibly softer. During the summer the light will be sharper and more localised around the new plant.

The lights of the 'chokka' boats will produce seaward light pollution of varying intensity that is regulated by the fishing season.

Attention to the lighting layout and design is required to limit light spill.

2.8.2 Bantamsklip

The wet and misty weather in winter is brought by the predominant east - north - easterly winds, which have an average wind speed during the months May to September of approximately 5.8 km per hour.

The generally clear summer weather is driven by the predominant westerly winds, which also have an average wind speed of 45 km per hour.

Implications for the Project

The Bantamsklip NPS will be less visible during the months of May to September (5 months) than during the months of October to April (7 months) because of the reduced visibility caused by rain, mist and overcast conditions.

The on-site lighting will extend the area of visibility at night of the Bantamsklip NPS. During the misty winter season, due to the diffusion of the light by moisture, the light glow will be visibly softer. During the summer the light will be sharper and more localised around the NPS.

Attention to the lighting layout and design is required to limit light spill.

2.8.3 Duynefontein

The wet and misty weather in winter is brought onshore by the predominant east – north - easterly winds, which have an average wind speed of approximately 45 km per hour during the months of May to September.

The generally clear summer weather is driven by the predominant southerly winds, which also have an average wind speed of 11.16 km per hour.

Implications for the Project

The Duynefontein NPS will be less visible during the months of May to September (5 months) than during the months of October to April (7 months) because of the reduced visibility caused by rain, mist and overcast conditions.

3 THE VISUAL ASSESSMENT

This visual impact assessment comprises three sections.

Firstly, the Visual Intrusion and Visibility Assessment describe the visual intrusion on the landscape character and sense of place by the NPS and the visibility of the NPS from identified sensitive land uses and viewpoints. The rating criteria for intensity and significance have been guided by the attributes of the landscape setting and land use. This assessment provides an understanding of the setting and visual context necessary to rate the visual impact according to the given criteria.

Secondly, the Visual Impact Assessment describes the visual impact of the NPS and components (including the construction lay-down area, according to the assessment criteria and ratings.

Thirdly, the viewshed analysis provides a graphic representation of the areas from where it is possible to see the NPS and the masts. This map is based purely on contours and does not take into account local screening elements such as buildings, trees and other tall vegetation.

The visual impacts associated with the phases of construction and decommissioning of the NPS sites are of short to medium duration (5 - 10 years). These are also primary impacts (localised, of short duration and easily mitigated at the end of the phase). Rehabilitation of the entire site after decommissioning the NPS will be a condition of approval and will also be a subject of further study.

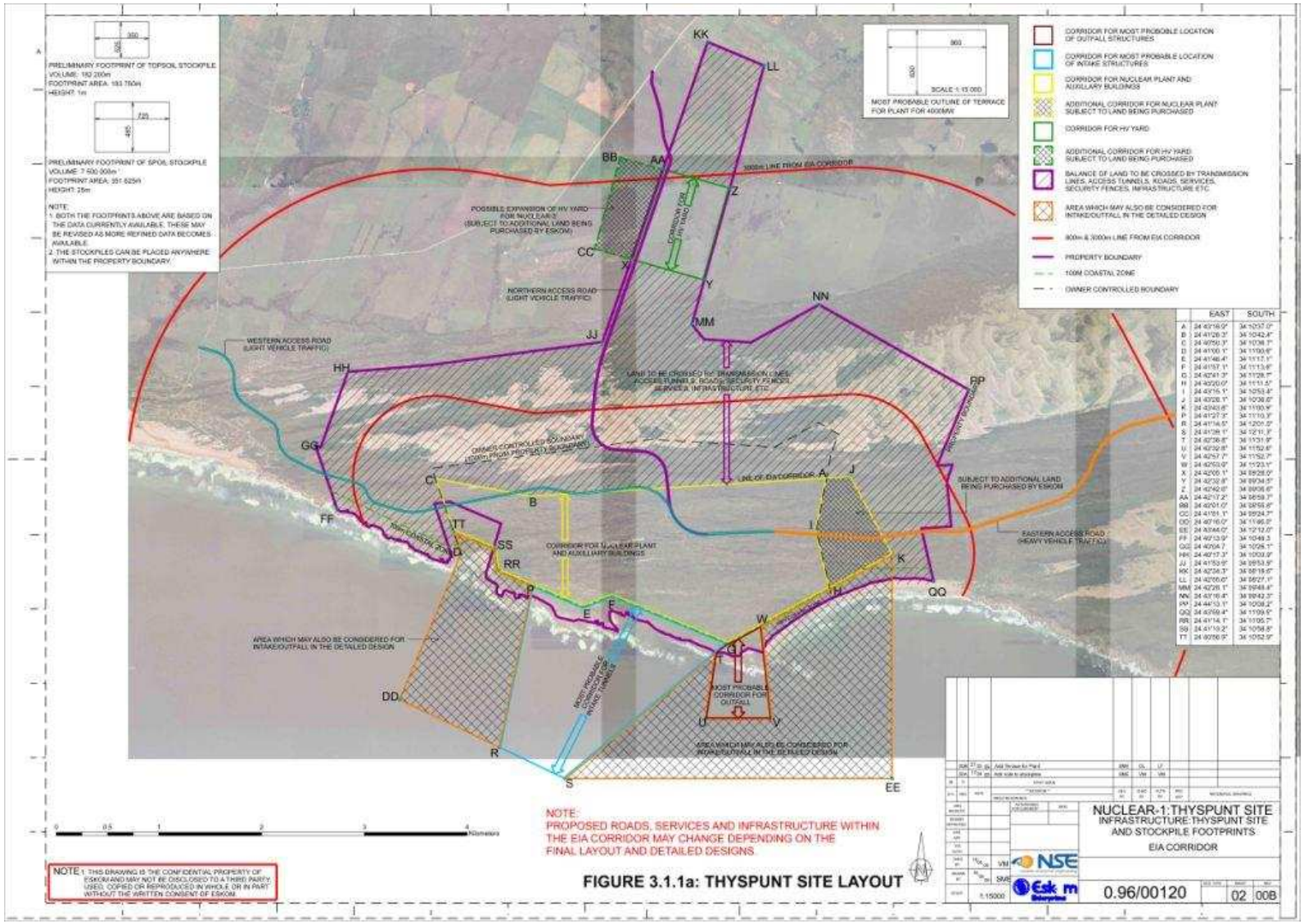
It is the operational phase that presents the most significant long-term visual impact. This is primarily due to the scale and form of the NPS. Refer to **Figures 3.1.1a, 3.1.2a, 3.1.3a** and **Figures 3.2.1, 3.2.2, 3.2.3.**

Apart from the physical structure of the NPS, the ancillary buildings and masts, there are new access roads, transmission towers and spoil dumps, which may cause additional visual impacts. These are considered additional risk sources that add to the overall visual impact of the NPS. Refer to Section 4.

3.1 Visual Intrusion and Visibility Assessment

This section addresses the intensity and significance of the visual intrusion and visibility of the NPS facility, including all associated infrastructure such as lay-down areas and masts.

Note that both visual intrusion and visibility are distance related. In other words the greater the distance, the less the intrusion and visibility.


NUCLEAR-1: THYSPUNT SITE
INFRASTRUCTURE: THYSPUNT SITE AND STOCKPILE FOOTPRINTS
EIA CORRIDOR
0.96/00120
02 00B
NOTE:
PROPOSED ROADS, SERVICES AND INFRASTRUCTURE WITHIN THE EIA CORRIDOR MAY CHANGE DEPENDING ON THE FINAL LAYOUT AND DETAILED DESIGNS
FIGURE 3.1.1a: THYSPUNT SITE LAYOUT

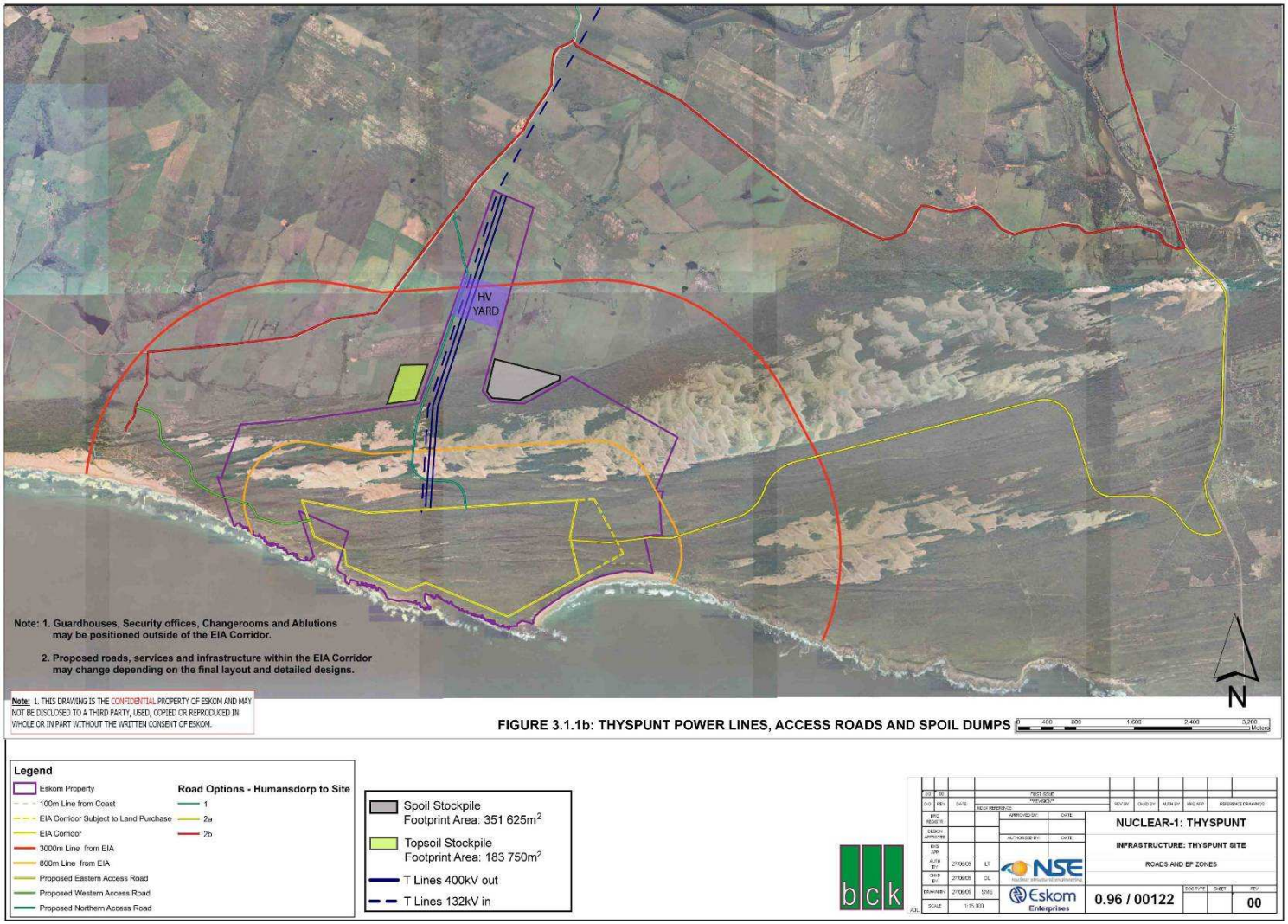


FIGURE 3.1.1b: THYSPUNT POWER LINES, ACCESS ROADS AND SPOIL DUMPS

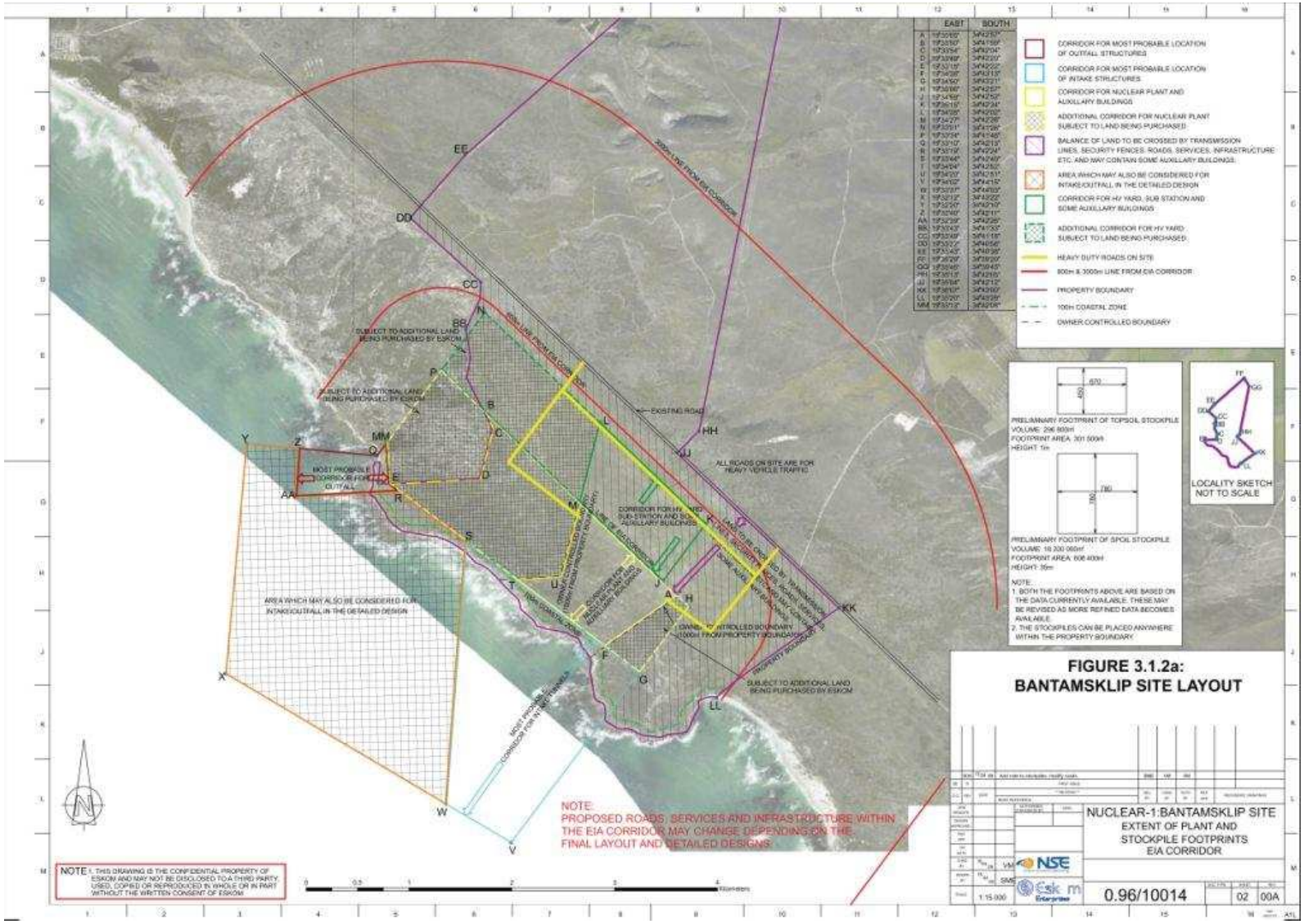


FIGURE 3.1.2a:
BANTAMSKLIP SITE LAYOUT
NUCLEAR-1:BANTAMSKLIP SITE
EXTENT OF PLANT AND
STOCKPILE FOOTPRINTS
EIA CORRIDOR
0.96/10014
NOTE:
PROPOSED ROADS, SERVICES AND INFRASTRUCTURE WITHIN THE EIA CORRIDOR MAY CHANGE DEPENDING ON THE FINAL LAYOUT AND DETAILED DESIGNS.
LOCALITY SKETCH
NOT TO SCALE
EXISTING ROAD
ALL ROADS ON SITE ARE FOR HEAVY VEHICLE TRAFFIC
SUBJECT TO ADDITIONAL LAND BEING PURCHASED BY ESKOM
AREA WHICH MAY ALSO BE CONSIDERED FOR INTAKE/OUTFALL IN THE DETAILED DESIGN
CORRIDOR FOR MOST PROBABLE LOCATION OF OUTFALL STRUCTURES
CORRIDOR FOR MOST PROBABLE LOCATION OF INTAKE STRUCTURES
CORRIDOR FOR NUCLEAR PLANT AND AUXILLARY BUILDINGS
ADDITIONAL CORRIDOR FOR NUCLEAR PLANT SUBJECT TO LAND BEING PURCHASED
BALANCE OF LAND TO BE CROSSED BY TRANSMISSION LINES, SECURITY FENCES, ROADS, SERVICES, INFRASTRUCTURE ETC. AND MAY CONTAIN SOME AUXILLARY BUILDINGS.
AREA WHICH MAY ALSO BE CONSIDERED FOR INTAKE/OUTFALL IN THE DETAILED DESIGN
CORRIDOR FOR HV YARD, SUB STATION AND SOME AUXILLARY BUILDINGS
ADDITIONAL CORRIDOR FOR HV YARD SUBJECT TO LAND BEING PURCHASED.
HEAVY DUTY ROADS ON SITE
800m & 3000m LINE FROM EIA CORRIDOR
PROPERTY BOUNDARY
100m COASTAL ZONE
OWNER CONTROLLED BOUNDARY
PRELIMINARY FOOTPRINT OF TOPSOIL STOCKPILE
VOLUME: 296 800m³
FOOTPRINT AREA: 301 500m²
HEIGHT: 1m
PRELIMINARY FOOTPRINT OF SPOIL STOCKPILE
VOLUME: 16 200 000m³
FOOTPRINT AREA: 606 400m²
HEIGHT: 35m
NOTE:
1. BOTH THE FOOTPRINTS ABOVE ARE BASED ON THE DATA CURRENTLY AVAILABLE. THESE MAY BE REVISED AS MORE REFINED DATA BECOMES AVAILABLE.
2. THE STOCKPILES CAN BE PLACED ANYWHERE WITHIN THE PROPERTY BOUNDARY
NOTE 1. THIS DRAWING IS THE CONFIDENTIAL PROPERTY OF ESKOM AND MAY NOT BE DISCLOSED TO A THIRD PARTY, USED, COPIED OR REPRODUCED IN WHOLE OR IN PART WITHOUT THE WRITTEN CONSENT OF ESKOM
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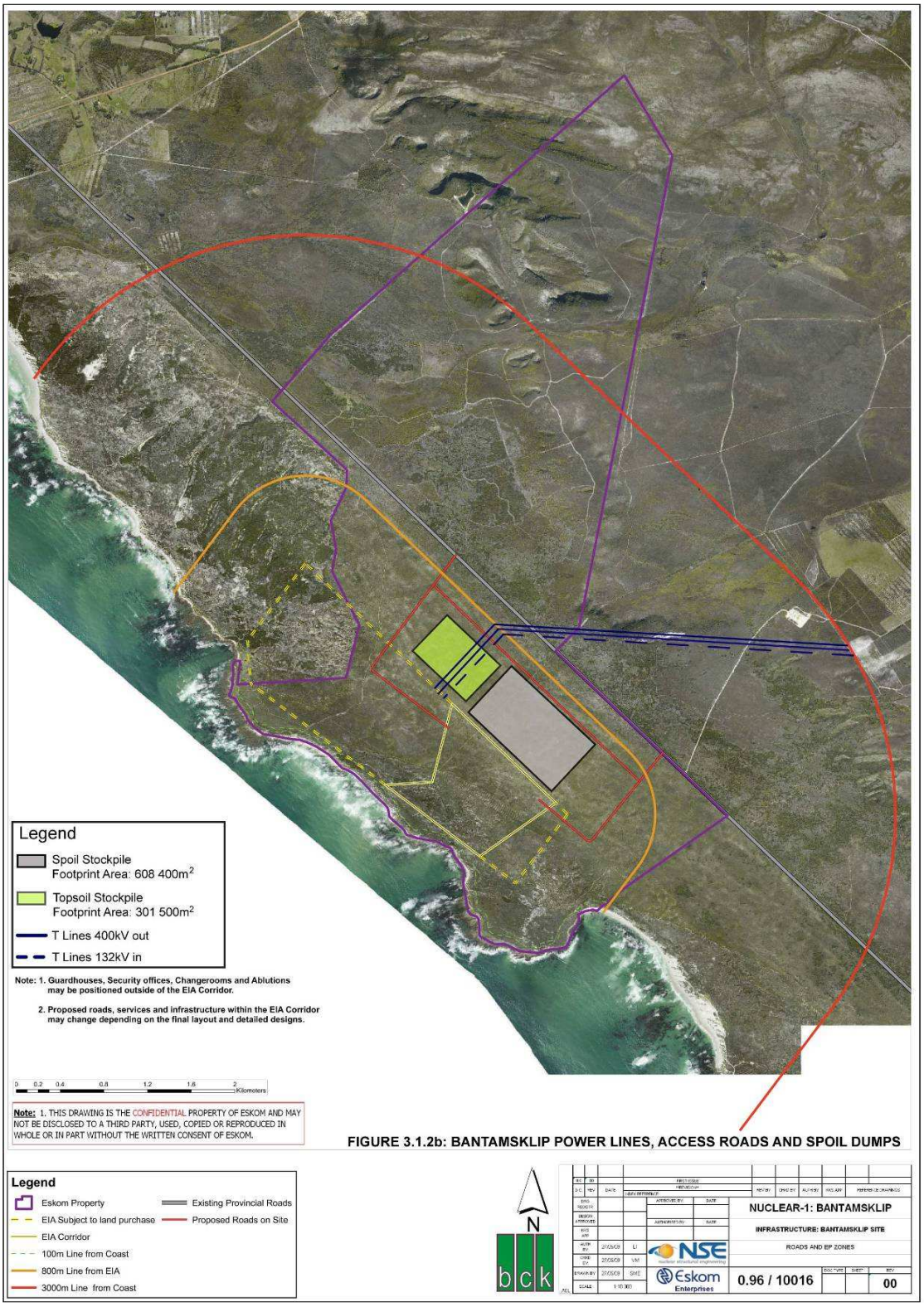


FIGURE 3.1.2b: BANTAMSKLIP POWER LINES, ACCESS ROADS AND SPOIL DUMPS

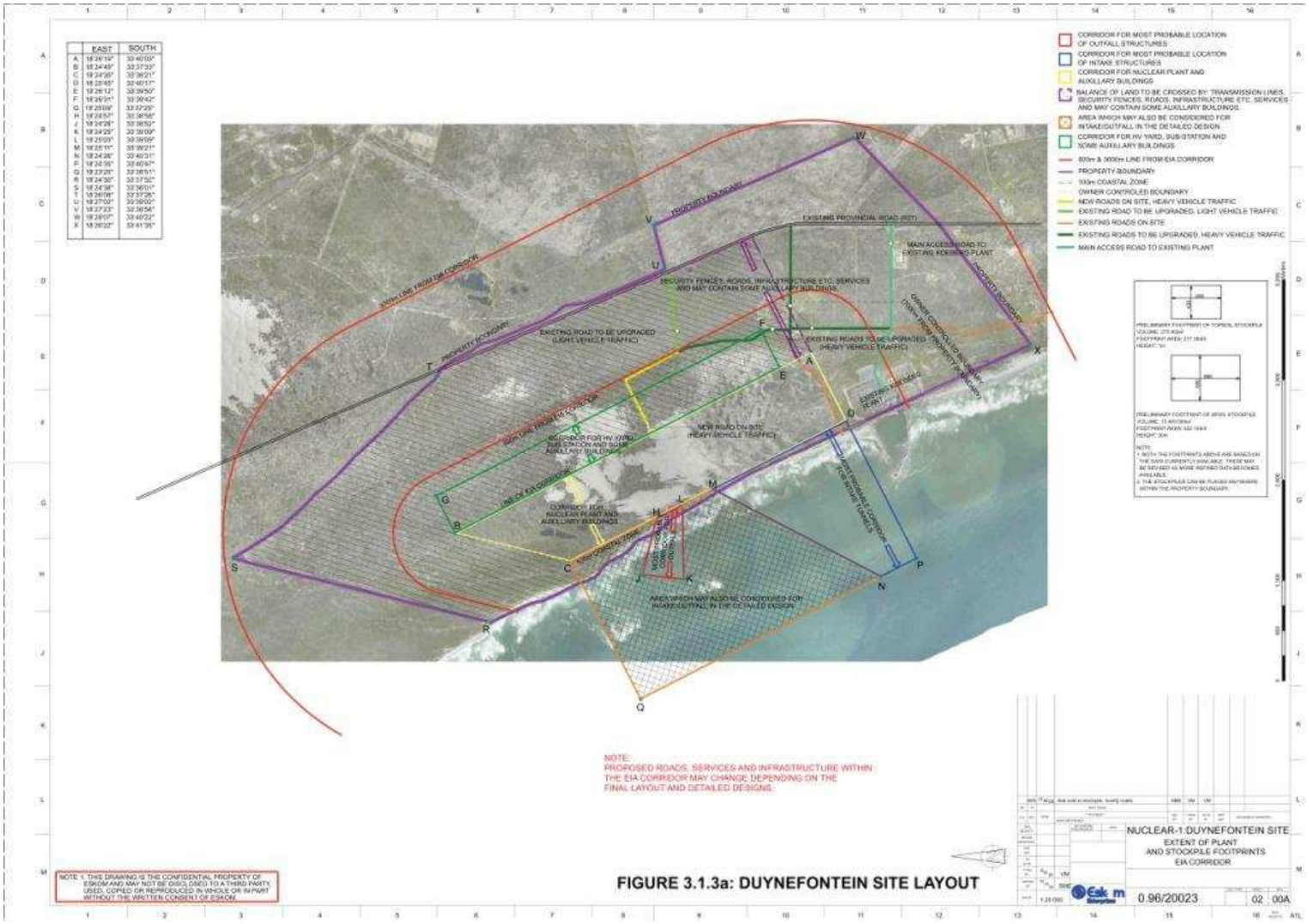


FIGURE 3.1.3a: DUYNEFONTEIN SITE LAYOUT

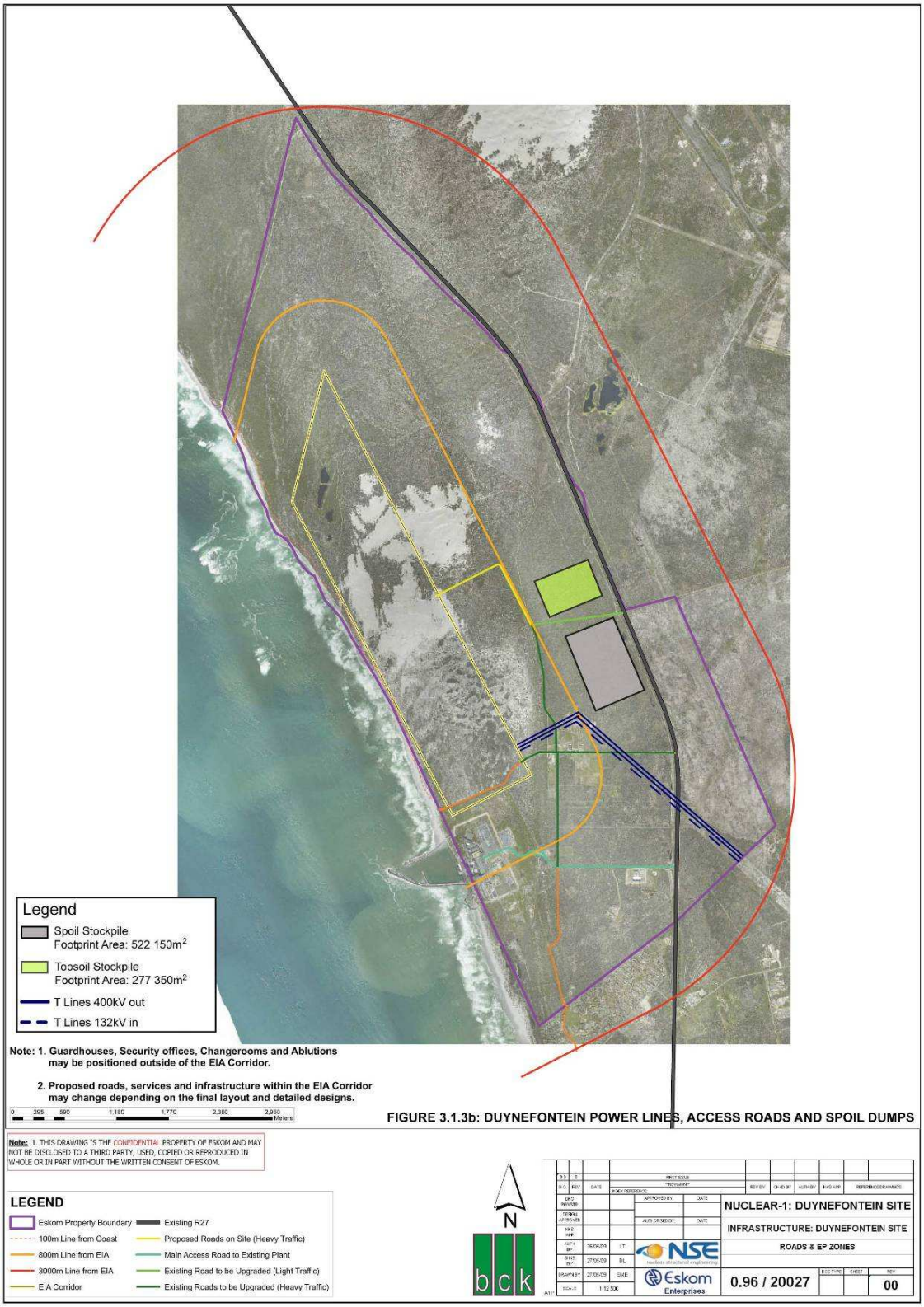
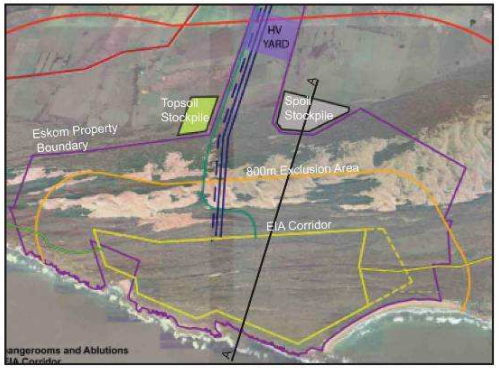
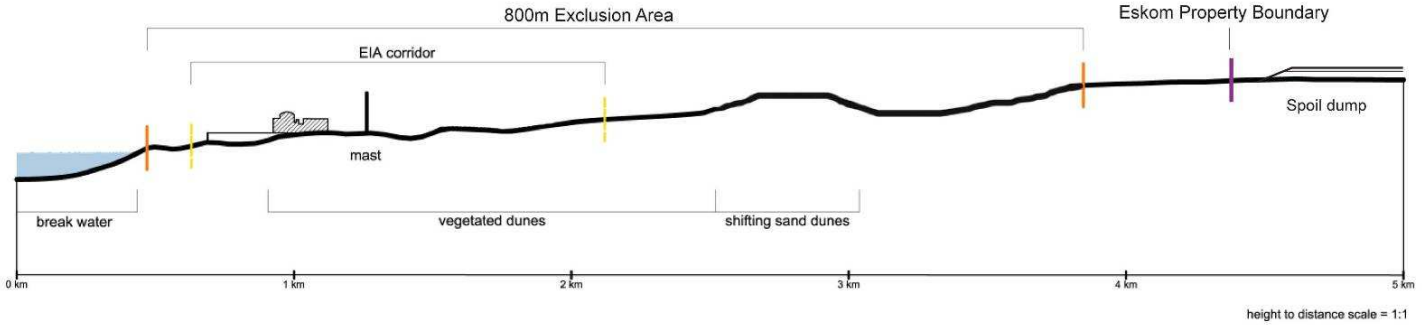


FIGURE 3.1.3b: DUYNEFONTEIN POWER LINES, ACCESS ROADS AND SPOIL DUMPS

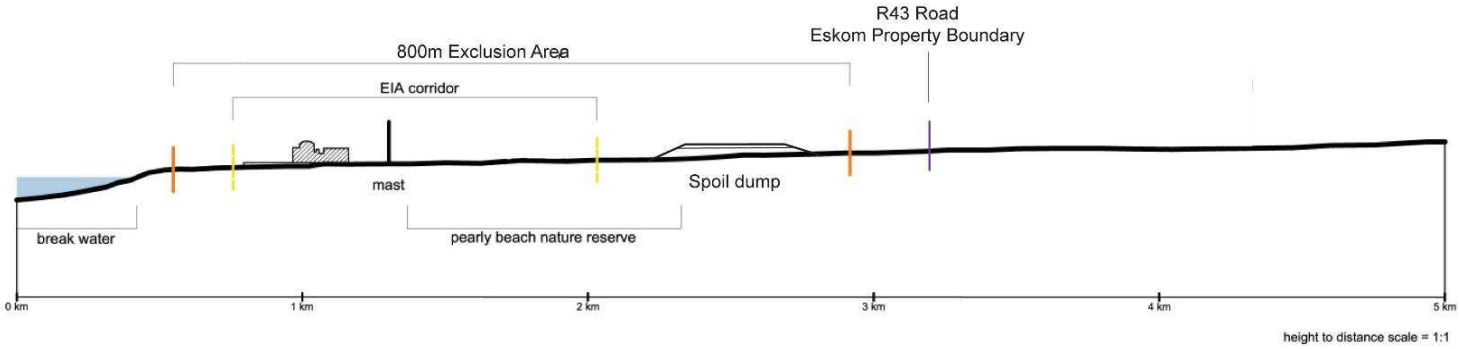


Locality plan indicating section



ESKOM NUCLEAR POWER PLANT	FIGURE 3.2.1: THYSPUNT DIAGRAMMATIC SITE SECTION	BAPELA CAVE KLAPWIJK LANDSCAPE ARCHITECTS AND ENVIRONMENTAL PLANNERS

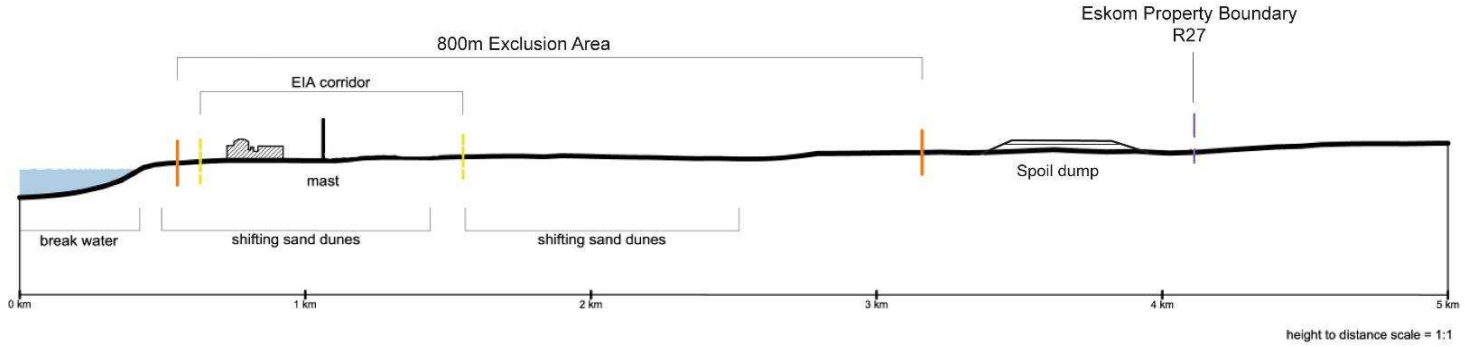
Locality plan indicating section



height to distance scale = 1:1

ESKOM NUCLEAR POWER PLANT	FIGURE 3.2.2: BANTAMSKLIP DIAGRAMMATIC SITE SECTION	BAPELA CAVE KLAPWIJK LANDSCAPE ARCHITECTS AND ENVIRONMENTAL PLANNERS

Locality plan indicating section



ESKOM NUCLEAR POWER PLANT	FIGURE 3.2.3: DUYNEFONTEIN DIAGRAMMATIC SITE SECTION	BAPELA CAVE KLAPWIJK LANDSCAPE ARCHITECTS AND ENVIRONMENTAL PLANNERS

The visual scale of the NPS will reduce as the distance of the observer from the site increases. That means that as the distance doubles, the visibility in scale of the object reduces by four times (Hull & Bishop, 1988). Refer to **Figure 3.6.1** in regard to this. The distance scale is used to depict spatial zones (high, medium and low) that categorise the intrusion and visibility of the NPS. These zones are defined as 2.5 km, 5 km and 10 km distance from the main structure.

3.1.1 Visual Assessment Criteria

The criteria and ratings were developed from site observations, so that the visibility and visual intrusion on views can be understood. This was translated into the intrusion and visibility assessment using the following criteria:

Note that these criteria are different from the Impact criteria given in Section ***3***.2.

Nature of the impact

The nature of the visual intrusion is classified as positive (beneficial), negative (detrimental) or neutral.

This appraisal categorises the overall perceived effect the activity or product (NPS) will have on the affected environment. This description includes what is being affected and to what degree.

Extent of the impact

Extent indicates whether the effect of the activity would be limited to the site and/or its immediate surroundings:

- Local – extending into adjoining properties
- Regional – impact within the local physical region
- National – Provincial / National impact

Duration of the impact

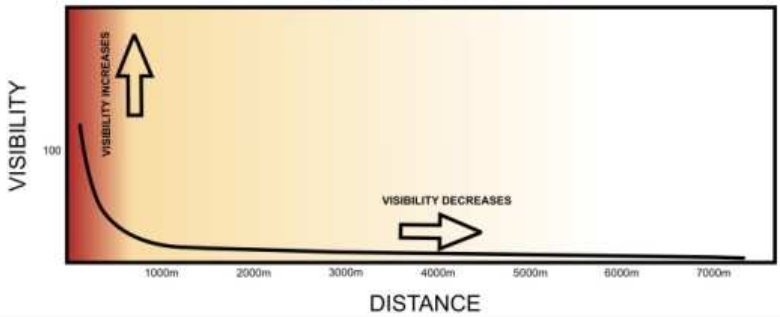
The lifespan of the visual intrusion would be short-term (0-5 years), medium-term (6-10 years), long-term (>10 years) or permanent.

- Short term – 0 to 5 year-construction phase
- Medium term – 6 to 15 years: stabilisation period for the operational phase
- Long term – 16 to 60 years: cessation of impact after the operational life of the activity
- Permanent – where mitigation, either by natural process or by human intervention, would not occur in such a way or within such a time span that the visual intrusion could be considered transient.

STRUCTURE @ 2km

STRUCTURE @ 4km

STRUCTURE @ 8km



RELATIONSHIP OF DISTANCE TO VISUAL SCALE FIGURE 3.6.1

Intensity

The degree or intensity to which the visual intrusion would affect the environment:

- Low – where the visual intrusion affects the natural, cultural or social environment in such a way that these views are not affected;
- Medium – where the visual intrusion affects the natural, cultural or social environment in such a way that these views continue in a modified positive or negative way;
- High – where the visual intrusion affects the natural, cultural or social environment in such a way that these views temporarily or permanently cease (negative) or change / improve (positive).

Refer to **Figures 3.5.1 to 3.5.3.**

The likelihood of the visual intrusion actually occurring indicated as:

- Improbable – very low possibility for the intrusion to occur due to design or historic experience
- Probable – good possibility for the intrusion to occur
- Highly probable – most likely for the intrusion to occur
- Definite – intrusion will occur regardless of any prevention or mitigation measures

Significance

Intrusion significance is determined through a synthesis of the aspects produced in terms of their nature, extent, duration, intensity and probability and are described as:

- Negligible – where the visual intrusion of the structure will have no effect on the scenic views and sense of place (>15 km)
- Low – where the visual intrusion of the structure will have some influence on the scenic views and sense of place (10-15 km);
- Medium – where the visual intrusion of the structure will have an influence on the scenic views and sense of place despite mitigation (5-10 km);
- High – where the visual intrusion of the structure will directly influence the scenic views and sense of place regardless of any possible mitigation (< 5 km);
- Uncertain – cannot be ascertained due to lack of information or knowledge or subjectivity.

As a result of the scale and fixed position of all the NPS sites on the properties relative to the coastline, the first four criteria (nature of impact, extent, duration,

probability) will be the same and apply to the visual intrusion that will be caused , therefore one statement will be made regarding these criteria.

The visual intrusion of the Thyspunt NPS will however vary when evaluated against the criteria of intensity of visual intrusion and the significance of the visual intrusion for each site (See **Tables 1 to 6**).

An example is the situation where a large structure is located in a remote undisturbed area of low relief. The visual intrusion's intensity is **low** since it cannot be seen from surrounding areas and the distance from the nearest habitation is large and the structure blends into the background and atmospheric haze. The significance, however, is **high** within the context of the unique scenic value of the pristine landscape because the sense of place and the character of that area will be severely compromised.

The converse can also be applied, in that high visual intrusion intensity can have a low significance in a visually diverse setting which allows an acceptable 'fit'. The visual intrusion assessment of the NPS will therefore be based on the criteria of intensity and significance relative to land use and the proximity to important viewpoints.

The general assessment of the common visual intrusion criteria for the NPS location on the three sites is:

Nature of the visual intrusion:	Negative – the 65 m high building and 95 m high stack will be highly visible on the flat coastal terrace in views along the coast and from the higher ground to the east looking seaward. The visual character and sense of place of the natural setting is downgraded. This change cannot be reversed due to the scale of the project. The structure is solid and will mostly be seen against the backdrop of the ocean and sky. It will therefore mostly be seen as a silhouette when viewed from inland. Views along the coast will be focused on the structure due to its large scale. The distant views along the coast, the natural setting of the undisturbed coastal landscape and the wild yet quiet sense of place of that area will be affected. This ambience will to a large degree be lost or diminished.
Extent of the visual intrusion:	The visual intrusion is experienced locally (within 15 km radius) as a result of the height of the building, its scale and the low relief of the coastal landform.
Duration of the visual intrusion:	The visual intrusion will persist until the buildings are decommissioned and removed. The intrusion will be experienced over the long term, > 60 years.
Probability of the intrusion occurring:	The visual intrusion will most probably be experienced.

Thyspunt

The following intensity and significance rating criteria have been set and apply to the NPS location.

Table 1: Thyspunt Visual Assessment Criteria - Intensity

Visibility and Intrusion Aspects	Intensity Rating Criteria		
	High	**Medium**	**Low**
Visibility from the existing coast road	The Thyspunt NPS is highly visible due to alignment with road parallel to the coastline 2 km south, i.e. within a radial zone of 2-5 km	The Thyspunt NPS is partially visible due to distance of 2,5 and 10 km, i.e. view continues but in a modified way due to distance	Low visibility intensity due to the road being further than 5 km from the Thyspunt NPS and views that are not affected due to intervening vegetation and landform
Visibility of Thyspunt NPS from general surrounding landscape	Not obscured as landform rises northwards from the site	Partially obscured by intervening vegetation and scale reduction due to distance	Mostly obscured by surrounding landform, intervening landform, vegetation, buildings and distance
Visual intrusion on landscape character and sense of place	Dominates sense of place and landscape character within 0-5 km	Partially influences sense of place and landscape character (5-10 km)	Has little effect on sense of place and landscape character due to distance (> 10 km)
Visibility from residential areas	Highly visible. Dominates view within 1 – 2,5 km	Visible but does not dominate view within range 2,5 – 5 km	Visible but not obviously noticeable in the view > 5 – 10 km

Table 2: Thyspunt Visual Assessment Criteria - Significance

Visibility and Intrusion Aspects	Intensity Rating Criteria		
	High	**Medium**	**Low**
Visibility from the existing coast road	The Thyspunt NPS obstructs particularly scenic views by being close to road and at an oblique angle, i.e. effectively obstructs views or sense of place despite mitigation within a 5 km radius.	The Thyspunt NPS particularly interferes with scenic views from the road, i.e. partially influences scenic view or sense of place despite mitigation (5-10 km)	The Thyspunt NPS is too far from the road to obstruct scenic views, i.e. does not influence scenic views or sense of place (> 10 km)
Visibility of Thyspunt NPS from general surrounding landscape	Compromises particularly scenic distant views of the landscape	Particularly noticeable in scenic landscape	Hardly noticeable in scenic landscape
Visual intrusion on landscape character and sense of place	Visually alters the character and sense of place of the immediate landscape (< 5 km)	Influences to a minor degree the landscape character (5-10 km)	Does not influence the landscape character (> 10 km)
Visibility from residential areas	The Thyspunt NPS is visually dominant within 5 km	Noticeable but not dominant 5 – 10 km	Noticeable 10 – 15 km

Bantamsklip

The following intensity and significance rating criteria have been set and apply to the NPS location.

Table 3: Bantamsklip Visual Assessment Criteria - Intensity

Visibility and Intrusion Aspects	Intensity Rating Criteria		
	High	**Medium**	**Low**
Visibility from the existing R43 coast road	The Bantamsklip NPS is highly visible due to alignment with road parallel to the coastline 2 km south, i.e. within a radial zone of 2-5 km	The Bantamsklip NPS is partially visible due to distance of 2,5 and 10 km, i.e. view continues but in a modified way due to distance	Low visibility intensity due to the road being further than 10 km from the Bantamsklip NPS, i.e. views that are not affected due to intervening vegetation and landform
Visibility of Bantamsklip NPS from general surrounding landscape	Not obscured as landform rises northwards from the site	Partially obscured by intervening vegetation and scale reduction due to distance	Mostly obscured by surrounding landform, intervening landform, vegetation, buildings and distance
Visual intrusion on landscape character and sense of place	Dominates sense of place and landscape character within 0-5 km	Partially influences sense of place and landscape character (5-10 km)	Has little effect on sense of place and landscape character due to distance
Visibility from residential areas	Highly visible. Dominates view within 1 – 2,5 km	Visible but does not dominate view within range 2,5 – 5 km	Visible but not obviously noticeable in the view > 5 – 10 km

Table 4: Bantamsklip Visual Assessment Criteria - Significance

Visibility and Intrusion Aspects	Intensity Rating Criteria		
	High	**Medium**	**Low**
Visibility from the existing R43 coast road	The Bantamsklip NPS obstructs particularly scenic views by being close to road and at an oblique angle, i.e. effectively obstructs views or sense of place despite mitigation within a 5 km radius.	The Bantamsklip NPS particularly interferes with scenic views from the road, i.e. partially influences scenic view or sense of place despite mitigation (5-10 km)	The Bantamsklip NPS is too far from the road to obstruct scenic views, i.e. does not influence scenic views or sense of place (> 10 km)
Visibility of Bantamsklip NPS from general surrounding landscape	Compromises particularly scenic distant views of the landscape	Particularly noticeable in scenic landscape	Hardly noticeable in scenic landscape
Visual intrusion on landscape character and sense of place	Visually alters the character and sense of place of the immediate landscape (< 5 km)	Influences to a minor degree the landscape character (5-10 km)	Does not influence the landscape character (> 10 km)
Visibility from residential areas	The Bantamsklip NPS is visually dominant within 5 km	Noticeable but not dominant 5 – 10 km	Noticeable 10 – 15 km

Duynefontein

The following intensity and significance rating criteria have been set and apply to the NPS location

Table 5: Duynefontein Visual Assessment Criteria - Intensity

Visibility and Intrusion Aspects	Intensity Rating Criteria		
	High	**Medium**	**Low**
Visibility from the existing R27 coast road	The Duynefontein NPS is highly visible due to alignment with road parallel to the coast line 2,5 km east, i.e. within a radial zone of 2-5 km	The Duynefontein NPS is partially visible due to distance of 2,5 and 10 km, i.e. view continues but in a modified way due to distance	Low visibility intensity due to the road being further than 10 km from the Duynefontein NPS, i.e. views that are not affected due to intervening vegetation and landform
Visibility of Duynefontein NPS from general surrounding landscape	Not obscured as landform rises eastwards from the site	Partially obscured by intervening vegetation and scale reduction due to distance	Mostly obscured by surrounding landform, intervening landform, vegetation, buildings and distance
Visual intrusion on landscape character and sense of place	Dominates sense of place and landscape character within 0-2,5 km	Partially influences sense of place and landscape character (2,5-5 km)	Has little effect on sense of place and landscape character due to distance (> 5 km)
Visibility from residential areas	Highly visible. Dominates view within 1–2,5 km	Visible but does not dominate view within range 2,5–5 km	Visible but not obviously noticeable in the view > 5–10 km

Table 6: Duynefontein Visual Assessment Criteria - Significance

Visibility and Intrusion Aspects	Intensity Rating Criteria		
	High	**Medium**	**Low**
Visibility from the existing R27 coast road	The Duynefontein NPS obstructs particularly scenic views by being close to road and at an oblique angle, i.e. effectively obstructs views or sense of place despite mitigation within a 5 km radius.	The Duynefontein NPS particularly interferes with scenic views from the road, i.e. partially influences scenic view or sense of place despite mitigation (5-10 km)	The Duynefontein NPS is too far from the road to obstruct scenic views, i.e. does not influence scenic views or sense of place (> 10 km)
Visibility of Duynefontein NPS from general surrounding landscape	Compromises particularly scenic distant views of the landscape and coastline (1-5 km)	Particularly noticeable in scenic landscape and coast line (5-10 km)	Hardly noticeable in scenic landscape (10-15 km)
Visual intrusion on landscape character and sense of place	Visually alters the character and sense of place of the immediate landscape (< 5 km)	Influences to a minor degree the landscape character (5-10 km)	Does not influence the landscape character (> 10 km)
Visibility from residential areas	The Duynefontein NPS is visually dominant within 5 km	Noticeable but not dominant 5–10 km	Noticeable 10–15 km

3.1.2 Visual Intrusion of the NPS at theThyspunt site

The visual intrusion is the extent to which the Thyspunt NPS dominates scenic views from critical viewpoints. The visual intrusion and visibility is described in terms of the following categories:

- Visibility from existing coastal road;
- Visibility from surrounding landscape within 15 km radius;
- Visual intrusion on landscape character and sense of place; and
- Visibility from residential areas, Oyster Bay, holiday homes to the east and Cape St. Francis

The visual intrusion intensity and significance is rated from high to low according to the criteria set out in **Tables 1 & 2.**

The visibility of the Thyspunt NPS will be a function of its height (65 m and a stack of height 95m above ground level) and its bulk (approximately 250 m long and 100 m wide). Refer to **Figures 3.3.1 & 3.4.1.** This area will include ancillary buildings, switch yard and laydown / construction yard and masts.

Visibility from the Coastal Road

The road's alignment is mostly beyond the 5 km radius and is screened by two ridge lines of consolidated dune and sand dunes. The closest section of the road to the Thyspunt NPS is 3 km away. However, this section is screened by the ridge line of the dune field.

The viewshed analysis (**Figure 3.3.1**) shows the Thyspunt NPS visible, but only a portion, from a short section of the road as it crosses the inland ridge. Refer to **Annexure A - Photo 3**.

There is a short section along the N-2 from where the Thyspunt NPS can be seen, but the 28 km distance will make it barely visible to the naked eye. Refer to **Annexure A - Photo 4.**

The intensity of the visibility of the Thyspunt NPS along this short section of road is low where direct unobstructed views are possible.

The significance of this view is considered to be low because only the top portion of the building will be visible, but it will not be visually intrusive and obstruct scenic views.

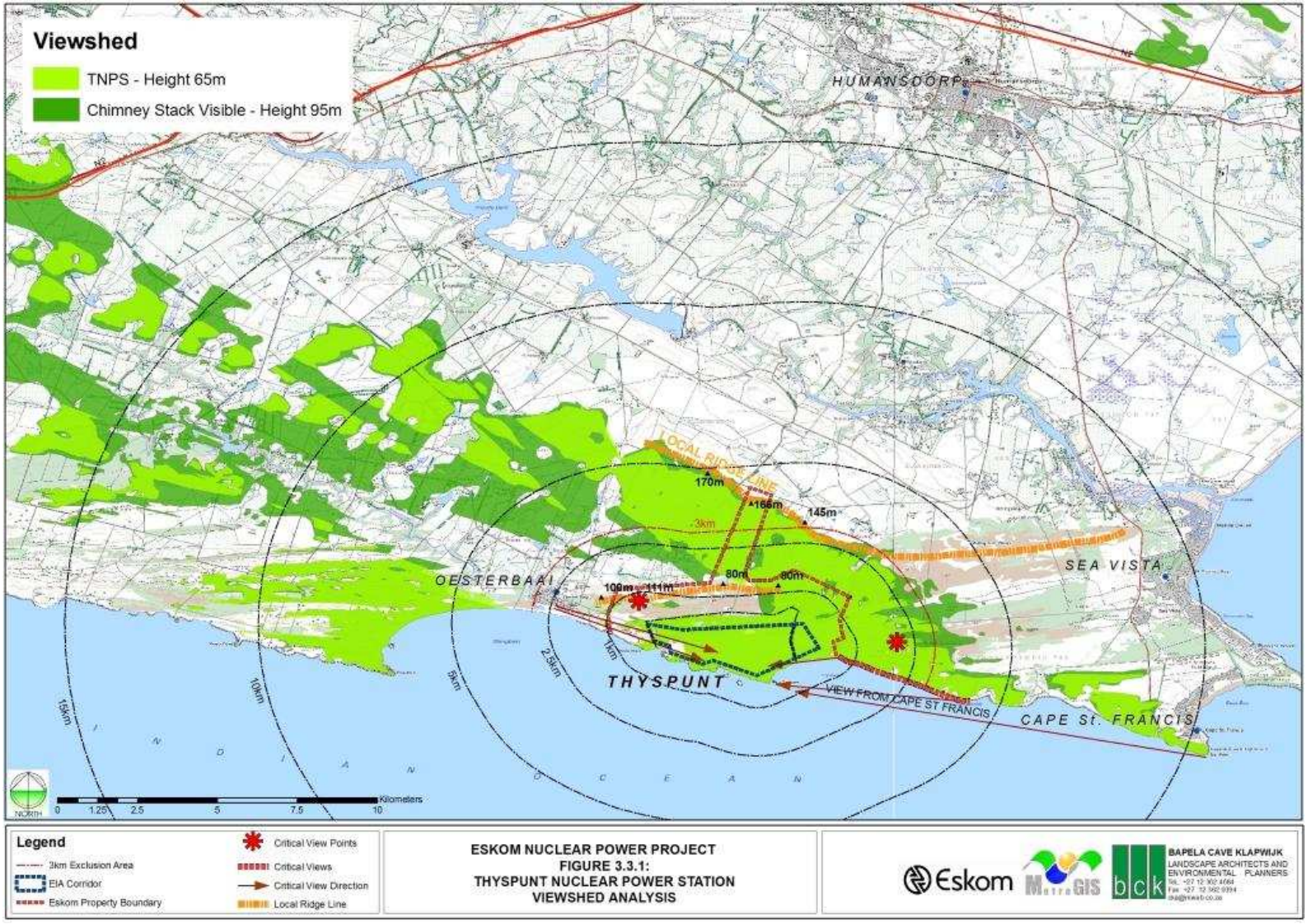
The intensity and significance of the visibility from the N2 beyond the 5 km radius is low, because the view of the Thyspunt NPS is limited due to intervening landform and vegetation and the cone of vision of the motorist does not include the Thyspunt NPS when travelling in either direction.

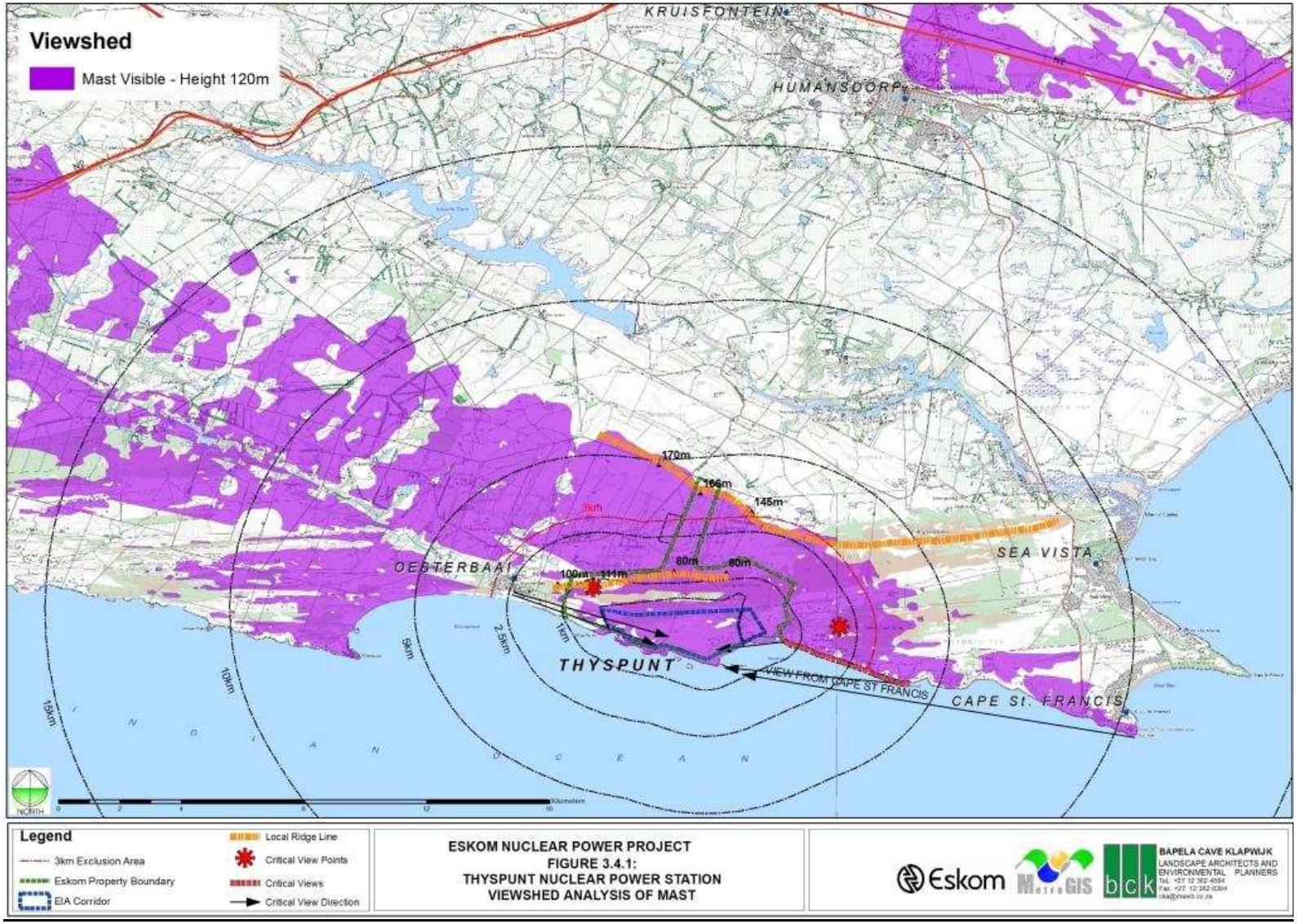
Visibility from the Surrounding Landscape

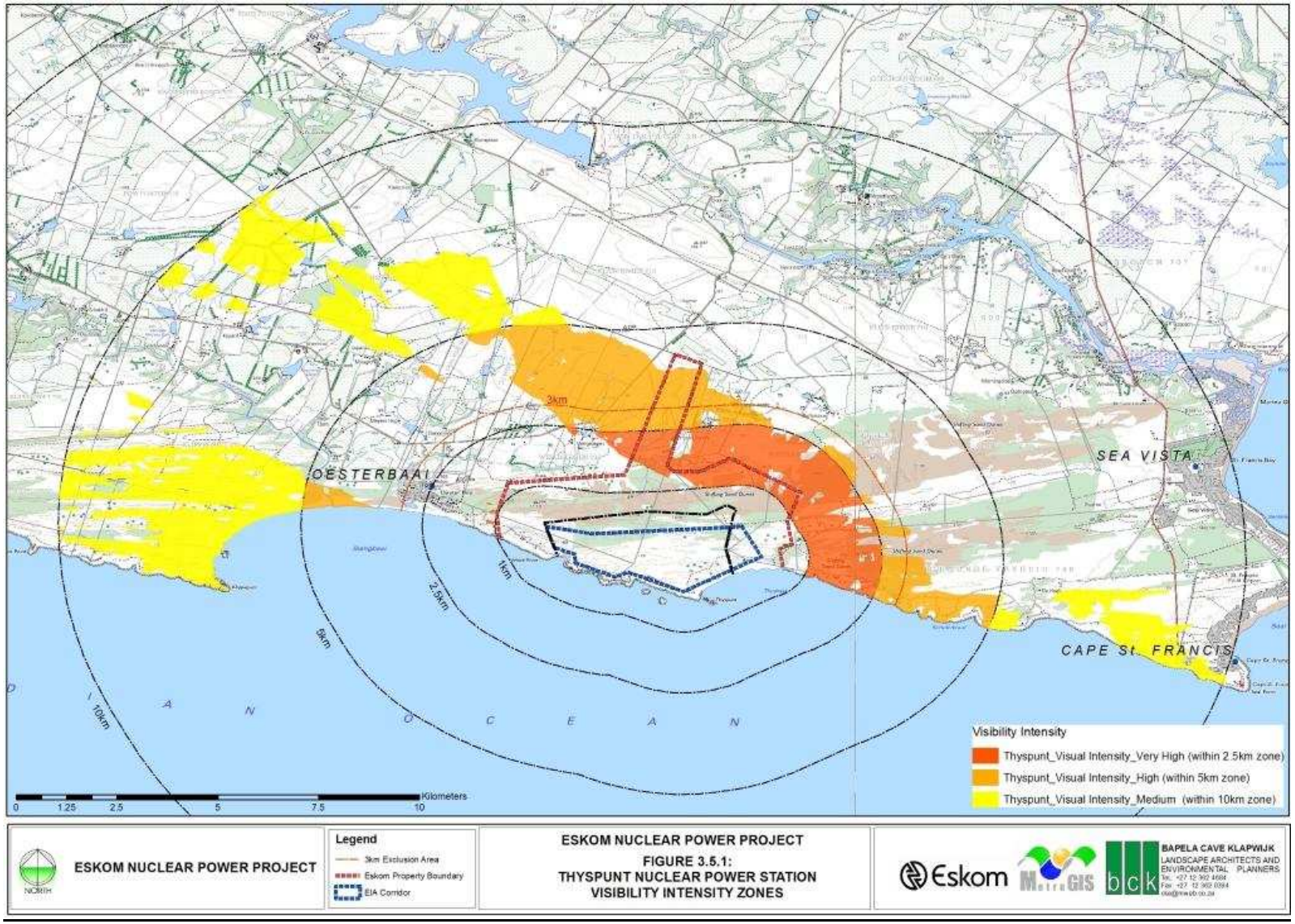
The Thyspunt NPS will be partially screened from views seaward by the dunes. However, the seaward facing landforms further inland will be exposed to views of the top part of the tall structures.

The coastal landscape is particularly scenic because of the unspoilt and undeveloped condition of the dune terrain and rocky coastline. The large scale and extensive area of the Thyspunt NPS will compromise distant scenic views from the coastal area to the east and west of the site. Tall vegetation will obscure views and therefore the visibility intensity is rated as high in the 0-2,5 km zone, medium in the 2,5-5 km zone and low for areas further than 5 km.

The significance of the Thyspunt NPS visibility from the surrounding landscape is rated as high because it compromises scenic distant views along the coast in the 0-5 km zone, medium in the 5-10 km zone and low beyond that.


Viewshed
TNPS - Height 65m
Chimney Stack Visible - Height 95m
HUMANSDORP
LOCAL RIDGE LINE
170m
166m
145m
3km
80m
80m
100m
111m
OESTERBAAI
SEA VISTA
THYSPUNT
VIEW FROM CAPE ST FRANCIS
CAPE St. FRANCIS
15km
10km
5km
2.5km
1km
INDIAN OCEAN
NORTH
0 1.25 2.5 5 7.5 10
Kilometers
Legend
3km Exclusion Area
EIA Corridor
Eskom Property Boundary
Critical View Points
Critical Views
Critical View Direction
Local Ridge Line
ESKOM NUCLEAR POWER PROJECT
FIGURE 3.3.1:
THYSPUNT NUCLEAR POWER STATION
VIEWSHED ANALYSIS
Eskom
MetroGIS
bck
BAPELA CAVE KLAPWIJK
LANDSCAPE ARCHITECTS AND ENVIRONMENTAL PLANNERS


Viewshed
Mast Visible - Height 120m
KRUISFONTEIN
HUMANSDORP
OESTERBAAI
SEA VISTA
THYSPUNT
CAPE St. FRANCIS
VIEW FROM CAPE ST FRANCIS
170m
166m
145m
80m
80m
100m
111m
3km
5km
10km
15km
2.5km
1km
INDIAN OCEAN
NORTH
Legend
3km Exclusion Area
Eskom Property Boundary
EIA Corridor
Local Ridge Line
Critical View Points
Critical Views
Critical View Direction
ESKOM NUCLEAR POWER PROJECT
FIGURE 3.4.1:
THYSPUNT NUCLEAR POWER STATION
VIEWSHED ANALYSIS OF MAST
Eskom
MetroGIS
bck
BAPELA CAVE KLAPWIJK
LANDSCAPE ARCHITECTS AND ENVIRONMENTAL PLANNERS


OESTERBAAI
SEA VISTA
CAPE St FRANCIS
3km
1km
2.5km
5km
10km
I N D I A N O C E A N
Kilometers
0 1.25 2.5 5 7.5 10
Visibility Intensity
Thyspunt_Visual Intensity_Very High (within 2.5km zone)
Thyspunt_Visual Intensity_High (within 5km zone)
Thyspunt_Visual Intensity_Medium (within 10km zone)
ESKOM NUCLEAR POWER PROJECT
Legend
3km Exclusion Area
Eskom Property Boundary
EIA Corridor
ESKOM NUCLEAR POWER PROJECT
FIGURE 3.5.1:
THYSPUNT NUCLEAR POWER STATION
VISIBILITY INTENSITY ZONES
Eskom
M.I.I. GIS
bck
BAPELA CAVE KLAPWIJK
LANDSCAPE ARCHITECTS AND ENVIRONMENTAL PLANNERS

Visual Intrusion on Landscape Character and Sense of Place

The scale and extent of the Thyspunt NPS and its location on an exposed coastline will make the entire facility highly visible in views along the coast.

Consequently, because of the visual dominance in the landscape, the sense of place is changed along this stretch of coast. The visual intrusion is rated as high in the 0-5 km zone, medium in the 5-10 km zone, because there is a reduction in visible scale, and low in the 10-15 km zone. The distance reduces the influence on this zone.

The undisturbed natural character and sense of wildness of the place will be visually altered and therefore the significance rating is given as high in the zone 0-5 km, medium in the 5-10 km zone and low in the 10-15 km zone.

Visibility from Residential Areas

As the Thyspunt NPS is 5 km from the residential Oyster Bay community the visibility intensity is expected to be high but only for the residents who have a direct line of sight. Most houses face south over the sea and the vegetated dunes of the conservation area screens the site. Refer to **Figure 3.3.1 Viewshed Analysis**. Therefore the significance is rated as low for Oyster Bay because at present there are few places that have direct line of sight of the Thyspunt NPS.

On the eastern coast the significance is high because the few holiday homes have direct line of sight within the 2,5 km zone. Visibility from Cape St. Francis is rated as low because of distance (15 km) and intervening landform and vegetation.

Conclusion for the Thyspunt NPS

The conclusion drawn is that the Thyspunt NPS will contribute to the visual intrusion of the existing local setting. This is a result of the large structures and transmission lines that will create the visual complexity and visual intrusion of the views from Oyster Bay beach but not the residential units in their present location. Higher inland properties will have some view of the structure, although views will be partially obscured by the dune field ridge.

Holiday homes built on the terrace edge east of the site will have direct views of the Thyspunt NPS.

Views from the coastal road ***(St Francis Bay to Oyster Bay)*** will not be affected due to landform and vegetation screening of the Thyspunt NPS.

A summary of the Intensity and Significance of Visual Intrusion for the Thyspunt NPS and the probable change with and without mitigation in place is shown in **Table 7.**

Table 7: Summary of Intensity and Significance of Visual Intrusion for the Thyspunt NPS including probable change without and with mitigation measures in place

Note: With mitigation measures in place only the intensity of visual intrusion or visibility will be reduced. The significance will remain the same as without mitigation.

	Visibility from the Coast Road *to Oyster Bay*						**Visibility from Surrounding Landscape**						**Visual Intrusion on Landscape Character and Sense of Place**						**Visibility from Residential Areas**					
Radiusdistance (km)	**0-2,5**		**2,5-5**		**5-10**		**0-2,5**		**2,5-5**		**5-10**		**0-2,5**		**2,5-5**		**5-10**		**0-2,5**		**2,5-5**		**5-10**	
Intensity / Significance	**I**	**S**	**I**	**S**	**I**	**S**	**I**	**S**	**I**	**S**	**I**	**S**	**I**	**S**	**I**	**S**	**I**	**S**	**I**	**S**	**I**	**S**	**I**	**S**
Thyspunt NPS																								
Without mitigation	L	L	L	L	L	L	H	H	M	H	L	M	H	H	H	H	M	M	H	H	H	L	M	L
With mitigation	L	L	L	L	L	L	H	M	M	H	L	L	M	H	M	H	L	L	H	H	M	L	L	L

3.1.3 Visual Intrusion of the NPS at the Bantamsklip site

The visual intrusion and visibility is described in terms of the following categories:

- Visibility from the existing R43;
- Visibility from surrounding landscape within 15 km radius;
- Visual intrusion on landscape character and sense of place; and
- Visibility from residential areas, Pearly Beach and Franskraalstrand.

The visual intrusion intensity and significance is rated from high to low according to the criteria set out in **Tables 3 & 4.**

The visibility of the Bantamsklip NPS will be a function of its height (65 m and a stack of height 95 m above ground level) and its bulk (approximately 250 m long and 100 m wide). This area will include ancilliary buildings, switchyard and laydown / construction yard. Refer to **Figure 3.3.2, 3.4.2** and **Figure 3.5.2.**

The visual intrusion is the extent to which the Bantamsklip NPS dominates the scenic views from critical viewpoints.

Visibility from the R43 Coast Road

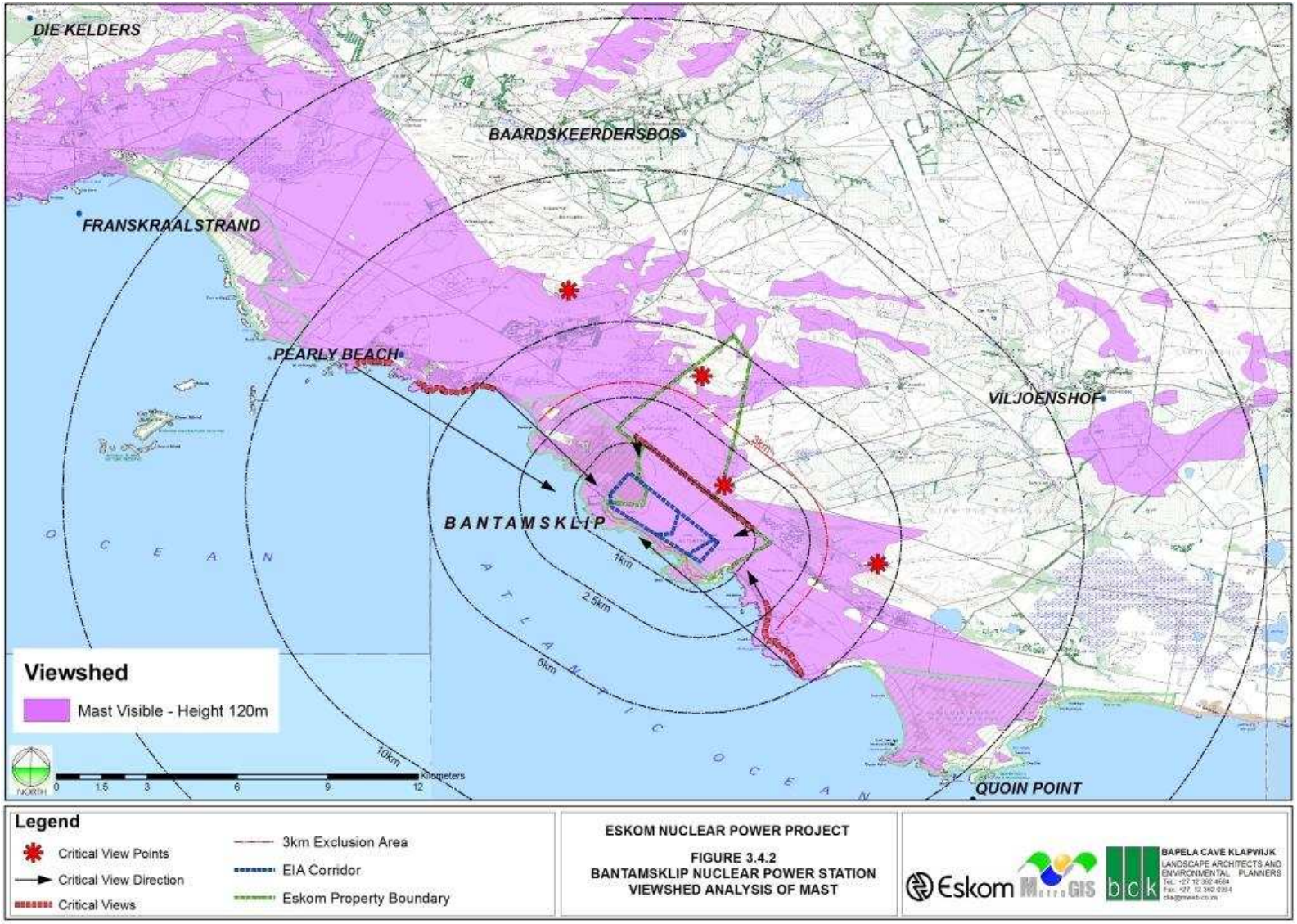
The road's alignment is parallel to the coastline and approximately 2 km from it. The closest section of the road to the Bantamsklip NPS is approximately 2 km, which is 1 km inside the 3 km exclusion zone around the proposed Bantamsklip NPS.

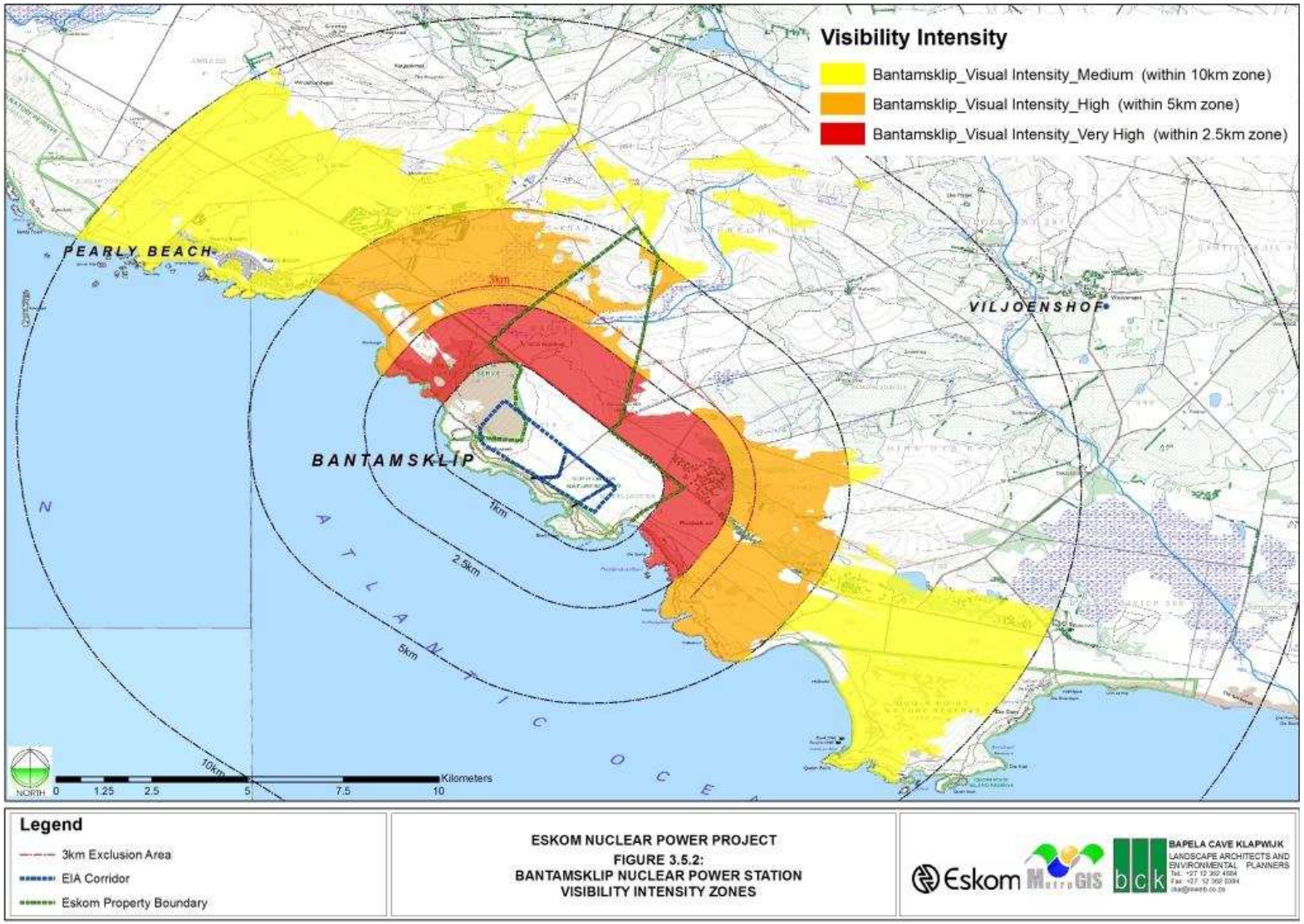
The viewshed analysis (**Figure 3.3.2**) shows the Bantamsklip NPS visible along a 30 km stretch, 15 km in each direction. This is not true for all the sections along the road because of the dense stands of Port Jackson shrubs, which line most of the seaward (south-west) side of the road. Refer to **Annexure B - Photo 1.**

Within the 5-10 km and towards the 2,5 km section east of the site the road is in cutting and therefore is screened for approximately 4-5 km. The most direct view of the Bantamsklip NPS will be from Point 116 (**Annexure B - Photo 16)** travelling westwards, because the road is elevated and the motorist is travelling on a gentle downward gradient, which offers views over the dense vegetation and directly onto the site.

The view from the R43 of the Bantamsklip NPS is in reality not as extensive as indicated by the viewshed diagram and this is a direct result of the tall (3 m plus) alien vegetation on the seaward edge of the road reserve. Certainly it is likely that the top portion of the Bantamsklip NPS will be seen from points along this road.

It is likely that eradication of the tall alien vegetation will take place, particularly as this endemic coastal vegetation is considered worthy of conservation. If this happens the extent of the views onto the Bantamsklip NPS from the R43 will become more extensive.


DIE KELDERS
BAARDSKEERDERSBOS
FRANSKRAALSTRAND
PEARLY BEACH
VILJOENSHOF
BANTAMSKLIP
OCEAN
ATLANTIC OCEAN
1km
2.5km
5km
10km
3km
QUOIN POINT
Viewshed
Mast Visible - Height 120m
NORTH
0 1.5 3 6 9 12 Kilometers
Legend
Critical View Points
Critical View Direction
Critical Views
3km Exclusion Area
EIA Corridor
Eskom Property Boundary
ESKOM NUCLEAR POWER PROJECT
FIGURE 3.4.2
BANTAMSKLIP NUCLEAR POWER STATION
VIEWSHED ANALYSIS OF MAST
Eskom
MetroGIS
bck
BAPELA CAVE KLAPWIJK
LANDSCAPE ARCHITECTS AND ENVIRONMENTAL PLANNERS


Visibility Intensity
Bantamsklip_Visual Intensity_Medium (within 10km zone)
Bantamsklip_Visual Intensity_High (within 5km zone)
Bantamsklip_Visual Intensity_Very High (within 2.5km zone)
PEARLY BEACH
VILJOENSHOF
BANTAMSKLIP
ATLANTIC OCEAN
1km
2.5km
5km
10km
NORTH
0 1.25 2.5 5 7.5 10
Kilometers
Legend
3km Exclusion Area
EIA Corridor
Eskom Property Boundary
ESKOM NUCLEAR POWER PROJECT
FIGURE 3.5.2:
BANTAMSKLIP NUCLEAR POWER STATION
VISIBILITY INTENSITY ZONES
Eskom
MetroGIS
bck
BAPELA CAVE KLAPWIJK
LANDSCAPE ARCHITECTS AND ENVIRONMENTAL PLANNERS

The intensity of the visibility of the Bantamsklip NPS along this short section of road is high in the zone 0-2,5 km where direct unobstructed views are possible and medium where views are obstructed by landform or vegetation in the 2,5–5 km zone. Intensity is low beyond 5 km.

The significance of this view is considered to be medium because it is a structure of such large scale that it is visually out of place in the scenic landscape. The sense of place of the site will be diminished both within the conservation area and from the areas surrounding it along the coast, particularly in the 0–2,5 km zone.

In the zone 2,5–5 km the significance is considered to be medium. The scale of the structures of the Bantamsklip NPS, when seen, will remain a significant feature in the view.

The significance of the visibility from the road beyond the 5 km radial distance is low, because the view of the Bantamsklip NPS is limited due to intervening landform and vegetation and the cone of vision of the motorist does not directly include the Bantamsklip NPS.

Visibility from the Surrounding Landscape

The visibility of the Bantamsklip NPS will remain in views along the coastline and in views seaward from the rising landform and hills north of the R43.

The landscape is particularly scenic because of the unspoilt and undeveloped condition of the hilly terrain and rocky coastline. The large scale and extensive area of the Bantamsklip NPS will compromise distant scenic views from the surrounding landscape and therefore the visibility intensity is rated as high in the 0–2,5 km zone, medium in the 2,5–5 km zone and low beyond this.

The significance of the Bantamsklip NPS's visibility from the surrounding landscape is rated as high within the 0–10 km zone and medium beyond this zone because it compromises and diminishes the sense of place and the visual quality of distant views of the landscape.

Visual Intrusion on Landscape Character and Sense of Place

The scale and extent of the Bantamsklip NPS and its location on a visually prominent coastline will make the entire facility highly visible.

Consequently, because of the visual dominance in the landscape, the sense of place will be changed. The visual intrusion rating is high in the 0-5 km zone, medium in the 5-10 km zone, because there is a change, but not major, and low in the 10-15 km zone. The distance reduces the influence on this zone.

The undisturbed natural character and sense of wildness of the coast will be visually altered and therefore the significance rating is given as high in the zone 0-10 km, medium in the 10-15 km zone.

Visibility from Residential Areas

As the Bantamsklip NPS is between 5 and 10 km of the residential suburb of Pearly Beach the visibility intensity is high, but only for the residential area on the shoreline of Pearly Beach, where some houses have a direct view across the bay to the site. Some homes on the farm Buffelsjacht to the east are just beyond 5 km and views

onto the Bantamsklip NPS will be direct in a north-westerly direction. The sea views are south-west. Beyond 10 km the intensity is low.

The significance of this visibility to any residential units along the eastern coastline is high within the 2,5 km zone because the Bantamsklip NPS will feature prominently, but the Bantamsklip NPS will not be dominant in the views east from houses along the coast beyond 5 km zone. This refers to those houses at Pearly Beach. Most houses along the beachfront are orientated to views southward of the sea. Refer to **Annexure B - Photos 4 & 5**. The significance is considered to be medium in the 5-10 km zone and low beyond.

Views from Franskraalstrand are mostly obscured by a vegetated dune and the distance (greater than 15 km) makes the visibility of the Bantamsklip NPS difficult with the naked eye.

Conclusion for the Bantamsklip NPS

The conclusion is that the Bantamsklip NPS will contribute ***significantly*** to the visual intrusion of the existing local and regional setting. This is a result of the large structures and transmission lines that will create the visual complexity and visual intrusion of the views from Pearly Beach and higher lying inland properties. The views of Bantamsklip NPS are reduced by the screening effect of tall vegetation along the R43, vegetated dunes and houses along the beach road. Refer to **Table 8.**

3.1.4 Visual Intrusion of the NPS at the Duynefontein site

The visual intrusion is described in terms of the following categories:

- ***Visibility from existing R27;***
- ***Visibility from surrounding landscape;***
- ***Visual intrusion on landscape character and sense of place; and***
- ***Visibility from residential areas such as Duynefontein, Melkbosstrand and Atlantis.***

The visual intrusion intensity and significance is rated from high to low according to the criteria set out in Tables 5 & 6.

Visibility

The visibility of the Duynefontein NPS will be a function of its height (65 m and a stack of height 95 m above ground level) and its bulk (approximately 250 m long and 100 m wide). Refer to Figures 3.3.3 and Figure 3.5.3.

Table 8: Summary of Intensity and Significance of Visual Intrusion for the Bantamsklip NPS including probable change without and with mitigation measures in place

Note: With mitigation measures in place only the intensity of visual intrusion or visibility will be reduced. The significance will remain the same as without mitigation..

	Visibility from the R43 Coast Road						Visibility from Surrounding Landscape						Visual Intrusion on Landscape Character and Sense of Place						Visibility from Residential Areas					
Radius (km)	**0-2,5**		**2,5-5**		**5-10**		**0-2,5**		**2,5-5**		**5-10**		**0-2,5**		**2,5-5**		**5-10**		**0-2,5**		**2,5-5**		**5-10**	
Intensity / Significance	**I**	**S**	**I**	**S**	**I**	**S**	**I**	**S**	**I**	**S**	**I**	**S**	**I**	**S**	**I**	**S**	**I**	**S**	**I**	**S**	**I**	**S**	**I**	**S**
Bantamsklip NPS																								
Without mitigation	H	H	M	M	L	L	H	H	M	H	L	H	H	H	H	H	M	M	H	H	H	H	H	M
With mitigation	M	H	M	M	L	L	M	H	L	H	L	H	M	H	M	H	L	M	H	H	M	H	H	M

Visibility from the R27 Coast Road

The road's alignment is parallel to the coastline and varies between 2 and 5 km from the coast.

The viewshed analysis (**Figure 3.3.3**) shows the Duynefontein NPS visible along a 20 km stretch, 10 km in each direction. This is not true for all the sections along the road because of the dense stands of Port Jackson shrubs, which line most of the seaward (south-west) side of the road.

Within the 2,5-5 km zone and while travelling north or south, views of the Duynefontein NPS are possible. However, tall (mostly alien) vegetation, obstructs the view for the motorist. This is true of the junction of the R27 with the Atlantis Road. There are also partially vegetated dunes in that area, which obscure full views of the Duynefontein NPS. While the visibility is low to negligible, it is most likely that the new entrance road will be at this junction. The removal of vegetation and the construction of a new road will open direct views to the proposed Duynefontein NPS.

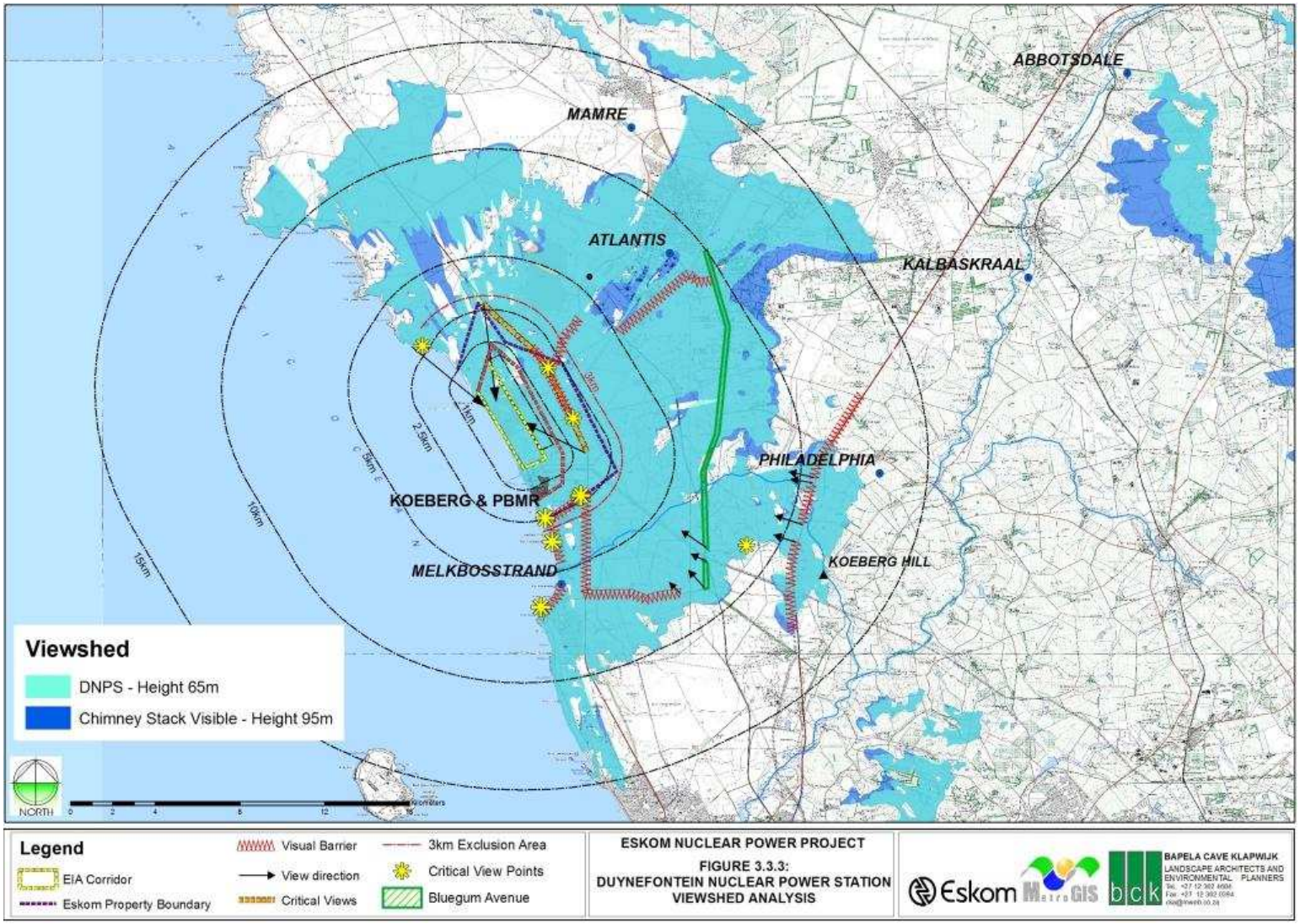
The view from the R27 of the Duynefontein NPS is in reality not as extensive as indicated by the viewshed diagram and this is a direct result of the tall (3 m plus) alien vegetation on the seaward edge of the road reserve. Certainly it is likely that the top portion of the Duynefontein NPS will be seen from points along this road.

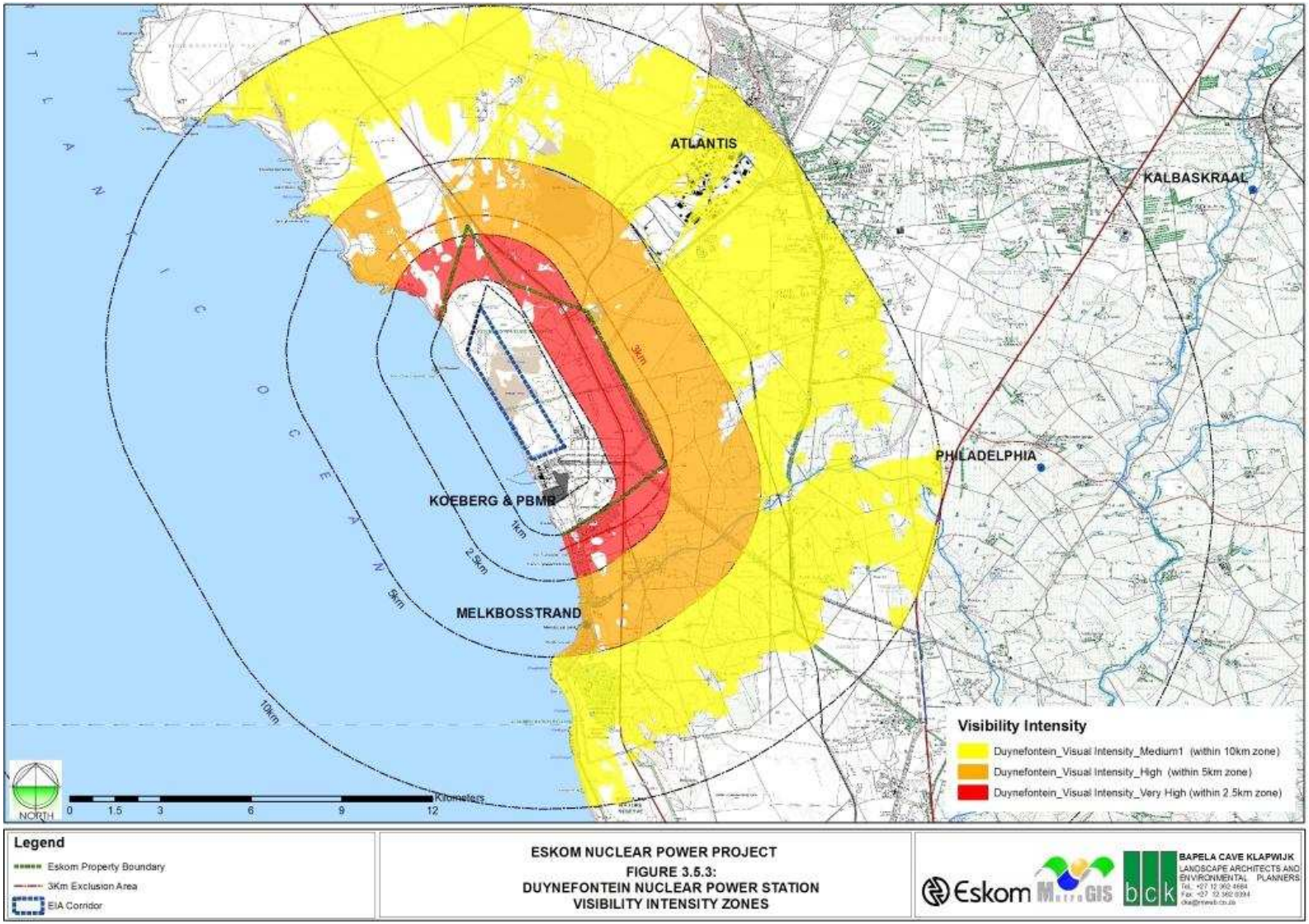
It is likely that eradication of the tall alien vegetation will take place, particularly as this endemic coastal vegetation is considered worthy of conservation. The extent of the views onto the Duynefontein NPS from the R27 will become more extensive.

The intensity of the visibility of the Duynefontein NPS along this short section of road is high where direct unobstructed views are possible and medium where views are obstructed by landform or vegetation. For the 2,5-5 km zone it is medium and for the 5-10 km zone, low.

The significance of this view is considered to be medium because it is considered that a building of such large scale is visually out of place in the scenic landscape. However, in the context of the existing Koeberg NPS and the possible future PBMR DPP the significance can be downgraded to low due to the presence of these large structures, all within a 4 km stretch of coastline.

The intensity and significance of the visibility from the road beyond the 5 km radial distance is low, because the view of the Duynefontein NPS is limited due to intervening landform and vegetation and the cone of vision of the motorist does not directly include the Duynefontein NPS.


ABBOTSDALE
MAMRE
ATLANTIS
KALBASKRAAL
PHILADELPHIA
KOEBERG & PBMR
MELKBOSSTRAND
KOEBERG HILL
1km
2.5km
3km
5km
10km
15km
Viewshed
DNPS - Height 65m
Chimney Stack Visible - Height 95m
NORTH
Legend
EIA Corridor
Eskom Property Boundary
Visual Barrier
View direction
Critical Views
3km Exclusion Area
Critical View Points
Bluegum Avenue
ESKOM NUCLEAR POWER PROJECT
FIGURE 3.3.3:
DUYNEFONTEIN NUCLEAR POWER STATION
VIEWSHED ANALYSIS
Eskom
MetroGIS
bck
BAPELA CAVE KLAPWIJK
LANDSCAPE ARCHITECTS AND
ENVIRONMENTAL PLANNERS


ATLANTIS
KALBASKRAAL
PHILADELPHIA
KOEBERG & PBMR
MELKBOSSTRAND
1km
2.5km
5km
10km
30km
Visibility Intensity
Duynefontein_Visual Intensity_Medium1 (within 10km zone)
Duynefontein_Visual Intensity_High (within 5km zone)
Duynefontein_Visual Intensity_Very High (within 2.5km zone)
NORTH
0 1.5 3 6 9 12
Kilometers
Legend
Eskom Property Boundary
3Km Exclusion Area
EIA Corridor
ESKOM NUCLEAR POWER PROJECT
FIGURE 3.5.3:
DUYNEFONTEIN NUCLEAR POWER STATION
VISIBILITY INTENSITY ZONES
Eskom MetroGIS
bck
BAPELA CAVE KLAPWIJK
LANDSCAPE ARCHITECTS AND ENVIRONMENTAL PLANNERS

Visibility from the Surrounding Landscape

The visibility of the Duynefontein NPS will remain in views along the coastline and in views seaward from the rising landform and hills east of the R27.

The landscape is particularly scenic because of the unspoilt and undeveloped condition of the dune fields along this stretch of the coastline. The large scale and extensive area of the Duynefontein NPS will compromise distant scenic views from the surrounding landscape and coastline and therefore the visibility intensity is rated as high for the 0-2,5 km zone, medium for the 2,5-5 km zone and low beyond that.

The significance of the Duynefontein NPS visibility from the surrounding landscape is rated as medium for the 0-5 km zone and low for areas beyond that, because it compromises scenic distant views of the landscape northward of the existing Koeberg NPS.

Visual Intrusion on Landscape Character and Sense of Place

The scale and extent of the Duynefontein NPS and its location on an exposed coastline will make the entire facility highly visible.

This visual dominance in the landscape will irreversibly change the sense of place. The visual intensity for the area north of the site is rated as high in the 0-5 km zone, because southwards the existing Koeberg NPS is visually dominant, medium in the 5-10 km zone, because there is a visible change at that distance, but not major, and low in the 10-15 km zone. Distance reduces the influence on this zone.

The undisturbed natural character and sense of wildness of the place will be visually altered and therefore the significance rating is given as high in the zone 0-5 km, medium in the 5-10 km zone. These are all considered for the area north of the site. The Koeberg NPS has already influenced the visual intrusion.

Visibility from Residential Areas

As the Duynefontein NPS is 5 km from the nearest residential suburb of Duynefontein, the visibility intensity is medium, but only for the residences on the north-eastern edge, because the existing Koeberg NPS will obstruct views of the Duynefontein NPS further south along the road and houses behind the front row will have their views obstructed by the houses north of them. The visibility intensity is low in the 5-10 km zone and beyond.

The significance of this visibility to the residential area is medium, because the Duynefontein NPS will be noticeable, but not dominant (5 km north). Beyond 5 km the rating is low.
Views from Atlantis residential area are obscured by houses and the industrial area. The distance greater than 10 km away makes the visibility from Atlantis negligible.

Conclusion for the Duynefontein NPS

The conclusion drawn is that the Duynefontein NPS will contribute to the visual intrusion of the existing local setting. This is a result of the large structures and transmission lines that will create visual complexity and intrude in views from Duynefontein and higher inland properties. The screening and obscuring of views of the Duynefontein NPS is reduced by tall vegetation along the R27, vegetated dunes and the existing Koeberg NPS. This, however, will change if this vegetation is

removed and the area at the R27 Atlantis Road cleared for a new entrance road to the Duynefontein NPS.

A summary of the Intensity and Significance of Visual Intrusion for the Duynefontein NPS and the probable change with and without mitigation in place is shown in **Table 9.**

3.2 Visual Impact Assessment

This section rates the overall visual impact of the NPS that incorporates the construction and lay-down area, the transmission line to the site boundary and the masts within the site and the proposed access roads and spoil dumps located within the EIA corridor. This is informed by the Visual Intrusion and Visibility Assessment.

Table 10 below provides a summary of the criteria and the rating scales that will be used. The assignment of ratings has been based on past experience of the EIA Project Team, the professional judgement of the specialists as well as through research.

Subsequently, mitigation measures have been identified and considered for each impact and the assessment has been repeated in order to determine the significance of the residual impacts (the impact remaining after the mitigation measure has been implemented (namely the 'visual impact rating after mitigation).

Table 9: Summary of Intensity and Significance of Visual Intrusion for the Duynefontein NPS including probable change without and with mitigation measures in place

Note: With mitigation measures in place only the intensity of visual intrusion or visibility will be reduced. The significance will remain the same with mitigation.

	Visibility from the R27 Coast Road						Visibility from Surrounding Landscape						Visual Intrusion on Landscape Character and Sense of Place						Visibility from Residential Areas					
Radius (km)	**0-2,5**		**2,5-5**		**5-10**		**0-2,5**		**2,5-5**		**5-10**		**0-2,5**		**2,5-5**		**5-10**		**0-2,5**		**2,5-5**		**5-10**	
Intensity / Significance	**I**	**S**	**I**	**S**	**I**	**S**	**I**	**S**	**I**	**S**	**I**	**S**	**I**	**S**	**I**	**S**	**I**	**S**	**I**	**S**	**I**	**S**	**I**	**S**
Duynefontein NPS																								
Without mitigation	H	M	M	L	L	L	H	M	M	M	L	L	H	H	H	H	M	M			M	M	L	L
With mitigation	M	M	M	M	L	L	M	M	L	M	L	L	M	H	M	H	L	M			M	L	L	L

The criteria that will be used to determine the significance of the impacts will include the following:

Table 10: Summary of Criteria and Rating Scales

Criteria	*Rating Scales*	*Notes*
Cumulative impacts (incremental impacts of the activity and other past, present and future activities on a common resource)	***Low***	***There is still significant capacity of the environmental resources within the geographic area to respond to change and withstand further stress.***
	Medium	***The capacity of the environmental resources within the geographic area to respond to change and withstand further stress is reduced.***
	High	***The capacity of the environmental resources within the geographic area to respond to change and withstand further stress has been or is close to being exceeded.***
Nature	***Positive***	***This is an evaluation of the type of effect the construction, operation and management of the proposed NPS development would have on the affected environment.***
	Negative	
	Neutral	
Extent	***Low***	***Site-specific, affects only the development footprint***
	Medium	***Local (limited to the site and its immediate surroundings, including the surrounding towns and settlements within a 10 km radius);***
	High	***Regional (beyond a 10 km radius) to national***
Intensity	***Low***	***Where the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected***
	Medium	***Where the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected***
	High	***Where natural, cultural or social functions and processes are altered to the extent that the impact will temporarily or permanently cease; and valued, important, sensitive or vulnerable systems or communities are substantially affected.***
Duration	***Low***	***0-9 years (i.e. duration of construction phase)***
	Medium	***10-15 years***
	High	***More than 15 years to permanent***
Probability (the likelihood of the impact occurring)	***Low***	***It is highly unlikely or less than 50 % likely that an impact will occur.***
	Medium	***It is between 50 and 70 % certain that the impact will occur.***
	High	***It is more than 75 % certain that the impact will occur or it is definite that the impact will occur.***

Criteria	Rating Scales	Notes
Reversibility (ability of the impacted environment to return to its pre-impacted state once the cause of the impact has been removed)	***High***	***Impacted natural, cultural or social functions and processes will return to their pre-impacted state within the short-term.***
	Medium	***Impacted natural, cultural or social functions and processes will return to their pre-impacted state within the medium term.***
	Low	***Impacted natural, cultural or social functions and processes will never return to their pre-impacted state.***
Potential for impact on irreplaceable resources	***Low***	***No irreplaceable resources will be impacted.***
	Medium	***Resources that will be impacted can be replaced, with effort.***
	High	***There is no potential for replacing a particular vulnerable resource that will be impacted.***
Consequence (a combination of extent, duration, intensity and the potential for impact on irreplaceable resources).	***Low***	***A combination of any of the following:*** • ***Intensity, duration, extent and impact on irreplaceable resources are all rated low*** • ***Intensity is low and up to two of the other criteria are rated medium*** • ***Intensity is medium and all three other criteria are rated low***
	Medium	• ***Intensity is medium and at least two of the other criteria are rated medium***
	High	• ***Intensity and impact on irreplaceable resources are rated high, with any combination of extent and duration*** • ***Intensity is rated high, with all of the other criteria being rated medium or higher.***
Significance (all impacts including potential cumulative impacts)	***Low***	• ***Low consequence and low probability*** • ***Low consequence and medium probability*** • ***Low consequence and high probability***
	Medium	• ***Medium consequence and low probability*** • ***Medium consequence and medium probability*** • ***Medium consequence and high probability*** • ***High consequence and low probability***
	High	• ***High consequence and medium probability*** • ***High consequence and high probability***

3.2.1 Description of Visual Impacts during Project Phases

The following visual impacts are expected during the project phases of Design Construction, Operation and Decommissioning. All of the following are typical of each site. Generic mitigation measures are recommended in Section 6: Mitigation.

3.2.2 Design Phase

The physical collection of data on site for this phase is the only visual impact that will occur. This applies particularly to the drilling to obtain geotechnical data. The visual impacts that result are the visual intrusion of views onto the area are caused by the drilling and ancillary equipment, visual degradation caused by the cutting of new

access roads, damage to vegetation and the erection of a site camp. These actions will cause degradation of the sense of place.

3.2.3 Construction Phase

The construction phase includes the NPS, the transmission lines, spoil dumps and the access routes from the nearest provincial road.

The following visual impacts are likely to occur during this phase:

- Visible dust over extensive areas caused by earthmoving equipment and vehicles on dirt roads.

- Degradation of visual quality of local settings that result from landform change and vegetation removal.

- Visual clutter that will result from structures associated with the project such as site offices, on-site accommodation of personnel, lay-down areas, storage sheds and workshops, cement batching plants, temporary stockpiles of topsoil, rock and backfill material, vehicle and machine storage/parking and the maintenance and manufacturing of workshops.

- Visual change to local setting caused by
  - Large spoil dumps;
  - Alteration of visual quality of the local night scene from lighting required for safety and construction;
  - Visual change to sense of place by the large level cleared areas; ***and***
  - ***Visual impact of construction traffic along new and existing roads to the NPS site.***

3.2.4 Operational Phase

- There will be a visual change to the sense of place of coastal and inland areas experienced by visitors and local communities due to the large scale of new elements in the landscape, including the NPS, the transmission lines within the site, new access roads, permanent spoil dumps and tall radio and meteorological masts.

- Changes in visual quality of the local landscape will be caused by new landforms arising from new access roads, platforms and spoil resulting from and required for the NPS and ancillary buildings.

- Changes in visual quality of the local night scene of the area will result from safety and security lighting of the NPS, perimeter fence, access control buildings and roads.

3.2.5 Decommissioning Phase

- Visible dust will be caused by heavy machinery and on-site haulage.

- Visual clutter will result from structures associated with site offices and accommodation.

- Visual change to the landscape will result from new landforms that are created by removal or addition of soil or building rubble from temporary dumps to cover or screen areas.

- Visual intrusion will result from new fencing and lighting for safety and security.

- Visual nuisance will result from heavy traffic on main roads.

3.2.6 Assessment of Visual Impact

The rating of the identified visual impact created by each element or action in each project phase (from design to decommissioning) is presented in **Table 11**. **Table 12** includes the rating with mitigation measures in place for each site.

3.2.7 Description of Visual Impacts and Mitigation for Specific Elements

The visual impacts that result from specific elements of the NPS project are described and mitigation measures given.

These are the NPS and Stack, transmission lines within the EIA area, masts, lighting, access roads and spoil dumps.

The rating of each element's visual impact according to the evaluation criteria is given in table form. These visual impacts apply only to the operational phase of the project and are generic for each site.

3.2.8 The NPS and Stack

The large scale of the NPS, both vertically and horizontally, together with the tall chimney stack, will be visually dominant in views along and towards the coastline.

Cumulative Impacts

Thyspunt

Medium - Visibility is contained within the 10km radius. Future and existing residential and farming development along the coast and inland is likely. Future expansion of the NPS will intensify visual impact by extending the footprint and large scale. New development in the viewshed will over time absorb the scale difference.

Bantamsklip

High – The extensive areas of open and scenic landscape from Franskraal to Quoin point in the viewshed are a valuable national asset. This area is becoming a destination for visitors and the community. The NPS sites dominating form on the coastline will degrade the wild and natural appeal that the coastline and the interior currently have. Future housing is unlikely as there are already large proclaimed land and marine reserves in that area.

Duynefontein

<u>Medium</u> - The existing Koeberg NPS and the existing Combined Cycle plant in Atlantis have imposed a regional visual presence in the landscape therefore the visual absorption of the proposed plant into the setting can be more easily made. The visual character and capacity of the surrounding land use allows for easier visual acceptance and 'fit' into the landscape.

Table 11: Thyspunt, Bantamsklip & Duynefontein: Visual Impact Rating Matrix – Project Phases[1]

Phase and Visual Impact Aspect	*Cumulative*	*Nature*	*Extent*	*Intensity*	*Duration*	*Probability*	*Reversibility*	*Impact on irreplaceable resources*	*Confidence level*	*Consequence*	*Significance*
DESIGN PHASE											
Visual intrusion of drill rigs and ancillary equipment	***Low***	***Negative***	***Low***	***Low***	***Low***	***Medium***	***High***	***Low***	***High***	***Low***	***Low***
With mitigation											
Visual degradation of vegetation clearance, access roads and site camps	***Medium***	***Negative***	***Low***	***Low***	***Low***	***Medium***	***High***	***Medium***	***High***	***Low***	***Low***
With mitigation	***Low***										
Degradation of Sense of Place	***Medium***	***Negative***	***Low***	***Low***	***Low***	***Low***	***Medium***	***Medium***	***High***	***Low***	***Low***
With mitigation											
CONSTRUCTION PHASE											
Visible dust	***Low***	***Negative***	***Low***	***Low***	***Medium***	***Medium***	***Medium***	***Low***	***High***	***Low***	***Low***
With mitigation											
Degradation of Visual Quality resulting from change to vegetation and landform	***Medium***	***Negative***	***Low***	***Low***	***Medium***	***High***	***Low***	***High***	***High***	***Medium***	***Medium***

[1] Where no rating is given for the impact with mitigation, it implies that the mitigation will not reduce the impact

With mitigation											
Phase and Visual Impact Aspect	***Cumulative***	***Nature***	***Extent***	***Intensity***	***Duration***	***Probability***	***Reversibility***	***Impact on irreplaceable resources***	***Confidence level***	***Consequence***	***Significance***
Visual clutter resulting from structures, site offices, laydown areas and site accommodation	***Low***	***Negative***	***Low***	***Low***	***Medium***	***Medium***	***Medium***	***Medium***	***High***	***Low***	***Low***
With mitigation											
Visual quality change caused by large spoil dumps	***Medium***	***Negative***	***Medium***	***Low***	***High***	***High***	***Low***	***Medium***	***Medium***	***Low***	***Low***
With mitigation	***Low***										
Visual alteration of night scene by lighting	***Low***	***Negative***	***Medium***	***Medium***	***Medium***	***High***	***Low***	***High***	***High***	***Medium***	***Medium***
With mitigation											
Visual change to Sense of Place	***Medium***	***Negative***	***Medium***	***Medium***	***Medium***	***High***	***Low***	***High***	***High***	***Medium***	***Medium***
With mitigation											
OPERATION PHASE											
Visual change to sense of place of local coastal	***Medium***	***Negative***	***Medium***	***Medium***	***High***	***High***	***Low***	***High***	***High***	***Medium***	***Medium***

and inland area due to large scale and extent of structures With mitigation											

Phase and Visual Impact Aspect	***Cumulative***	***Nature***	***Extent***	***Intensity***	***Duration***	***Probability***	***Reversibility***	***Impact on irreplaceable resources***	***Confidence level***	***Consequence***	***Significance***
Change in visual quality of local area caused by new landforms and roads With mitigation	***Medium***	***Negative***	***Medium***	***Medium***	***High***	***High***	***Low***	***High***	***High***	***Medium***	***Medium***
Change in visual quality of local night scene by lighting With mitigation	***Medium***	***Negative***	***Medium***	***Medium***	***High***	***High***	***Low***	***High***	***High***	***Medium***	***Medium***
DECOMMISSIONING PHASE											
Visible dust With mitigation	***Low***	***Negative***	***Low***	***Low***	***Medium***	***Medium***	***High***	***Low***	***Medium***	***Low***	***Low***
Visual clutter resulting from structures, site offices and on site	***Low***	***Negative***	***Low***	***Low***	***Medium***	***Medium***	***Medium***	***Medium***	***Medium***	***Low***	***Low***

accommodation With mitigation											
Visual change to local landscape due to earthworks and spoil dumps	***Medium***	***Negative***	***Medium***	***Medium***	***Low***	***High***	***Low***	***Medium***	***High***	***Medium***	***Medium***
With mitigation	***Low***									***Low***	
Visual nuisance of heavy traffic on local roads With mitigation	***Low***	***Negative***	***Medium***	***Low***	***Medium***	***Medium***	***Medium***	***Low***	***Medium***	***Low***	***Low***

Nature

Thyspunt

Negative – The sense of place of the coastal and inland setting ***will be*** degraded.

Bantamsklip

Negative – The sense of place of the coastal and inland setting ***will be*** degraded.

Duynefontein

Negative –The sense of place of the coastal and inland setting north of the site ***will be*** degraded.

Extent

Thyspunt

Medium – visible from within the ***10*** km radius. This is a result of the coastal orientation changing beyond the 20 km radial zone east of the site at Cape St. Francis. This situation eliminates views of the site from beyond 20 km along the coastline. The dunes and hills along the coast obscure views to the site beyond 10 km.

The construction and laydown areas within the site are site-specific and are contained within the ***EIA corridor***.

Bantamsklip

Medium - Visible from within the ***10*** km radius. This is a result of the coastal orientation changing beyond the 20 km radial zone. This situation eliminates views of the site. The hills parallel to the coast obscure views to the site beyond 10 km to the north and east.

The construction and laydown areas within the site are site-specific and are contained within the ***EIA corridor***.

Duynefontein

Medium - Visible from within the ***10*** km radius. This is a result of the gently sloping landform towards the featureless coastline. Views of the Duynefontein NPS are generally contained within the shallow bowl of the local landform. Refer to **Figure 3.3.3.**

The construction and lay-down areas within the site are site-specific and contained within the ***EIA corridor***.

Intensity

The intensity of the visual impact is considered for the radial area of >2.5km<5km.
The rating for the zone <2.5km will always be high.
The rating for the zone >2.5km< 5km is medium.
The rating for the zone > 5km is low.

Thyspunt / Bantamsklip / Duynefontein

Medium - the natural, cultural and social functions and processes continue, but in a modified way. The surrounding area will most likely be open to visits by the public, but the visual character and sense of place will have been irreversibly altered.

Duration

Thyspunt / Bantamsklip / Duynefontein

High (greater than 10 years) - The impact will cease after the operational life and demolition of the structures.

Probability

Thyspunt / Bantamsklip / Duynefontein

High - The visual impact will occur because of the large scale and prominent position on the coastal edge.

Reversibility

Thyspunt / Bantamsklip / Duynefontein

Low - The site area will not be able to return to its pre-impacted state. This is due to the physical changes made to the site and immediate surroundings, for instance the reactor foundations and the platform on which the NPS will be built creates and extensive raised level area under which are enormous concrete foundation. Total removal of the reactor and turbine building cannot be achieved but earth works can round of engineered landforms. The spatial views of the NPS sites from along the coast and inland may return to those similar to the pre impacted state but the detail will be different. In addition the newer development in the viewshed will have altered the sense of place in the intervening period.

Impact on Irreplaceable Resources

Thyspunt / Bantamsklip / Duynefontein

High - The visual asset of the unspoiled coastline for 5km either side of the site is uniquefor Thyspunt and Bantamsklip but only north of the Duynefontein site.

Confidence Level

Thyspunt / Bantamsklip / Duynefontein

High - The visibility of the NPS as a result of its scale and location on the landform will negatively impact scenic views from along the coast and inland towards the site. Viewshed analysis confirms the extent of visibility.

Consequence Rating

Thyspunt / Bantamsklip / Duynefontein

The intensity is medium, the extent is l***ow*** and the duration is ***high***.

The rating is therefore **Medium** for Thyspunt, Duynefontein and Bantamsklip (Refer to **Rating Table 10**).

Significance Rating

Thyspunt / Bantamsklip / Duynefontein

The consequence is medium and the probability is ***high***.

The rating is therefore ***Medium*** for all sites.

Generic Mitigation Measures

The following are general mitigation measures to reduce the visual impact of the NPS:

- Select colours for the NPS that allow for a visual scale reduction i.e. horizontal band and colour to fit general colour of the setting.
- Position the NPS further from the coastline to allow for a retained strip of natural coastline (minimum 100m) between the plant and the high water mark.
- Screen the lower portions of the structures by strategically positioned earth berms and tree and shrub planting.
- Design a rounded roof structure for the turbine halls and reactor buildings. This will reduce straight shadow lines on the structures.

3.2.9 Transmission Lines

It is assumed that transmission line routes will be aligned directly inland from the NPS at each of the sites. These parallel tall pylons will be visually presented to the surrounding landscape in silhouette due to the NPS being near sea level. Their height of approximately 45m will be highly visible from the surrounding landscape, as they cross higher ground en route to the interior. The transmission lines are only considered up to the edge of each NPS site known as the EIA corridor and, where appropriate, the radius between 2.5 km and 5km from the Nuclear Power Station.

At the time of writing the preferred direction of the transmissions lines immediately outside the EIA corridor had not been determined by the consultants evaluating the visual impacts. There will be two 400kV lines that leave the HV Yard and one 132kV

line that will enter the site. The latter will supply power for the operation of the NPS. The configuration of the Transmission lines in the corridor within the site boundary is 50m for the 132kV distribution line and 95m for the two 400kV. The latter has centre line to centre line spacing. Refer to **Figures 3.1.1b, 3.1.2b and 3.1.3b**.

Cumulative Impacts

Thyspunt

The preferred route for the incoming 132kV and the outgoing two 400kV transmission lines is due north from the NPS over the dune field and onward along the panhandle. In this case the HV Yard is to be located midway in the panhandle.

Medium - The lines add to the visual complexity of the NPS as these cross the dune ridge and further inland as they cross the coast road ***(Cape St. Francis to Oyster Bay)*** and the N2.

Within the EIA corridor

The lines from the generator building will converge to a point on the northern boundary of the EIA corridor. At this point the lines will traverse the east west dune field and enter the HV Yard located in the panhandle. The transmission lines will be more visible as the vegetation clad dune landform rises from the coast. At the point of crossing this ridgeline the towers will be in silhouette.

The lines and the HV Yard add to the visual complexity of that valley when considered together with the large sand and rock spoil forms and the security fence on the perimeter of the HV Yard and perimeter fence. If the northern access route is selected, the visual impact of all these features will have a high cumulative visual impact because the scale of the structures will be experienced at their greatest alongside the road.

Bantamsklip

High - The Transmission Line adds to the existing visual complexity of the NPS as it traverses the coastal terrace and crosses the R43 at right angles to the road. This feature adds to the extent of the visual impact at the local level in a highly scenic area.

Within the EIA corridor

The coastal terrace is flat with a partially vegetated sand dune on the western boundary. The transmission line and towers will add to the visual complexity of the spoil forms, security fence, central access road and radio mast. The transmission lines will converge towards the middle of the northern EIA corridor boundary before heading into the hinterland.

The possible presence of the spoil dump may screen views of the transmission lines from road users travelling westward along the R43.

The cumulative visual impact will be high in this scenic area.

Duynefontein

High - The Transmission Line will add to the existing visual complexity of the transmission lines that leave the Koeberg NPS. This feature adds to the aerial extent of the visual impact at the local level, particularly as all the transmission lines cross important local regional and national roads.

Within the EIA corridor

The flat terrain of the low, sparsely vegetated coastal dune will accentuate the transmission lines and the towers as they converge to a common crossing position on the north-eastern boundary of the EIA corridor. The visual complexity as described above will be increased by the scale and number of the transmission lines.

The cumulative visual impact is regarded as high.

Nature

Thyspunt

Negative - The lines will add to the visual complexity and extent of visual change within the EIA corridor, the 3 km exclusion zone and up to the 5 km zone as the line crosses the dune ridge.

Bantamsklip

Negative - This line will add to the visual complexity and extent of visual change within the EIA corridor, the 3 km exclusion zone as it crosses the R43 coast road.

Duynefontein

Negative - This line will add to the visual complexity and extent of visual change within the EIA corridor, the 3 km exclusion zone particularly as there are and will be lines from Koeberg.

Extent

Thyspunt / Bantamsklip / Duynefontein

Low – Site-specific i.e. within the EIA corridor and the landward boundary to the 3 km exclusion zone.

Intensity

The intensity of the visual impact is considered for the EIA corridor and the radius between 2.5 and 5km

Thyspunt

High – The very high visibility due to the large scale against the surrounding low vegetation of the dune field. The NPS will be visible from the access road.
Medium - The line traverses rising grazing/cultivated ground.
Bantamsklip

High- The very high visibility due to the large scale in an area of low vegetation. The NPS will be visible from the access road.
High - The line traverses a particularly scenic natural area.

Duynefontein

Medium –The high visibility with the contrast lessened by existing lines in the area. The NPS will be visible from the access road.
Low - The line traverses an area already influenced by existing transmission lines from Koeberg.

Duration

Thyspunt / Bantamsklip / Duynefontein

High – The impact will cease after the operational life and demolition of structures.

Probability

Thyspunt / Bantamsklip / Duynefontein

High - The visual impact will occur because of the large scale of the towers that will form a linear structure above the flat and gently sloping land surface.

Reversibility

Thyspunt / Bantamsklip / Duynefontein

High – For both the EIA corridor and the radial area. The original visual integrity of the land traversed will be able to be returned to the pre-impacted site after the transmission line and towers are removed.

Impact on Irreplaceable Resources

Thyspunt / Bantamsklip/ Duynefontein

High – For the EIA corridor and the radial area. Each landscape setting is unique and visual sense of place will be diminished.

Confidence Level

Thyspunt / Bantamsklip / Duynefontein

High – For the EIA corridor and the radial area. The visibility of the transmission lines will alter the sense of place of adjacent land use, but this visibility will diminish with distance from the route.

Consequence Rating

EIA corridor

Thyspunt - The intensity is high, the extent is ***low*** and the duration is ***high***.
Bantamsklip - The intensity is high, the extent is ***low*** and the duration is ***high***.
Duynefontein - The intensity is medium , the extent is ***low*** and the duration is ***high***.

Radius > 2.5km < 5 km

Thyspunt - The intensity is medium, the extent is ***low*** and the duration is ***high***.
Bantamsklip - The intensity is high, the extent is ***low*** and the duration is ***high***.
Duynefontein - The intensity is low, the extent is ***low*** and the duration is ***high***.

Therefore, for

The EIA corridor

Thyspunt - The consequence is ***Medium*****.**
Bantamsklip - The consequence is ***Medium*****.**
Duynefontein - The consequence is ***Low*****.**

Radius >2.5km <5 km

Thyspunt - The consequence is ***Medium*****.**
Bantamsklip - The consequence is ***Medium*****.**
Duynefontein - The consequence is **Low.**

Significance Rating

Thyspunt - has a medium consequence rating and a ***high*** probability therefore the significance is ***Medium***.
Bantamsklip - has a high consequence rating and a ***high*** probability therefore the significance is ***Medium***.
Duynefontein - has a low consequence rating and a ***high*** probability therefore the significance is **Medium**.

Generic Mitigation Measures

The recommended mitigation of visual impacts associated with the transmission lines within the 3 km exclusion zone are as follows:

- The use of guyed cross rope suspension towers will have less of a visual presence due to the lattice guyed tower legs.
- The colour of the tower components should be galvanised grey. This natural colour will allow the form to blend with the background at distances.
- Where the line crosses a road, the crossing should be at right angles to the road to minimise the view along the line route.

3.2.10 Masts

There will be two masts at each NPS, namely a meteorological mast (120m) and a radio mast (95m). Both will be located in the vicinity of the NPS and will have a red light on top in accordance with the requirements of the Civil Aviation Authority.
The masts' construction will be a triangular or similar patterned lattice form and will be guyed. The mast colour will have alternating vertical sections of red and white.

The height, the colour and the red lights will make the masts visible both during the day and night from very much further than the NPS in clear climatic conditions.

The main visual concern is that the masts will act as a beacon in the landscape in any views along the coast and from inland towards the coast within 10 km in each direction from the NPS. Refer to **Figures 3.4.1 & 3.4.2.**

The Thyspunt site has the smallest and narrowest viewshed for the NPS. This is due to the west to east orientated vegetated and sand dune fields, the one set is nearer the coast and the other is approximately 2.5 km inland. Refer to **Figure 3.3.1.**. The high points of these dunes are approximately 110m and 160m. These masts will most likely be positioned on the highest landform within the site (the exact locations have at the time of writing not been confirmed)

If this is so the view shed will be extensive. It must be noted that St. Francis Bay has a radio tower within its view and Cape St. Francis has a view of this tower as well as the lighthouse.

The Bantamsklip site has higher ground and hills, which contain the viewshed to a strip of approximately 2 to 3 km wide from the coastline. The same visual concern as for Thyspunt applies. There are a cluster of masts (which also have aviation warning lights) on top of the Carruthers Hill approximately 1 km NE of the site.

The Duynefontein site lies in a shallow bowl in the landscape (**Refer to Figure 3.3.3).**

The same visual concerns apply as for Thyspunt, however the existing and future visual complexity of the transmission lines that cross north south roads en route inland already present a visual diversion.

The Koeberg Hill 10 km to the east of the site has a cluster of communication masts.

The visual impact assessment of the ***proposed*** masts is as follows:

Cumulative Impacts

Thyspunt

Medium - The sense of place will be further diminished within a 5 km radius by the visual intrusion on views.

Bantamsklip

Medium - The sense of place will be further diminished within a 5 km radius zone by the visual intrusion on views.

Duynefontein

Low - The sense of place relates to land use in transition from farm/rural to suburbs and industrial areas.

Nature

Thyspunt

Negative - The sense of place of the predominantly natural and remote setting will be compromised.

Bantamsklip

Negative - The sense of place of the predominantly natural and remote setting will be compromised.

Duynefontein

Neutral - The sense of place already has a visually diverse suburban and industrial character with some agriculture.

Extent

Thyspunt / Bantamsklip / Duynefontein

Medium - The mast visibility will be contained within a radius of 10 km – existing masts are within this zone.

Intensity

The intensity of the visual impact is considered for the radius of 2.5 to 5 km.

Thyspunt / Bantamsklip / Duynefontein

Low - The lattice structure of the narrow masts, while tall, are less visually intrusive than a solid tower.

Duration

Thyspunt / Bantamsklip / Duynefontein

High - As long as the NPS is in operation (> ***10*** years).

Probability

Thyspunt / Bantamsklip / Duynefontein

High - The visual impact described is certain to occur because of the height and visually prominent location of the masts.

Reversibility

Thyspunt / Bantamsklip / Duynefontein

High -The masts are point structures and therefore their visibility is eliminated on their removal. Their footprint and access route can be rehabilitated to the pre-impacted state.

Impact on Irreplaceable Resources

Thyspunt / Bantamsklip / Duynefontein

High – the beach landscape setting is unique and the visual sense of place will be diminished.

Confidence Level

Thyspunt / Bantamsklip / Duynefontein

High - The masts will add to the visibility of the NPS and therefore contribute to the diminished local pre-impacted sense of place.

Consequence Level

Thyspunt / Bantamsklip / Duynefontein

The intensity is low, the extent is ***medium*** and the duration is ***high*** for each of the three sites. The consequence level is therefore **Low**.

Significance Rating

Thyspunt / Bantamsklip / Duynefontein

All the sites have a low intensity and a ***high*** probability rating. The significance rating for each site is therefore ***Low*.**.

Generic Mitigation Measures

- The mast colour should be a light grey or white as it will mostly be seen in silhouette.
- Any access road to the mast site should be designed and stabilised to visually fit into the surrounding landform and vegetation.

3.2.11 Lighting

The extent type and intensity of lighting necessary for meeting the security and safety requirements of the NPS site is unknown at the time of writing this report. The assessment therefore is based on the effect the illumination of the Koeberg Nuclear Power Station (Koeberg NPS) has on the night scene within a radius of 5 km.

The Thyspunt and Bantamsklip site do not have intense or extensive light groups (towns) within 5 km. The base condition of background lighting along 10 km of coastline is considered to be very low. Some individual holiday homes along the coastline may have lights on. Out to sea is another matter because the intense incandescent lights used on the chokka boats dominate the sea and surrounding coastline to such an extent during the "chokka season" that one may easily "read a book by the light" per communication with a resident, Mr Burrows near Cape St Francis.

In view of this existing night time visual impact regularly experienced by individuals and communities throughout the year at varying intensities, the potential night time visual impact of the NPS is significantly reduced (Refer to **Annexure A - Photo 14).**

The Duynefontein site is adjacent to an already illuminated Koeberg NPS. The net effect on the night scene will be to increase the light footprint further northwards. The intensity of this increased illuminated area will not be at the same intensity as Koeberg NPS because a large portion of the light intensity is caused by the tall and intense lights along the breakwater around the intake basin. The new proposed NPS will not have an intake basin and breakwater. Site lighting during the construction and decommissioning stage will be less intense at all three sites. The potential visual impact resulting from site lighting will be diminished by existing lighting conditions around and on the sites, but the extent of illuminated area will be increased. The visual assessment of the site lighting is as follows:

Cumulative Impacts

Thyspunt / Bantamsklip / Duynefontein

Medium - The lighting impact will add to an existing light impact. Therefore, future development in the area will extend the lit areas and thereby reduce the significance of the NPS lighting.

Nature

Thyspunt / Bantamsklip / Duynefontein

Negative - The NPS lighting extends the light footprint of the local area.

Extent

Thyspunt / Bantamsklip / Duynefontein

Medium - Within a radius of 5 km the lit areas are the most intense.

Intensity

Thyspunt / Bantamsklip / Duynefontein

Medium - The increase in light in the setting diminishes the sense of place present in the pre-impacted state within the 5 km radial zone.

Duration

Thyspunt / Bantamsklip / Duynefontein

High - The visual impact will remain until the plants are decommissioned (60 years of operational life).

Probability

Thyspunt / Bantamsklip / Duynefontein

High - The lights that surround sites seaward and the adjacent Koeberg NPS are unlikely to be removed in the long term.

Reversibility

Thyspunt / Bantamsklip / Duynefontein

High - Because light is the visual impact source the removal of lighting will cause the night scene to revert to the pre-impacted state.

Impact on Irreplaceable Resources

Thyspunt /Bantamsklip / Duynefontein

High - Darkness in a remote area is an irreplaceable resource.

Confidence Level

Thyspunt / Bantamsklip / Duynefontein

High - The extended area that is illuminated will diminish the sense of place that existed prior to the NPS construction.

Consequence Rating

Thyspunt / Bantamsklip / Duynefontein

The intensity is medium, the extent is local and the duration is long-term for all three sites.

The consequence rating is therefore **Medium**.

Significance Rating

Thyspunt / Bantamsklip / Duynefontein

The significance rating for all three sites is **Medium** because the consequence is medium and the probability is highly probable.

Generic Mitigation Measures

- All lighting should be designed by a qualified and experienced lighting engineer who will match the light source to the task, as well as consider the overall effect.

- Light source should not be visible. This is achieved by the fitting type that screens the source and the location and direction of the light fitting.

- Lighting for visual effect will not be acceptable. This will include the flood lighting of the sides of structures either from the bottom or the top of their sides.

- Lighting colour should be chosen to repel insects.

Issues and Comments

NAME & ORGANISATION	ISSUES / COMMENTS	RESPONSE
Mr John Basson Transnet National Ports Authority Lighthouse Services	• Has the impact that a NPS will have on the effectiveness of the lighthouse at Danger Point, as far as background lighting is concerned, been taken into consideration? This issue was raised at the meeting held in Gansbaai late last year. • Quion Point Lighthouse might also be affected.	A lighthouse is a rotating intense beam-seen as white light in a predetermined position. Red or green for instance to orientate vessels of sea worthy bearings. Sector lights may additionally have a red or green filter on parts of the lantern house to distinguish safe water areas from dangerous shoals. The light cannot be confused with background lights for this reason. At Bantamsklip (Quion Point) and Thyspunt (Danger Point) the lighting at the NPS has been identified as being highly visually intrusive in that setting and mitigation measures that recommend detail design to limit light spill have been proposed. This includes using a special light source and fitting that directs the light downward and not outward. Flood lighting should only be used where absolutely necessary and be fixed in that condition.

3.2.12 Access Roads

These roads are considered to be those roads that give access to the site from the nearest public road and that will need to be constructed as a 'greenfields' project. This assessment therefore does not consider the required upgrading of existing roads to accommodate abnormal loads and construction traffic. The alignment of the roads

are are shown on plans 0.96/00122, 0.96/10016 and 0.96/20027'Infrastructure' for the 3 sites.

The new road will have a hard surface width of 12.4m that includes a road shoulder of 2.5m, and a construction reserve of 30m (Report on Main Access Roads to Sites: Eskom Civil 0001 Rev: A- 2008-05-09 p11)

The access roads for the 3 sites are as follows.

Thyspunt
Refer to Figure 3.1.1b

There are three proposed access roads from existing provincial roads. These are the eastern, the northern and the western access roads. All these roads are 'greenfields' alignments (through natural landscape).

The sense of place of the existing setting will be negatively affected by the construction traffic, primarily during the construction phase that will last approximately 10 years.

The Eastern Access Road

The road will commence at the Cape St. Francis road and be cut through the vegetated dune field in a north-western direction, until a point where it will turn and follow a west south-west direction just south of the second dune field from the coast to the NPS site.

The new road will be aligned parallel to the vegetated dunes along most of its length that make up the large dune field between Oyster Bay and St Francis Bay.

Because the topography is wash board like with the ridges and troughs orientated in the west to east direction, due to the prevailing wind, there will need to be a substantial amount of cut and fill. The approximate length of this road will be 12 km.

The visual impact of new landforms and the removal of dune vegetation will change the present sense of place of relatively remote and scenic dune vegetation in various forms of development, although much of the vegetation is alien invader species planted to stabilise the sand on the dunes. The effective stabilisation of the new sand surfaces exposed and created will be a requirement. Despite the mitigation and the fact that the road will not be seen, the visual integrity and sense of place will be degraded along the entire road corridor.

The visual impact of construction traffic along the eastern access route will further disturb the sense of place. The impact will endure for the construction period (approximately 10 years). In addition, the traffic through the St Francis Bay area during construction will add to the visual impact along this corridor.

The Northern Access Road

This route leaves the Oyster Bay Road just south of the sandstone ridge and heads in a south-easterly direction over coastal fynbos to enter the Eskom property. From this point the road follows the western boundary southwards and cuts through the active dune field at right angles. Once through, the road swings east and then south again to enter midway along the northern boundary of the EIA corridor.

Approximately one third of the route is through the sensitive dune vegetation on the northern and southern side. The other two thirds of the road are within old or fallow land and a short portion of coastal fynbos on thin soils over the sandstone. The road is approximately 4 km long.

The new road will be visible from the southbound traffic on the Oyster Bay Road because it will rise with the approach to the dunes. The cutting through the dunes will be highly visible until these slopes have been re-vegetated. The sense of place will be marginally altered because the area is an agricultural landscape with gravel roads. If this access route is selected, the road from Humansdorp will be upgraded in alignment and tarred.

The sense of place will be further disturbed by the visual impact of construction traffic.

The Western Access Road

This route leaves the Oyster Bay Road just north of the town and then alternately cuts through and along the vegetated dunes that lie to the north of the town. This road is approximately 3 km long. The cutting through the east-west dunes and then along the 'slack' (the depression between dune crests) will mean that the sand cut and fill slopes will require effective re-vegetation to prevent erosion and 'blow outs'. This modification of the landscape will change its natural coastal vegetation character and significantly change the sense of place, which in this case is unique due to the presence of indigenous vegetation and wildlife. In fact that area is a nature conservancy.

The sense of place will be further disturbed by the visual impact of construction traffic.

Bantamsklip
Refer to Figure 3.1.2b

Two access roads, approximately 2.6 km apart, from the coast road R43 are proposed. Both travel directly southwards to the NPS and each will be approximately 1.5 km long. The terrain traversed has a thin covering of sand over a calcrete base and the vegetation is extremely hardy and low (300 mm to 1.5 m). The two entrance roads are linked by a road parallel to the R43 and approximately 300 m to the south.

The existing 2 to 3 m tall vegetation will screen the access road from the R43.However, for security reasons this vegetation may be removed. Much of the vegetation near the R43 is alien invader species such as Rooikrans and Port Jackson and this will be removed, leaving the Fynbos to regenerate.

The access roads will be seen from the higher ground to the north, as will the entire NPS and ancillary structures.

The visibility of the road in the context of the overall change in the sense of place caused by the construction, power lines and spoil heaps, and the operation of the NPS, will be negligible by comparison.

It will be the distance (1 km from the R43 to the edge of the EIA corridor) and the remaining vegetation after clearing that will be the visual mitigating factor.

There will be removal of the site-specific coastal vegetation that will further diminish the sense of place. Given the extent of site clearance necessary for the NPS there will be few areas of vegetation left in the 2 km strip between the coast and the R43 within the site boundary.

Duynefontein
Refer to Figure 3.1.3b.

Two existing roads will be upgraded for heavy and for light vehicles. The heavy vehicles access road is 1.2 km north and the light vehicle road is 2.7 km north of the existing entrance to Koeberg NPS.

The three access roads will be linked by a road parallel to the R27 approximately 2.8 km west of the R27.

The ground cover is low strandveld type vegetation over a relatively flat sand terrace of low hummock type dunes.

The visual impact in the context of the existing setting and access roads on the Koeberg NPS site is not considered to be visually intrusive as minimal earthworks are required for the road.

The visual assessment of the access roads is as follows:

Cumulative Impacts

Thyspunt

Eastern Access Road

High- The visual integrity of the undisturbed dune field and vegetation is an important element in reducing the visual impact of the NPS. The visual intrusion of the road will change the visual character and sense of place of the remote dune fields and related vegetation. The new access provided will most probably cause further degradation of the vegetation. Given the undulating terrain, the long distance and the wide reserve that will be cleared for road construction, the road will be visible from higher dunes in the area.

In general the road is unlikely to be seen from existing coastal houses or roads, but the cumulative visual impact of future development cannot be discounted as advantage is taken of the access to a presently inaccessible natural area.

Northern Access Road

Low - The cumulative visual impact of an extra road in an agricultural setting and character is not visually disturbing.

What may become a cumulative visual impact will be the possible increase in the extent of the sand dune as the road traverses the high point of the dune and existing vegetation on the road edge is reduced by sand blasting during periods of strong prevailing winds. The area that will be affected is approximately one third (1.3 km) of the total road length. This road will be visible from the Oyster Bay Road southbound after crossing the sandstone ridge closest to the coast.

Western Access Road

High - The alignment of the road is across and parallel to the vegetated dunes and the change in landform to accommodate the vertical alignment of the road there will have to be extensive cuts and fills. The sand is white and vulnerable to wind erosion. The cumulative visual impact is the earthworks associated with the road. There are about eleven dune crests to cross in an area that is considered a conservation area.

This road will not be seen, but the visual degradation of the sense of place and character of the natural area will be significant, as this is a place that the Oyster Bay residents frequently use for recreational pursuits such as walking and birding. This road will visually link Oyster Bay to the NPS.

Bantamsklip

Low - The visual integrity of the western dunefield and associated vegetation is an important element in reducing the visual impact of the NPS. The visual intrusion of the road is limited, given the flat terrain and short distance.

Duynefontein

Low - The visual integrity of the low dune field and vegetation is not an important element in reducing the visual impact of the NPS. The visual intrusion of the road is limited, given the flat terrain and short distance and that existing road alignments are used.

Nature

Thyspunt / Bantamsklip / Duynefontein

Negative -The visual integrity of the dunes and associated vegetation is diminished. The roads reduce the area of vegetation that visually softens the image of the NPS above ground level. This is more applicable to Thyspunt and Bantamsklip than for Duynefontein.

Extent

Thyspunt

Low - Within 10 km of the site boundary of the NPS.

Bantamsklip

Low - Within 2 km of the site boundary of the NPS.

Duynefontein

Low - Within 2 km of the site boundary of the NPS.

Intensity

Thyspunt

Eastern Access Road

Medium - The visual integrity of a large area of the dune field is diminished by the divisive effect of the road.

Northern Access Road

Low – the visual integrity of a small portion of the dune field is diminished.

Western Access Road

Medium – the visual integrity of a small portion of the dune field is diminished.

Bantamsklip

Low - The visual integrity of vegetation is partially diminished over a short distance.

Duynefontein

Low - The visual integrity of surrounding vegetation is hardly diminished because existing road alignments are used.

Duration

Thyspunt

High - The access roads will remain despite decommissioning of the NPS.

Bantamsklip

High - The access roads will remain until decommissioning of the NPS.

Duynefontein

High - The access roads will remain until decommissioning of the NPS.

Probability

Thyspunt / Bantamsklip / Duynefontein

High

Reversibility

Thyspunt / Bantamsklip / Duynefontein

Low – The roads will remain to give access to the area and new land uses.

Impact on Irreplaceable Resources

Thyspunt / Bantamsklip / Duynefontein

High - The visual resource of the area is diminished.

Confidence Level

Thyspunt / Bantamsklip / Duynefontein

High

Consequence Rating

Thyspunt

The intensity is medium for eastern access and low for the northern and the western access road.

Bantamsklip

The intensity is low.

Duynefontein

The intensity is also low.

The extent is ***low*** and the duration is ***high*** for all three sites.

The rating is therefore:

Thyspunt
Eastern access - Medium
Northern access - Low
Western access - Low

Bantamsklip - Low
Duynefontein - Low

Significance Rating

The consequence for Thyspunt is eastern access: medium; northern access route: low; western access route: low, and for both Bantamsklip and Duynefontein it is also low. The probability for all three sites is highly probable.

The significance rating is therefore:

Thyspunt
Eastern access - Medium
Northern access - Low
Western access - Low

Bantamsklip - Low
Duynefontein - Low

Generic Mitigation Measures

- The cut and fill sections need to be designed or shaped on site to blend with the adjacent landform and materials. A standard slope angle will not be appropriate.

- The rehabilitation of the road reserve requires a detailed plan showing stabilisation methods and a specification of planting type and species together with maintenance requirements. A landscape architect and an experienced rehabilitation contractor should be engaged at the detailed design stage of the road.

- ***No construction vehicles will be operational during the holiday period, mid December to mid January.***

Table 12: Summary of NPS Visual Impacts for Elements at Each Site

Element of Project and Site	Cumulative	Nature	Extent	Intensity	Duration	Probability	Reversibility	Impact on irreplaceable resources	Confidence level	Consequence	Significance
NUCLEAR POWER STATION											
Thyspunt	Medium	Negative	***Medium***	Medium	***High***	***High***	Low	***High***	High	Medium	***Medium***
With mitigation											
Bantamsklip	High	Negative	***Medium***	Medium	***High***	***High***	Low	***High***	High	***Medium***	***Medium***
With mitigation											
Duynefontein	Medium	Negative	***Medium***	Medium	***High***	***High***	Low	***High***	***High***	Medium	***Medium***
With mitigation											
TRANSMISSION LINES											
Thyspunt	Medium	Negative	***Low***	Medium	***High***	***High***	High	***High***	High	Medium	***Medium***
With mitigation											
Bantamsklip	High	Negative	***Low***	Medium	***High***	***High***	High	***High***	High	***Medium***	***Medium***
With mitigation											
Duynefontein	High	Negative	***Low***	Low	***High***	***High***	High	***High***	High	Low	***Low***
With mitigation											
MASTS											

Element of Project and Site	Cumulative	Nature	Extent	Intensity	Duration	Probability	Reversibility	Impact on irreplaceable resources	Confidence level	Consequence	Significance
NUCLEAR POWER STATION											
Thyspunt	Medium	Negative	***Medium***	Low	***High***	***High***	High	***High***	High	Low	***Low***
With mitigation											
Bantamsklip	Medium	Negative	***Medium***	Low	***High***	***High***	High	***High***	High	Low	***Low***
With mitigation											

Element of Project and Site	Cumulative	Nature	Extent	Intensity	Duration	Probability	Reversibility	Impact on irreplaceable resources	Confidence level	Consequence	Significance
NUCLEAR POWER STATION											
Duynefontein	Low	Neutral	***Medium***	Low	***High***	***High***	High	***High***	High	Low	***Low***
With mitigation											
LIGHTING											
Thyspunt	Medium	Negative	***Medium***	Medium	***High***	***High***	High	***High***	High	Medium	Medium
With mitigation				Low						Low	Low
Bantamsklip	Medium	Negative	***Medium***	***Medium***	***High***	***High***	High	***High***	High	Medium	Medium
With mitigation				***Low***							

Element of Project and Site	Cumulative	Nature	Extent	Intensity	Duration	Probability	Reversibility	Impact on irreplaceable resources	Confidence level	Consequence	Significance
NUCLEAR POWER STATION											
Duynefontein	Medium	Negative	***Medium***	Medium	***High***	***High***	High	***High***	High	Medium	Medium
With mitigation											
ACCESS ROADS											
Thyspunt											
- Eastern with mitigation	High	Negative	***Low***	***Medium***	***High***	***High***	Low	***High***	High	Medium	Medium
- Northern with mitigation	Low	Negative	***Low***	***Low***	***High***	***High***	Low	***High***	High	Low	Low
- Western with mitigation	High	Negative	***Low***	***Low***	***High***	***High***	Low	***High***	High	Low	Low
Bantamsklip	Low	Negative	***Low***	Low	***High***	***High***	Low	***Medium***	High	Low	Low
With mitigation											
Duynefontein	Low	Negative	***Low***	Low	***High***	***High***	Low	***Low***	High	Low	Low
With mitigation											
Element of Project and Site	**Cumulative**	**Nature**	**Extent**	**Intensity**	**Duration**	**Probability**	**Reversibility**	**Impact on irreplaceable resources**	**Confidence level**	**Consequence**	**Significance**

Element of Project and Site	Cumulative	Nature	Extent	Intensity	Duration	Probability	Reversibility	Impact on irreplaceable resources	Confidence level	Consequence	Significance
NUCLEAR POWER STATION											
NUCLEAR POWER STATION											
SPOIL DUMPS											
Thyspunt	Medium	Negative	***Medium***	Medium	***High***	***High***	Low	***High***	High	Medium	***Medium***
With mitigation											
Bantamsklip	Medium	Negative	***Medium***	Medium	***High***	***High***	Low	***High***	High	Medium	***Medium***
With mitigation											
Duynefontein	Medium	Negative	***Medium***	Medium	***High***	***High***	Low	***High***	High	Medium	***Medium***
With mitigation											

3.2.13 The Spoil Dumps

The volume of sand and rock spoil to be disposed of on surface and within the EIA corridor is given in **Table 13** (cubic metre) dated 18 May 2009 and the estimated required form and footprint in Table 16: Size of sand and rock spoil dumps.

The sand to spoil is the sand excavated minus the sand to be used in backfill. The rock to spoil is that which is excavated.

In order to get an order of magnitude for the size of the spoil dump to accommodate the volumes given which are very large the following cross section of the dump was decided upon.

The cross section has a base of 480 m and a height of 40 m and a side slope of 1:3 (vertical to horizontal). **Refer to Table 14**.

The corresponding length of the dump to accommodate the sand spoil is given for the volumes for each site based on the above cross section.

Given the large area required at each site the spoil dump or dumps cannot be accommodated along the eastern EIA corridor boundary for Duynefontein NPS and along the northern EIA corridor boundary for Bantamsklip and Thyspunt NPs's. This is due to the ancillary structures such as switchyards, buildings and possible well fields.

Spill sites have therefore been proposed within the Eskom site boundary for Duynefontein and Bantamsklip but due to the overall biophysical sensitivity of Thyspunt site, two locations have been suggested outside the Eskom property line on private land north of the dune field. Refer to Figures 3.1.1b, 3.1.2b and 3.1.3b.

The footprint can be reduced by making the dump higher. However, the scale of the landscape and the visual fit are important considerations. These dumps will have to be stabilised with vegetation to achieve a degree of visual integration with the surrounding landscape setting, colour, texture and form if they are to be permanent. The visual assessment has been done on this assumption.

It must be noted that the final form of the dumps in the position mentioned may need change in order to accommodate nearby proposed access roads and the transmission lines as well as the prevailing wind direction. This will increase the effective length of the dumps.

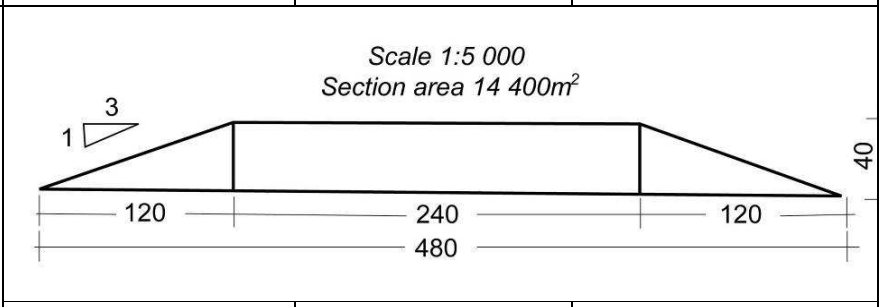
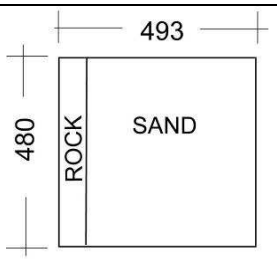
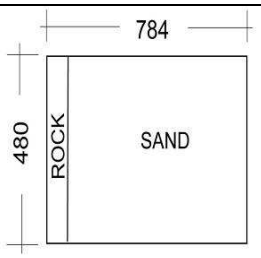
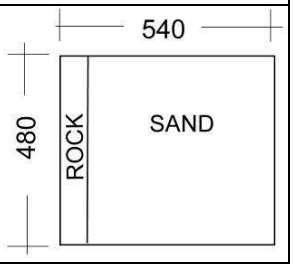
The large volumes of sand and rock that will be placed on the existing landforms that have taken thousands of years to form will have a visual impact, primarily due to the scale of the dumps. However, this will vary with distance from the site the contrast with the local setting and the position of the observer.

It is not just a matter of dumping load after load of material on the existing landform. The area for the dump has to be prepared. This will involve the stripping of the top layer of soil for the later establishment of vegetation on the new landform. The stockpiling of this material in dumps not higher than 2 m near the area where it will be later required. These stockpiles will have a temporary visual impact as this material must be used within one year, otherwise the fertility and the seeds will deteriorate.

Table 13: Volume for Excavation for 2 Units

Volumes for Excavation for 2 Units (cubic_meter)	18/5/2009					
Phase	Thyspunt		Bantamsklip		Duynefontein	
	Sand Removed	Rock Removed	Sand Removed	Rock Removed	Sand Removed	Rock Removed
Natural Ground to Topsoil (0,3m deep)	229,456		197,850		183,920	
Topsoil to Terrace at +10mamsl	5,753,741		8,202,746		4,468,248	
Terrace at +10mamsl to Average Bedrock at -3mamsl	2,136,561	N/A	3,762,828			
Terrace at +10mamsl to Average Bedrock at -4mamsl					4,344,860	
Average Bedrock at -3mamsl to Intake Basin at -16mamsl	117	N/A		N/A		
SAND STOCKPILE	**7,890,419**		**11,965,574**		**8,813,108**	
Terrace for HV Yard at +111mamsl	157,616					
Terrace for HV Yard at +38mamsl			195,593		153,285	
Average Bedrock at -3mamsl toTerrace at +10mamsl	1,360,759		1,696,708			
Average Bedrock at -4mamsl toTerrace at +10mamsl					2,180,059	
BACKFILL	**1,518,375**		**1,892,301**		**2,333,344**	
SAND STOCKPILE	7,890,419		11,965,574		8,813,108	
BACK FILL	1,518,375		1,892,301		2,333,344	
SAND TO SPOIL	**6,372,044**		**10,073,273**		**6,479,764**	
Terrace at +10mamsl to Average Bedrock at -3mamsl	N/A	289,276	N/A			
Average Bedrock at -3mamsl to Intake Basin at -16mamsl	N/A	381,795		1,161,306		
Average Bedrock at -4mamsl to Intake Basin at -16mamsl						1,245,065
Intake Tunnel System (1000m long at ± -35m deep)		37,285		37,285		37,285
ROCK STOCKPILE		**708,356**		**1,198,591**		**1,282,350**

Table 14: Size of sand and rock spoil dumps

CHARACTERISTICS	THYSPUNT m^3	BANTAMSKLIP m^3	DUYNEFONTEIN m^3
Height – 40 m Width – 480 m Side slope – 1:3			
<u>Volume</u> - m^3 Sand Rock <u>Length</u> (m) Sand dump Rock dump	 6 370 000 708 400 443 50	 10 100 000 1 198 600 701 83	 6 500 000 1 282 400 451 89
Area comparison			

<u>Thyspunt</u>
Refer to Figure 3.1.1b

This large volume of sand and rock (about 7 million m^3) will require an area of approximately 500 m x 480 m at the cross section illustrated. If placed in the areas proposed either side of the panhandle. They will have the greatest visual impact within the valley (NW – SE). The dump will be seen from the farmsteads within this valley and users of the road to Oyster Bay. The visual intrusion in views of and along this valley will be low provided it is formed to fit the rising landform of the edge of the dune field and is re-vegetated with local indigenous flora species.

At 40 m high the dump will be seen from the existing district road to Oysterbay. However if it is lowered it may not be visible (24m as shown on Figure 3.1.1b). The most prominent view will be from the northern access road when driving southwards. This section of the district and access road will focus on the dump located at the southern end of the panhandle.

<u>Bantamsklip</u>
Refer to Figure 3.1.2b

The large volume of sand and rock (10.1 million m^3) will require an area of approximately 780 m x 480 m at the cross section illustrated. If placed in the area south of the R43 but within the 800m exclusion line.

This dump will be highly visible from the R43 despite its distance of approximately 300m and will effectively screen the Nuclear Power Station along its length. The visual impact of existing vegetation approximately 3m high along the southern edge of the road reserve will obscure the base of the dump. However, further to the south-east the R43 road rises and views of the dump will become more visible, but the scale will be lessened by the distance.

The dump will not be visible from Pearly Beach due to the intervening sand dune. The dump will be visible from the higher lying land to the north, but this is at its closest about 1 km from the dump. There are no homesteads within 3 km on this raised landform.

Duynefontein
Refer to Figure 3.1.3b

The large volume of sand and rock (6.5 million m^3) will require an area of approximately 540 m x 480 m at the cross section illustrated. If the dump is located west of the S27 and east of the 800m exclusion line it will screen the NPS along its length and be highly visible to motorists on the S27 due to the scale of the dump height of 30m.

The gently rising land to the east and the N7 will provide views to the dumps. However, given the distance and the scale of the other structures such as the NPS and the transmission lines, the spoil dump will be less of an obvious visual intrusion in views westwards towards the coast.

The nearest residential neighbourhood is Duynefontein 2.4 km from the south-east corner of the EIA corridor. The visual intrusion in the view north from this area will be noticed, but it will not significantly change the scenic value because of the Koeberg NPS and transmission lines. The form will assist in obscuring the existing and future transmission lines from views northward by providing a background land form.

The visual impact as assessed is as follows:

Cumulative impacts

Thyspunt / Bantamsklip / Duynefontein

Medium – the capacity of the visual environment to withstand further visual degradation is reduced due to the area that will be disturbed by the dumps.

Nature

Thyspunt / Bantamsklip / Duynefontein

Negative – the visual impact on the natural environment and the sense of place of that setting will be negative for all sites despite Duynefontein having Koeberg nearby.

Extent

Thyspunt / Bantamsklip / Duynefontein

Medium – the visual impact is confined to the immediate surrounding areas as shown by the viewshed analysis.

Intensity

Thyspunt / Bantamsklip / Duynefontein

Medium – the visual environment is altered, but will continue to portray a scenic environment by way of the undisturbed surrounding setting.

Duration

Thyspunt / Bantamsklip / Duynefontein

High – (16 to more than 60 years) the impact will cease by human intervention after the operational life of the project.

Probability

Thyspunt / Bantamsklip / Duynefontein

High - the visual impact will occur regardless of preventative measures.

Reversibility

Thyspunt / Bantamsklip / Duynefontein

Medium – the visual setting will never return to the original state, ***but form and planting can partially restore the visual fit.***

Impact on irreplaceable resources

Thyspunt / Bantamsklip / Duynefontein

High - an irreplaceable visual resource is impacted upon.

Confidence level

Thyspunt / Bantamsklip / Duynefontein

High – the described visual impact will occur

Consequence rating

Thyspunt / Bantamsklip / Duynefontein

The intensity and the extent are ***medium*** and the duration is ***high*** for all three sites.

The rating is therefore:

Thyspunt – Medium
Bantamsklip – Medium
Duynefontein – Medium

Significance rating

Thyspunt / Bantamsklip / Duynefontein

The Consequence is medium and the Probability is ***high*** for all sites.

The rating is therefore:

Thyspunt – ***Medium***
Bantamsklip – ***Medium***
Duynefontein - ***Medium***

Generic mitigation measures

- The form of the spoil dump is most important because this will determine the primary impact. The form should therefore be considered in detail in the context of the surrounding scale and form of the dunes as well as the need to accommodate access roads and transmission lines and security patrolling of the secure areas.

- The side slopes should ideally be 1:3 but not steeper than 1:2. The landform on its long axis should be the same as that of the dune axis in the case of Thyspunt; for Bantamsklip the form is to be taken from the existing dune to the west and for Duynefontein the barchan dunes on the site. The direction of the prevailing wind and the way in which this has formed the dunes is an important consideration in order to reduce dust and fine sand from blowing into the works area.

- The top 300 mm of soil must be removed from the dump area and stockpiled nearby for later re-vegetation of the final dump form.

- It is recommended that a Landscape Architect be appointed together with a Landscape Rehabilitation Contractor who has experience in rehabilitation of sand dumps in that biome. The landscape architect must, in liaison with the engineers, design the entire dump form and produce the specification in collaboration with the rehabilitation contractor. It must be noted that the development of the dump and the rehabilitation must be done in phases as the material becomes available.

3.3 Viewshed Analysis

The viewshed simulation is based on the height of the NPS building as being 65 m above ground level, which is taken to be the platform height of 15 m amsl. The additional height of the stack of 30m provides for a discharge height of 95m. This is the worst case. It is a relatively slender structure and will at distances of greater than 5 km exert a minor visual addition to the form of the NPS. The viewshed map for the

NPS differentiates between the visibility of the stack and the main structure. The result shows the extended viewshed for the structure and the stack. An additional viewshed map shows the theoretical areas from where the 120m meteorological tower can be seen. This area is extensive although the visibility beyond 5 km will be minimal due to the slender form of this tower.

The Viewshed Map indicates those areas from which one will theoretically be able to see the structures and stack because only the landform contours have been used in the simulation. The result therefore does not include intervening structures or vegetation that obstructs views.

Thyspunt

The viewshed analysis shows that the proposed Thyspunt NPS to be located at the low point on the north-west to south-east orientated valley between Oyster Bay and Cape St. Francis. This valley extends inland to the north-west with the northern rim being the stabilised ancient dune ridge 5 km from the site. This topographical form effectively limits views southwards to the site from beyond the 10 km radius line.

The actual visibility is further restricted on the west as the dunes converge on the coast east of Oyster Bay. Existing vegetation on these dunes further screens views of the Thyspunt NPS from Oyster Bay.

Bantamsklip

The viewshed map of the 120m mast indicates the large additional area of visibility.

A more accurate viewshed was determined during the site visit when the area was driven and views were recorded towards the site as well as where no views were possible. This is primarily due to tall vegetation and trees (Refer to **Figure 3.3.2)**.

Viewshed analysis shows that the proposed Bantamsklip NPS is theoretically visible from most areas along the 30 km coastal strip and from the higher ground on the seaward side of the hills north of the site.

The actual visibility of the Bantamsklip NPS is restricted by tall vegetation on the southern side of the R43 and the vegetated dunes to the north of the site (Refer to **Annexure B - Photos 1, 2 and 3)**.

Other than this any elevated area that has views of the coastline will have the Bantamsklip NPS included in the views.

Duynefontein

The more accurate viewshed was determined during the site visit when the area was driven and views were recorded towards the site, as well as where no views were possible, primarily due to tall vegetation and trees e.g. the bluegum avenue (Refer to **Figure 3.5.3)**.
The viewshed analysis shows that the proposed Duynefontein NPS and Koeberg NPS to be located at the low point of half a shallow basin of radius approximately 8 - 10 km with a raised rim of low consolidated dunes. This topographical form effectively limits views of the site to those within a 10 km radius.

The actual visibility is further restricted by the gentle slope towards the site, because any structure or vegetation taller than 2 m that is near the observer will block any views of the Duynefontein NPS.

There will be no 120m meteorological mast, since the existing mast for Koeberg NPS will be used.

3.4 Visibility during Daytime and Night time

3.4.1 Daytime Visibility

Daytime visibility is accentuated because the plant will mainly be seen as a silhouette in views along the coast.

The high visibility zone or zone of highest impact in a view towards the NPS is within the 0-2,5 km radius.

The medium visibility zone is between the 2,5 km and 5 km radius, the low visibility zone is between the 5 km and 10 km radius and the negligible visibility zone is between the 10 km and 15 km radius.

The visibility will vary in these zones as a result of the weather condition at the time. Haze, mist and rain can hide the NPS from views within a 2.5 km radius (Refer to **Annexure C - Photos 5a & b)**. The significance of the intensity of the visual intrusion of the NPS will therefore change as well.

The image of the NPS will reduce in scale as the distance increases (Refer to **Annexure A - Photos 6 & 7)**. In daylight the image will be a clear silhouette, but during overcast or misty conditions the NPS may become unnoticeable as it will merge with surroundings because of the lack of contrast and moisture haze from the breaking waves and onshore breeze.

3.4.2 Night Time Visibility

While the unlit structure will visually disappear against the dark background, the site and structure will become highly visible when lit. This contrast with the darkness extends the site and plant's visibility at night (Refer to **Annexure A, Photo 8)**. The NPS can be even more visually intrusive at night than during the day, particularly within a 5 km radius (Refer to **comparative night views of the Koeberg NPS as an example)**. The meteorological mast is likely to be visible at night due to the red light on top.

3.4.3 Increase in Light Pollution at Night

The light dispersion around the NPS will vary according to the atmospheric conditions. In misty conditions the illuminated area glows, as the moist air diffuses the light. This is a softer light, but can be seen from a greater distance. In clear conditions the illuminated area is brighter and sharper, creating a greater contrast against the dark backdrop. This is because of limited or no lights in the surrounding 5 km radius.

The contrast between the illuminated NPS and the dark surroundings will be dramatic when observed for the first time, and clearly a high visual impact on the night time views towards the site from the surrounding landscape and land uses.

The "light spill" from the lights at the Koeberg NPS demonstrates the visual effect non-focused lighting can have on an area. The "light spill" beyond where the illumination is required, is referred to as light pollution (Refer to **Annexure A – Photo 8**).

Should the same illumination extent and intensity be applied to the NPS this "light pollution" area will extend the visibility of the NPS eastward and westward along the coast for Thyspunt and Bantamsklip and northwards and southwards for Duynefontein.

This situation need not occur as mitigation in the form of efficient and focused lighting can be applied. New technology incorporated in light fittings does address the elimination of or reduction of light spill.

In the context of the Thyspunt and Bantamsklip site it is important to note that at certain times of the year when the chokka boats are fishing off these shores, their lights can outshine those of the NPS. During these periods the light pollution is at its greatest and in an area where it is least expected. In the context of the Duynefontein site significant existing "light pollution" exists from the illumination of the Koeberg NPS. The illumination of the Duynefontein NPS will add to the condition, however with planning of light distribution over areas, focused lighting configurations and the use of fittings that limit "light spill" this can be contained. The additional effect of the Duynefontein NPS at night can be reduced.

3.5 Proposed Wind Farm Thyspunt area – Cumulative Visual Impact

A request was received by Arcus Gibb during the finalisation of the Nuclear Visual Impact Assessment Report in October 2009 for BCK to assess the cumulative visual impact on the scenario of the Nuclear 1 Thyspunt site and the Wind Farm being built in the same area.

3.5.1 Wind Farm Proposed Sites

Three sites have been proposed and they are shown on **Figure 4 Proposed Sites for Establishment of Wind Farms within the Kouga Municipality** and are labelled a) Western, b) Central and c) Eastern sites.

3.5.2 Assumptions

- That one of the three sites shown will be the selected site for the Wind Farm and therefore an assessment of each site and the visual relationship to Thyspunt will be presented.

- That the entire area shown will have wind turbines located on them. The numbers and density is not known at this stage.

- The size and style of wind turbines is taken to be those manufactured in Denmark and which have an approximate height of 45 metre at the top of the turbine housing and a blade length of 20m.

3.5.3 Cumulative Visual Impact Assessment of Thyspunt and Wind Farms in Three Locations

The cumulative visual impact of Thyspunt and the three Wind Farm sites is determined by the visual change and impression in and of the landscapes experienced by the observer. The observer is identified as the members of the community and visitors to the area of St Francis Bay, Cape St Francis and Oyster Bay.

The area over which the Wind Farm and the Thyspunt NPS extend and the vertical scale of each project combined with the topography and existing land use are determinants of the intensity of the cumulative visual impact. The significance of the cumulative visual impact can be rated by the change in landscape character and sense of place and the value that the local community and the visitors attribute to that local setting.

These visual elements have been rated as High, Medium and Low in **Table 15 Cumulative Visual Impact Criteria with respect to the Thyspunt NPS site for each Wind Farm Site.**

Each of the three Wind Farm sites are rated with respect to the cumulative visual impact with the Thyspunt NPS. Refer to **Table 16 Rating of Cumulative Visual Impact of Wind Farm and Thyspunt NPS for Three Sites** (W,C & E).

3.5.4 Conclusion

The visual combination of the Central Wind Farm and the Thyspunt NPS location will have the highest cumulative visual impact on the local setting and the region. The reason for this is as follows:

- Although the main NPS structures are mostly screened by the east-west dune ridge, the transmission lines and the HV yard, haul road (visually preferred northern route) and possibly large spoil heaps all lie within the Central Wind Farm's location and therefore the proposed Wind Farm will add to the visual complexity in that landscape setting.

- The central wind farm site will be experienced by communities nearby and by persons travelling to and from Oyster Bay along the district road that runs along the northern boundary of the Wind Farm site and through it on its western section.

- The wind turbines of the central site will be experienced at close range (less than 1 km) by all who travel the district roads to Oyster Bay, Humansdorp and St Francis Bay.

- The visual perception of an energy generation node will be reinforced by the combined visibility of the two projects.

- The landscape character and sense of place of the setting will be altered over a large area within a 5 km radius of the Thyspunt NPS.

- The viewshed for the central Wind Farm will be extended into the Krom River Valley both westwards and eastwards for at least a distance of 10 km from Thyspunt NPS.

- The cumulative visual impact of the Thyspunt HV yard and transmission lines and Wind farm will be experienced by a large number of people who will be both transient and resident.

The Western and the Eastern windfarm sites are too far to be visually associated with the Thyspunt NPS viewshed although the western site falls within the outer edges some 10 to 15 km away.

The Eastern site is entirely outside the Thyspunt NPS viewshed and therefore there is no cumulative visual impact. However this location will be visually experienced by the community of St Francis Bay.

Although the cumulative visual impact will be high if the Central location is selected, it can be argued that it is preferable to contain the visual change to the landscape character and sense of place to one location, than to have two large facilities that change coastal character and sense of place in two locations within a popular residential and holiday / tourist region.

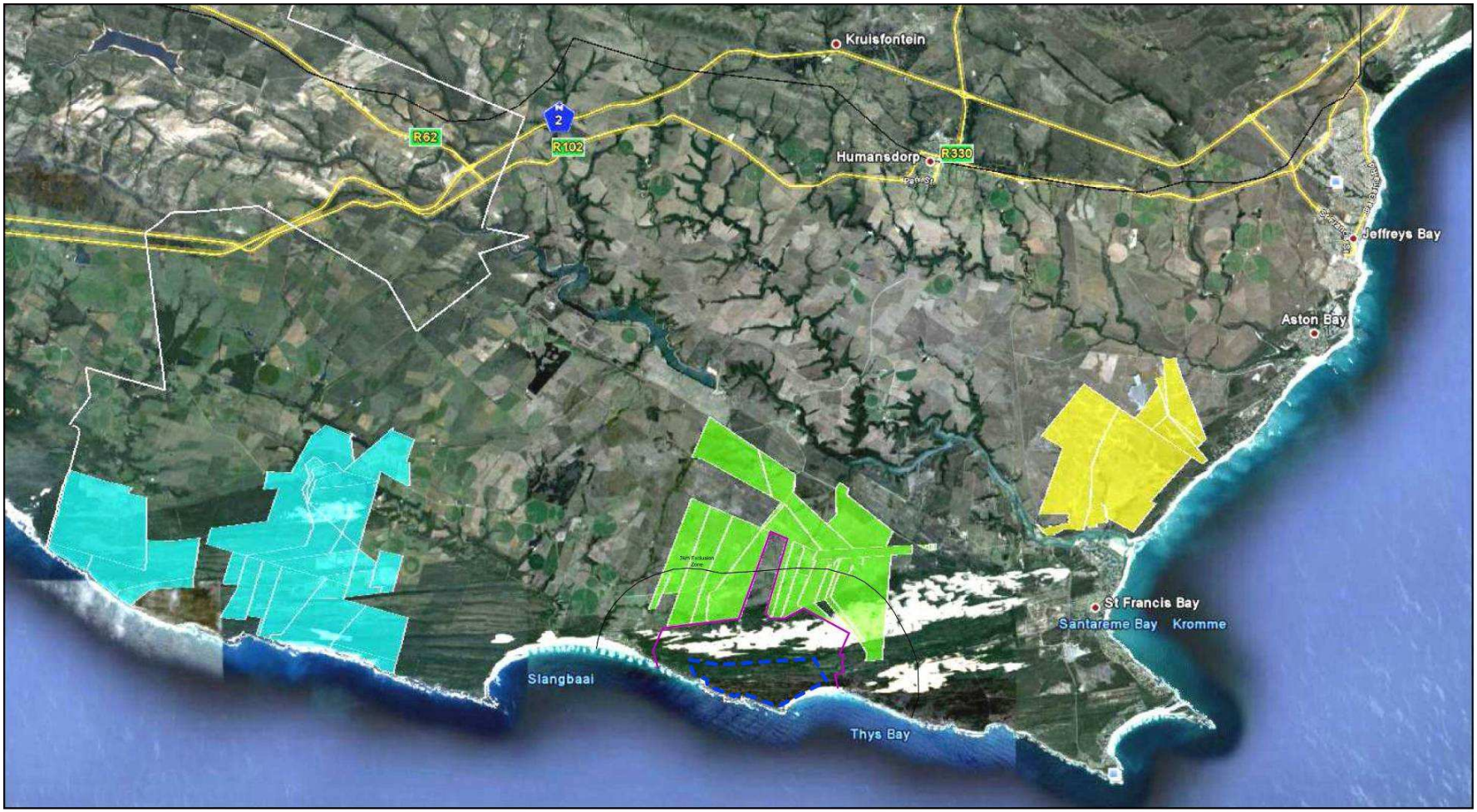
Table 15: Cumulative Visual Impact Criteria with respect to the Thyspunt NPS Site for each Wind Farm Site

Visual Elements	Intensity Rating Criteria		
	High	**Medium**	**Low**
Combined visibility of TNPS and Wind Farm	within 5km of Thyspunt NPS viewshed	within 5-10km of Thyspunt NPS viewshed	Within or beyond 10-15km of Thyspunt NPS viewshed
Visual perception of an energy generation node by community and visitors	adjacent to Thyspunt Site	within 5-10km of Thyspunt Site	Within or beyond 10-15km of Thyspunt Site
Degree of landscape character change experienced by community and visitors	Combined Thyspunt and Central Wind Farm	Eastern Wind Farm	Western Wind Farm
Degree of sense of place change experienced by community and visitors	Combined Thyspunt and central Wind Farm	Eastern Wind Farm	Western Wind Farm

Table 16: Rating of Cumulative Visual Impact of Wind Farm & Thyspunt NPS for Three Sites (W,C &E)

Visual Aspect	**West**	**Central**	**Eastern**
Combined visibility of TNPS and Wind Farm	Low	High	Low

Visual Aspect	West	Central	Eastern
Visual perception of an energy generation node by community and visitors	Low	High	Low
Degree of local landscape character change experienced by community and visitors	Medium	High	Low
Degree of local sense of place change experienced by community and visitors	Medium	High	Low
	2 Medium 2 Low	4 High	4 Low



LEGEND	ESKOM NUCLEAR POWER PROJECT FIGURE 4: PROPOSED SITES FOR ESTABLISHMENT OF WIND FARMS WITHIN KOUGA MUNICIPALITY	BAPELA CAVE KLAPWIJK LANDSCAPE ARCHITECTS AND ENVIRONMENTAL PLANNERS Tel.: +27 12 362 4684 Fax: +27 12 362 0394 cka@mweb.co.za
EIA Corridor Eskom Property Boundary		

3.6 The 'No Go' Option

The 'no go' option for Duynefontein, Bantamsklip and Thyspunt NPS sites is considered in the context of the statement from Eskom that if no Nuclear Power Station is to be built on a site, the property or the portion set aside for the purpose will be sold. This is likely to be done by public tender. The following assessment of the 'no go' option describes the possible visual impact that may result from the sold land undergoing a land use change in keeping or compatible with the surrounding development.

3.6.1 Duynefontein NPS site

The available area for the NPS currently forms part of a nature reserve which is used frequently by the public for walks, birding and picnicking because of its wilderness and scenic appeal. Portion of this land probably on the northern boundary will be sold.

The visual consequences

Land to the north of the site is mostly owned by developers who intend to build housing estates. It is therefore probable that Eskom land sold will be included in this long term scenario because it will be unlikely that a developer will purchase the land to retain as a nature reserve. In this situation the scenic coast line that represents and retains particularly the character and sense of place of the desolate but unique elements of two dune types and threatened vegetation communities will be damaged by subdivision into erven crossed by roads and contained by fences.

An accessible and highly scenic public amenity will be lost by transformation into a housing estate or other urban type land use. The visual impact of the new land use will further degrade the visual quality of the extensive portion of the coastline currently under Eskom's management.

3.6.2 Bantamsklip NPS site

The NPS site will utilise most of the land between the coastline and the R43 district road. The balance of Eskom's property is north of the R43 and includes an historic farmstead, a wild flower harvesting enterprise and a large sector of the Langvlei wetland. The latter contributes to an undisturbed highly scenic valley surrounded by hills comprised mainly of Table Mountain sandstone.

The visual consequences

The visual quality, undisturbed fynbos clad, relatively remote landscape unit of coast, wetland edged by hills on the northern boundary will remain intact. This is a unique area of wetlands limestone fynbos and rocky coastline that is one of the only a few abalone breeding areas along the southern coastline.

This imparts a particular and unique sense of place to visitors. The realisation of this characteristic is reflected in the conservation reserves both east and west of the site. The risk associated with this site is the systematic visual degradation of its features that may be caused by later developments in the form of residential estates and holiday resorts. This scenario can be expected given the adjacent Pearly Beach

community and the holiday/residential towns of Gansbaai and Fransekraal further west along the coast.

Should an uncontrolled and unmanaged development scenario be realised the long term visual sense of place will be irreparably damaged. The visual impact on the existing setting can be greater and over a larger area than the visual impact of a large NPS and if housing is developed over the associated HV switchyard and transmission lines. The assumption is made that the farm will not be bought by a private individual or company to primarily conserve a threatened coast line and coastal area.

Alternatively if the area is managed solely for conservation purposes, the visual uniqueness and sense of place will be retained in its current condition.

3.6.3 Thyspunt NPS site

The area comprises of varied visual attributes. These are its relative concealment from views to the coast from inland, its remote setting facilitated by the east west dunes and the rugged rocky coastline. Other biophysical attributes such as a significant wetland in a dune slack and numerous fresh water springs that emerge near the beach line make this site visually appealing and unique. This visual diversity should all remain in the no go scenario. However the land will be sold by Eskom.

The visual consequences

The scenario of encroaching residential and commercial resort development can become a reality given that Oyster Bay and Cape St Francis would consider expanding eastwards and westwards respectively. There are presently applications for residential developments on land west of Cape St Francis and along the landform between the dune field and the coastline.

On the other hand if the area is managed solely for conservation purposes the visual uniqueness and sense of place will be retained in its current condition.

4 MITIGATION MEASURES

The NPS's location on the coastline is determined by the need to use seawater for cooling. The size and form of the reactor and Turbine-Generator buildings are determined by the internal plant and safety requirements.

The reactor building is 65 m above ground level. The chimney stack (95m) and the transmission lines, switch lines and masts are ancillary elements that contribute to the visual image of the NPS. The reactor and attached Turbine-Generator building are at + 15 m amsl (Refer to **Figures 3.2.1, 3.2.2 and 3.2.3**).

The height, bulk and location of the NPS will result in the structure having a high visual intrusion visible within 2.5 km of the structures. Visual mitigation will need to be effective beyond the 3 km exclusion zone.

There are general measures that can be applied to reduce the visual impact at close range during construction and at long range during operation. Colour and screening are the visual mitigation opportunities available for the daytime while light spill control will reduce the amount of "light pollution" at night.

Most views of the NPS within the 5 km zone will be in silhouette because of the rising landform northwards inland and from the coastal terrace east and west. This applies to Thyspunt and Bantamsklip whereas for Duynefontein the landform rises gently to the east inland.

The mitigation measures that follow are proposed for each phase and each visual impact identified in that phase.

4.1 General Visual Mitigation Measures for the Nuclear Power Station – Design Phase

The design development phase requires certain specific information from each site. This will be geotechnical, landform and sensitive ecological areas. Machinery and vehicles will regularly visit the site and visual degradation will be caused. Mitigation therefore starts on any project at the design phase.

4.1.1 Mitigation Objective and Level

- To minimise visual degradation during information and data gathering, construction and operation phases.
- The level of mitigation effort is low as the scale of operation is small and directed at specific areas but it will have long term cost benefits to the project.
- To limit extensive mitigation costs during the construction and operation phases by timeously being aware of the sensitivities of the site.
- To include measures in tender documentation so that all the costs associated with mitigation are accounted for in the project.

4.1.2 Recommended Mitigation Measures

Visual Impact - Visual degradation of natural environment by drill rigs, vehicles and access roads

Mitigation

- Restrict access to sensitive areas by vehicles and machinery.
- Select routes to each location based on sensitive areas.
- Do not allow deviation from access road or random driving through natural areas.
- Draft specific specifications for each action and provide a "conduct" list to persons working on site during the design phase.

Monitoring

- Check compliance with actions on a checklist.

Visual Impact - All identified visual impacts on the project

Mitigation

- Prepare mitigation design details and specifications for all actions e.g. colour and form, slope stabilisation and vegetation to blend new cut and fill landforms into the setting.
- Include screen berms in tender documentation for pricing by contractor.

Monitoring

- Check off actions on a check list.

Visual Impact - Defacing landscape elements during surveying of site e.g. painting rocks and removal of vegetation without permission.

Mitigation

- Draw up code of practice for site work by surveyors and their staff with specific reference to environmental aspects related to their work.

Monitoring

- Check if code is produced and is issued and used by surveyors

Visual Impact - Large scale and form of the NPS and transmission towers in a visually exposed and natural coastal setting. A highly visually dominant structure in views along coast and towards coast from inland.

Mitigation

- Colour

It is recommended that because of the scale of the NPS its form should be visually reduced by a darker band of the base colour near the top of the main structure, e.g. Reactor Building and Turbine-Generator Building. Refer to **Annexure B - Photo 10 Koeberg Example**.

The base colour recommended is a light grey or blue grey or a light straw. The visually prominent stack should be painted white or very light grey.

The light grey colour of the concrete of the Reactor Structure is suitable to reduce the visible scale.

The transmission line towers to the 3 km exclusion zone boundary should be the grey of the standard galvanised finish.

It must be noted that as the sun angle changes so will the visibility of the larger structures.

It is recommended that a Landscape Architect be consulted with regard to the simulation of the NPS to assist in the selection of colours that will fit the setting during the summer and winter seasons.

Monitoring

- Follow up on detail design and specifications.

Visual Impact - Large scale of NPS and associated structures

Mitigation

- Screening

The effectiveness of a physical screen increases with its proximity to the observer.

Therefore, any earth berm screening should be as close to the "viewing" zone as is practically possible and be higher than the horizontal line of sight to the structure to be screened.

Views along the coast of the NPS within the 2,5 to 5 km zone will experience the greatest visual intrusion and the highest visual intensity due to the scale. The significance is high since the scenic value of that view will have been irreparably changed.

The first consideration of the location for a screen berm is along the eastern and western boundary of the NPS site for Thyspunt and Bantamsklip only. The alternative will be to consider a lower berm plus a visually permeable screen along the crest of the berm. This will, however, have limited screening effect at the distance from the viewer, but could reduce the light spill from lower level lights.

The screen berm option should be carefully considered, because in constructing the berm the existing fynbos vegetation will need to be removed, put in a temporary nursery and replanted. The berm construction will require heavy machinery. Dust during construction will be a nuisance and the re-

establishment of the fynbos vegetation will need to be completed. The direction and velocity of prevailing winds will need to be taken into account, particularly in dune environment.

In order to provide a reasonable amount of visual screening the berm would need to be approximately 10 m high. The effect of this screen will be to reduce the extent of the visible portion of the building and to screen lower level lights.

Monitoring

- Follow up on detail design and specifications and inclusion in tender documentation.

Visual Impact - High visibility of NPS at night as a result of security and safety lighting

Mitigation

- Lighting

  The night view currently towards the NPS site presents an extensive area of darkness. Night views of the NPS will be in contrast with the dark background provided by the sea and surrounding natural area. The control of "light spill" can reduce the night time visual impact.

  The following mitigation measures are recommended:

  A suitably experienced person should design the lighting plan for the NPS and surround security areas. The process would also involve the modelling of the light spill for various light units to achieve the required effect and to limit the "light spill". The aspects of the lighting solution should include the following:

  - Light fittings should have shields to eliminate sight of the light source from sensitive nearby land uses e.g. nearby communities;
  - Down lighting of areas to be preferred to up lighting;
  - Perimeter lights to be directed downwards and inwards;
  - Emitted light colour to be a low pressure sodium (yellow), preferably not mercury halide (blue-white) or fluorescent lights, as these attract insects and considerable depletion of the insect populations will result over time;
  - Do not flood light the entire main structure but incorporate concealed lights high on the structure to shine downwards. Darker areas on the building elevations will provide a less visually noticeable structure;
  - No light fittings should spill light upwards or be directed upwards from a distance towards the area or building to be illuminated; and
  - The lighting plan should strive to maximise the energy efficiency. This should include a hierarchy of lights that are essential to those that are switched on only when needed.

Monitoring

- Follow up on detail design of lighting intensities location and fitting type. Include in tender documentation.

Visual Impact - Loss of visual integrity and continuity of the beach area by structures, fences and roads

Mitigation

- Move the NPS further inland to provide at least a 200m width above high tide line, of undisturbed beach and adjacent area.

Monitoring

- Audit to check compliance.

4.2 Construction Phase

This phase in the project is important in the context of visual impact mitigation because it is the time when all recommended measures are implemented. Regular monitoring to ensure that the correct visual aspects are attended to and are put in place at the right time will also benefit the visual presentation of the project.

4.2.1 Mitigation Objective and Level

- To minimise visual clutter of lay-down and works areas to surrounding land uses.
- To limit visible dust generation.
- To reduce visual bulk of transmission line towers.
- To stabilise and shape land forms to visually 'fit' the surrounding setting.

4.2.2 Recommended Mitigation Measures

Visual Impact - The machinery, equipment and material at the construction site, camp and lay-down area presents visual clutter where visible to the public e.g. along roads and from residential areas.

Mitigation

- The visual impact will be caused by construction activities and material stored within the site. These areas should be screened along their perimeter.
- It is recommended that, attached to the 2 m high construction site fence should be 2 m high dark green or black shade cloth along boundaries that will be visually exposed to the public e.g. roads or residential areas.

Monitoring

- Audit to check compliance.

Visual Impact - Dust generated during earth moving and vehicles travelling in dirt roads. This is also an issue at night.

Mitigation

- Dust generated from the area will be seen, particularly at night, as it will diffuse the light. Correct and effective dust suppression methods will reduce this. The suppression techniques must include wetting down trafficked areas and the paving or temporary stabilisation of the surface of frequently used roads.

Monitoring

- Audit to check compliance.

Visual Impact - Transmission line to exclusion zone boundary are large structures and visually intrusive when grouped.

Mitigation

- The transmission towers should be as visibly "light" as possible. The new generation of cross rope suspension or kite towers should be considered.

- The colour of transmission line pylons should be the grey that results from the galvanising of the steel. Newly galvanised metal should not be painted, as it will soon weather to a matt grey. Grey is visually neutral in the landscape and at distance blends easily into the background.

Monitoring

- Audit to check compliance.

Visual Impact - Disturbed natural areas and new landforms after construction. This includes the site and new access roads, borrow pits etc. off site.

Mitigation

- On completion of construction of the NPS, the rehabilitation and stabilisation of all disturbed areas must be carried out to a high standard so that stabilisation, aesthetic form and ecological sustainability are able to rapidly improve with time.

- It is recommended that a Landscape Architect be appointed or consulted to design the rehabilitation and stabilisation of all disturbed areas.

Monitoring

- Inspect rehabilitated areas monthly initially and quarterly later to monitor new growth of planted and seeded vegetation. Repair and replant where required. Acceptable 'Cover' will be 80% of surface covered by vegetation.

Visual Impact – Lighting of Construction Areas

Mitigation

- Lighting should be directed where possible to prevent light spill. Use ***light fixtures*** that conceal the light source and direct lights so as not to shine beyond the site onto adjacent residential areas.

Monitoring

- Check compliance with requirements.

Visual Impact – Spoil dumps form dimensions and rehabilitation

Mitigation

- Consider the form and scale of the surrounding dunes in detail, as well as the need to accommodate access roads and transmission lines and security patrolling of the secure areas.

- The side slopes should ideally be 1:3 but not steeper than 1:2. The landform on its long axis should be the same as that of the dune axis in the case of Thyspunt; for Bantamsklip the form is to be taken from the existing dune to the west and for Duynefontein the barchan dunes on the site. The direction of the prevailing wind and the way in which this has formed the dunes is an important consideration in order to reduce dust and fine sand from blowing into the works area.

- The top 300 mm of soil must be removed from the dump area and stockpiled nearby for later revegetation of the final dump form.

- It is recommended that a Landscape Architect be appointed together with a Landscape Rehabilitation Contractor who has experience in rehabilitation of sand dumps in that biome. The landscape architect will, in liaison with the engineers, design the entire dump form and produce the specification in collaboration with the rehabilitation contractor. It must be noted that the development of the dump and the rehabilitation must be done in phases as the material becomes available

Monitoring

- Check compliance with requirements.

4.3 Operational Phase

The visual impact that relates to this phase is the monitoring and maintaining of the mitigation measures implemented during the construction phase for the NPS and the new access route to the site.

Where implemented visual mitigation measures are found not to be as effective as originally planned, modification and improvements should be implemented. This could apply for instance to the location of screen fencing or the height of a screen berm and the progress of vegetation establishment on new landforms.

4.3.1 Mitigation Objective and Level

- To ensure that mitigation measures are effective, current and are maintained at the level required.

4.3.2 Recommended Mitigation Measures

Visual Impact - The ineffectual result of implemented visual mitigation measures or the identification of new visual impact issues.

Mitigation

Maintain and modify where required to effectively mitigate visual impacts of the NPS and associated infrastructure. This may involve the management of re-vegetated cut or fill slopes to provide the visual integration with the surrounding landform. The extension of screen berms in certain areas and other related aspects.

Monitoring

- Monitor the vegetation establishment on new landforms, the performance of safety and security lighting, the overall visual image of the NPS with respect to the effectiveness of the visual impact mitigation measures. This aspect should be included in audit reports.

4.4 Decommissioning Phase

This phase is intensive and complicated and will take a number of years. The visual mitigation during this phase will depend on the manner and method of decommissioning the plant and ancillary structures. If the entire structures of NPS are to be demolished, then the visual mitigation will need to include screening and dust mitigation similar to those recommended for the construction phase. If the buildings and structures are to be put to another use, the type of usual mitigation measures will be less noticeable.

4.4.1 Recommended Mitigation Measures

Visual Impact - The physical removal of structures by demolition will have a visual impact on the surrounding land use, which will have changed significantly during the approximate 60 years of operation of the NPS.
Mitigation

- Apply where appropriate, the construction phase measures and develop specific measure to suit the new conditions that prevail.

Monitoring

- ***Audit and monitor for compliance the measures prescribed.***

4.4.2 The Effectiveness and Mitigation Measures

The magnitude and significance of a visual impact of a structure in a particular view will vary from person to person. This is because visual impact appreciation is subjective.

The effectiveness of visual mitigation measures is aimed therefore at reducing rather than eliminating the visual impact to the observer. This is as a result of the large scale of the project's elements.

All proposed mitigation measures are therefore considered to be effective in reducing the visual impact. Mitigation by way of screening by vegetation will take a longer time to be effective. This measure is reliant on regular maintenance to ensure effective growth.

4.4.3 Site-Specific Mitigation

The detailed layout of each site was not available at the time of writing, therefore location-specific and detail-specific visual mitigation measures have not been provided.

5 CONCLUSIONS AND RECOMMENDATIONS

The assessment of the visual impact of the NPS indicates that the consequence and significant ratings for Thyspunt are medium and high, whilst that for Bantamsklip they are high and high and for Duynefontein are medium and high respectively.

This is due to the following:

- The scale and prominent position on the coast will make the NPS a dominant feature in all three settings. The visibility from communities and residences within a 5 km radius is considered to be high. This includes the town of Pearly Beach for Bantamsklip, Oyster Bay and Cape St. Francis for Thyspunt and Duynefontein and Altantis for the Duynefontein site. Included are the various houses east and west of the first two sites.

- The landscape character and sense of place of the landscape setting will be irrevocably changed by the NPS.

- The visual intrusion of the NPS into views from the surrounding residential areas will be significant, because of the visual contrast and the direct line of sight.

- The general high quality scenic coastal views will be intruded upon by the large scale of the NPS.

- The visual intrusion of the NPS on the night scene is considered to be high, due to the concentration of light in an area that presently has no conspicuous lighting. The exception is the Duynefontein site where the illuminated area will increase northwards.

- The large scale and prominent location of the NPS on the coastline allows little opportunity for effective visual mitigation. Visual impact reduction is however possible.

The following applies to the Duynefontein Site:

- With respect to visibility the Duynefontein NPS is relatively close (2 km) to the Koeberg NPS and is of similar scale. The Koeberg NPS is already a dominant visual element in the setting and therefore the Duynefontein NPS will add to visual intrusion intensity and visibility caused by these large elements.

- The landscape character and sense of place of the setting will be changed marginally by the Duynefontein NPS, because the localised existing industrial image, created by the Koeberg NPS and associated buildings and transmission lines in that area, will be reinforced. A larger area of diminished character and sense of place will result.

- The intrusion of the Duynefontein NPS into views from the residential areas will increase the intensity of view obstruction. This increase in visual intrusion is considered not to be significant, because the setting and view is already dominated by the Koeberg NPS and transmission lines. The nearest residential suburbs of Duynefontein and Melkbosstrand will be most affected by the increase in visual impact on views north. The residential suburbs of

Atlantis are beyond the industrial zone and will therefore have no view of the Duynefontein NPS.

- The general views over the coastal landform to the sea are over an open, gently seaward sloping landscape and the scale of the Duynefontein NPS will be visually intrusive as it will form, together with the Koeberg NPS, a visual grouping of very large structures.

In the context of the above arguments of the Duynefontein NPS's visual intrusion and impact intensity and the setting in the partly industrial, partly agricultural and partly residential landscape character, the overall conclusion is that it is of high visual impact and of high significance because of the cumulative visual intrusion on an extensive natural and wild coastal landscape.

The assessment with the Duynefontein NPS indicates a major visual intrusion on the landscape north of the Koeberg NPS, because the condition has been evaluated against an existing visually altered landscape. The view from the residential areas of Duynefontein and Melkbosstrand will be marginally altered.

Further over time the open land outside the exclusion zone will convert to residential development and the visual contrast of the large buildings in a predominantly agricultural landscape will reduce. This however is lunlikely for the Bantamsklip site but possible for the Thyspunt site.

The visual impact mitigation measures proposed for the NPS will therefore only reduce its visual intrusion marginally within a 5 km radius. It is nevertheless recommended that the mitigation measures presented are developed further and in detail during the design phase of the NPS.

The visual impact of the transmission line from the NPS to the 3 km exclusion zone boundary will be significant, because these will cross the R43 near Bantamsklip, and the R27 at Duynefontein and will in the case of Thyspunt will cross the dune field ridges that will emphasise their scale and extent. At Duynefontein the lines will extend the existing corridor created by Koeberg NPS.

There will be an introduction of light into a previous dark area along the coast. However, the intensity and distribution of the light can be reduced if lighting of the site and structures are carefully planned for the required areas by using lighting configurations which focus on light colour and luminaire type that limit the "light spill".

The visibility of the NPS at night may, at times, be more or less intrusive than during the daytime. The variation will be as a result of the light responding to the climatic conditions.

There will be a visual impact generated by the construction camp and lay-down areas as a result of their scale, disorderly arrangement and activity. This visual incongruity in the setting can be reduced by screening and site-specific mitigation actions.

There is a very intense light from seasonal 'Chokka boats' that completely alter the remote sense of place at night. This phenomenon is of particular negative status to the coastal homesteads and villages at Thyspunt and Bantamsklip.

Of the two masts, the meteorological mast will be the most visible particularly at night due to the red aviation warning lights and its greater height. The viewshed for this structure is extensive. Visual impact mitigation is not even possible as the mast colour

and stay wires cannot be effectively blended with the sky due to aviation visibility requirements.

The new access road to the sites will alter the visual character of the setting. The roads for Bantamsklip and Duynefontein are short and direct from nearby existing provincial roads, the R43 and R27 respectively. However, the access routes to Thyspunt will require a major disruption of the dune field and associated vegetation, which will cause significant visual degradation of the undisturbed area.

The study has identified additional risks that are associated with the visual impact of the NPS. These are:

- The accommodation on site of material excavated from foundations for the structures; and

- The design of the new landform to accommodate the material in a form that will fit the setting and vegetation type. This point will continue to apply if the material is removed from site.

The visual impact mitigation measures that are proposed for the NPS will only reduce the visual intrusion of the project within a 5 km radius. The mitigation measures following will be the most effective;

- The location of the NPS and its high security zone to be a minimum of 200 metres inland from the high water line; (it is noted that the predicted high water line will rise as a result of climate change and therefore the setback should take this into account.)

- The colour variation of the NPS large structures;

- The minimisation of light intensity and light spill by the analysis of lighting requirements and the selection of lig***ht fixtures*** that direct light. This analysis should be carried out by a specialist lighting engineer; and

- The construction of screening elements, berms, planting and fences at particular areas within and around the site. This task should be carried out by a qualified Landscape Architect.

All of the above measures should be carried out and finalised during the design phase of the project as these aspects will then be fully integrated with all construction and design requirements.

It is recommended that a Landscape Architect be appointed at the site design stage to integrate the structures into the surrounding setting to reduce the identified visual impact that the NPS will have.

The recommended location point where the transmission lines should exit the EIA corridor for Thyspunt and Bantamsklip is due north of the NPS. Their preferred alignment to the property lines and beyond is indicated on plans in this report.

For the Duynefontein site the transmission lines should exit the EIA corridor due east of the NPS and the spoil dump sites should be located parallel to the eastern boundary of the EIA corridor.

The positions of the access roads to the Sites from the nearest Provincial roads are not visually intrusive for the Bantamsklip and Duynefontein sites. However it is recommended that the northern access road for the Thyspunt site is preferred from a visual perspective, because this route will have the least negative visual impact on the sense of place of the existing dune field.

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ANNEXURES

ANNEXURE A
PHOTOGRAPHS OF THYSPUNT

Photo 1 (Point 105): Typical house placement east of site

Photo 2 (Point 104): Holiday home on beach east of site

Photo 3 (Point 106): View south to site from ridge on coast road

Photo 4 (Point 108): View from N2 towards site to south- site not visible due to trees on horizon

Photo 5a: View north from Melkbosstrand – Visibility in clear weather. Koeberg as example

Photo 5b: View north from Melkbosstrand – Visibility in overcast weather. Koeberg as example

Photo 6: Visual scale of TNPS reduces with distance – 2km. Koeberg as example

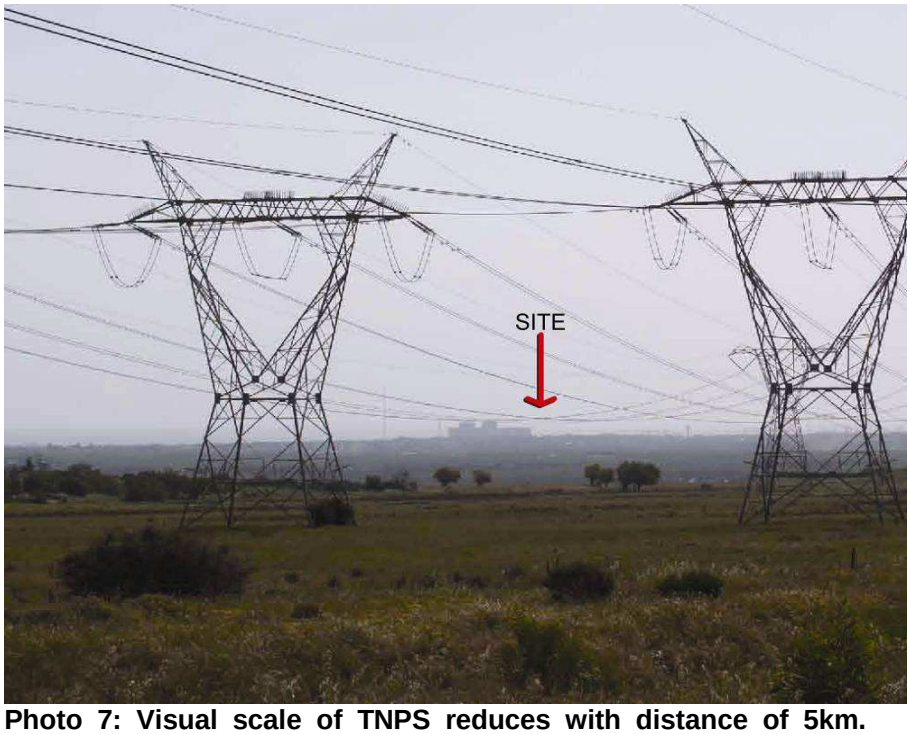

Photo 7: Visual scale of TNPS reduces with distance of 5km. Koeberg as example

Photo 8: Visibility at night. Koeberg as example

Photo 9 (Point 102b): View from parking area west from Cape St Francis

Photo 10 (Point 102a): View from parking area west from Cape St Francis

Photo 11 (Point 103a): *Photomontage view 6km from site*

Photo 12 (Point 103b): Photomontage view 6km from site

Photo 13 (Point 107): View from Oyster Bay beach towards Thyspunt Nuclear Power Station (TNPS) – not visible

Photo 14: Lights on "chokka" boats in Port St Francis

ANNEXURE B
PHOTOGRAPHS OF BANTAMSKLIP

Photo 1 (Point 112): Pearly Beach crossroad – Tall vegetation possibly obscures lower half of Bantamsklip Nuclear Power Station (BNPS) 5km away

Photo 2 (Point 111): View of site 15km away obscured by tall vegetation

Photo 3 (Point 113): Beach houses are orientated to maximize southward views of the sea

Photo 4 (Point 114b): Photomontage view of BNPS from Pearly Beach at 5km

Photo 5: View north from Melkbosstrand – Visibility in clear weather – Koeberg as example

Photo 6: View north from Melkbosstrand – Visibility in overcast weather – Koeberg as example

Photo 7: Visual scale of BNPS reduces with distance of 2km – Koeberg Power Station as example during the day

Photo 8: Visual scale of BNPS reduces with distance of 5km – Koeberg Power Station as example

Photo 9: Example of light spill at Koeberg Nuclear Power Station at night

Photo 10: Visual mitigation – Dark band and light stack reduces visual scale of structures – Pebble Bed Nuclear Reactor as example

Photo 11 (Point 109): View from Franskraal beach area 20km from site

Photo 12 (Point 110): Site 20km away barely visible from Franskraal Beach Road and higher ground

Photo 13 (Point 113): View from beach road – most houses look out to sea not eastward to site

Photo 14 (Point 114a): Houses partly orientated to site

Photo 15 (Point 115): Bantamsklip entrance

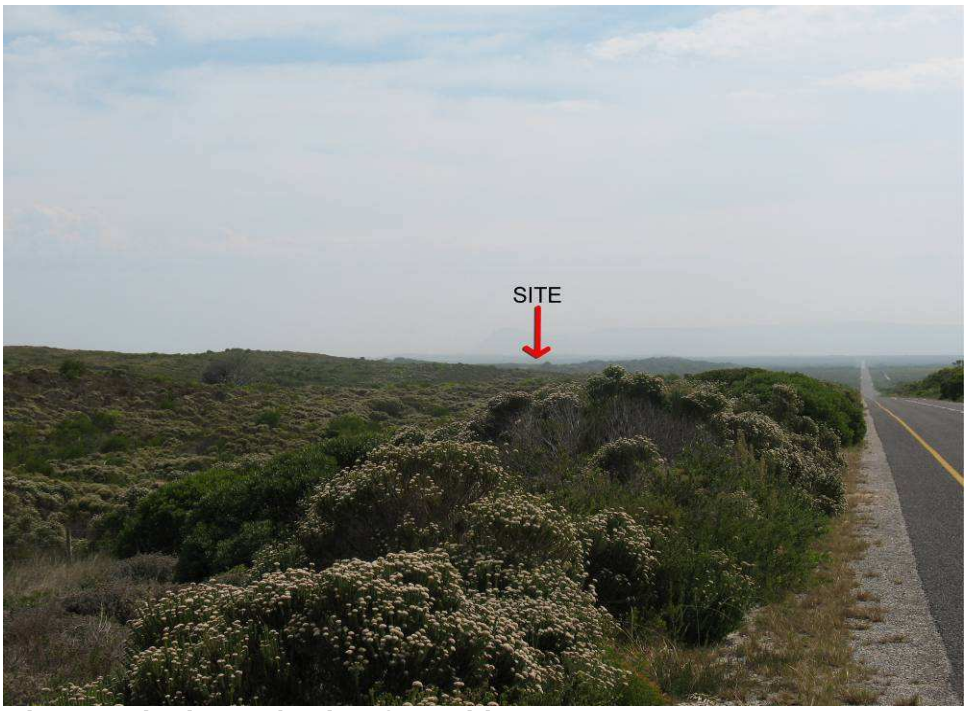

Photo 16 (Point 116): View from ridge

Photo 17 (Point 117): View west

ANNEXURE C
PHOTOGRAPHS OF DUYNEFONTEIN

Photo 1 (Point 46): View SW to Duynefontein - site not visible

Photo 2 (Point 47): View SW from Dassenberg Road travelling west from Atlantis

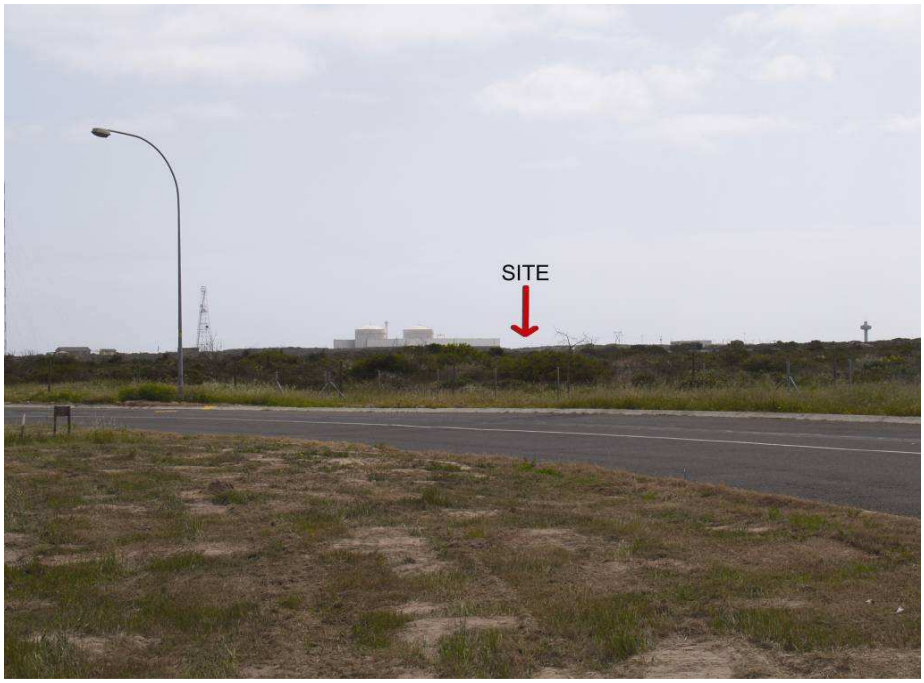

Photo 3 (Point 36): View north from Napoleon Street and Galleon Street Northern most edge of Duynefontein suburb

Photo 4: Day and night scene – Koeberg as example

Photo 5a (Point 39): View north from Melkbosstrand. Koeberg as example – Visibility in clear weather

Photo 5b: View north from Melkbosstrand. Koeberg as example – Visibility in overcast weather

Photo 6 (Photo 48): Visual scale of DNPS reduces with distance of 5km. Koeberg as example

Photo 7 (Photo 48): Visibility at night. Koeberg as example

Photo 8 (Point 50): View east from Koeberg Hill

ANNEXURE D
PHOTO SIMULATION METHOD OF NPS AT THYSPUNT

METHOD

1. ***The photo's position was recorded by coordinates in WGS48 format.***

2. ***The coordinates as well as the site constraint plan that showed the position where the NPS should be located, were inserted into the Google Earth satellite view of the site and surrounding area. The distance of the viewer from the site was determined.***

3. ***A 3D wire diagram of the one of the possible NPS designs that was supplied by Eskom was used in the program 3D Max.***

4. ***Using the above computer programme, the 3D wire model was placed on the site plan, which in turn was placed on a Digital Terrain Model (DTM) that had 3D contours. The coordinates and the distance were entered and the computer programme generated an image of the NPS as it would be seen from the photo point.***

5. ***The digital photo was opened in the computer programme and the wire image of the NPS on the contoured landform was overlain to match the landform on the photo to the landform of the computer image.***

6. ***The wire diagram of the NPS was then fixed to the digital photo. The NPS on the photo was shaded to complete the solid form of the structure.***