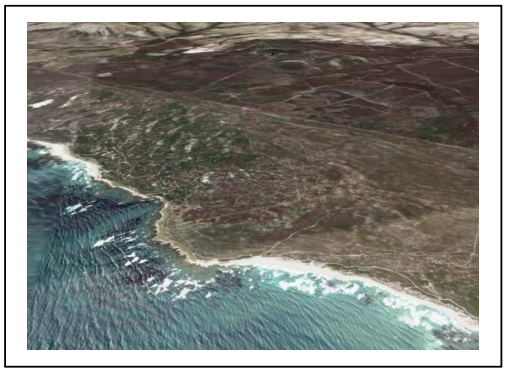
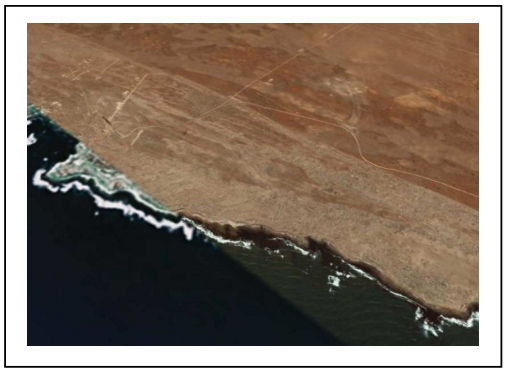
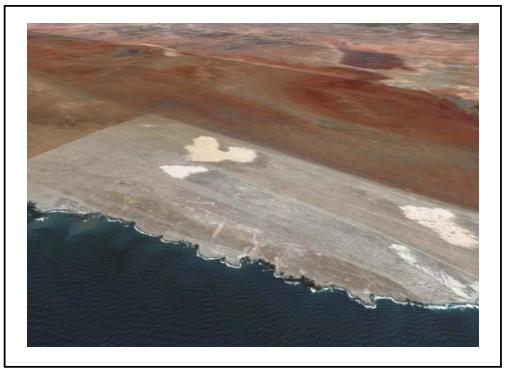
Eskom Holdings Limited

DRAFT

ENVIRONMENTAL IMPACT ASSESSMENT FOR THE PROPOSED NUCLEAR 1 POWER GENERATION PLANT

SPECIALIST STUDY FOR SCOPING REPORT



Initial Visual Assessment Report

EXECUTIVE SUMMARY

The initial visual assessment of the five sites for a Nuclear Power Station was visited and their visual attributes were experienced as well as recorded.

A brief description of their physical attributes reinforces the initial impression that all the sites are located in areas that have different but attractive visual qualities.

This initial assessment required an understanding of the qualities of each site relative to their sensitivity to visual changes.

To order this, an analysis of each site was made according to each site's significance in the context of the surrounding land use and in the context of the uniqueness in that region. This showed that Thyspunt, Bantamsklip and Schulpfontein have higher ratings than Koeberg or Brazil. In other words, the first three are more sensitive to visual change and hence visual impact than Koeberg and Brazil based on surrounding land use and uniqueness.

A further assessment of the sites showed, in the context of the Power Plant and ancillary structures being in place, a different visual ranking when criteria of visibility from major roads, surrounding landscape and existing communities, visual intrusion on landscape character and sense of place when the significance of this intrusion were considered.

The results indicated that the ranking of the most sensitive sites, that is those that would suffer the greatest visual impact were Schulpfontein, Bantamsklip, Thyspunt, and the least sensitive area Brazil and Koeberg.

These rankings, however, serve to order sites in terms of their sensitivity to change, but it is clear that for all sites the visual impact will be significant because of the following:

- the visual impact will be high, because of the large scale and form of the structure;
- the visual impact will be significant for all sites, except Koeberg, because the sense of place will be irreversibly changed;
- the character of all the sites will be altered irreversibly; and
- that the overall visual impact on the site and immediate surroundings within a 5 km radius will be negative to a degree to which it is considered to be significant.

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1 INTRODUCTION

1.1 Background

Eskom Holdings Limited (Eskom), as part of the National Electrical Supply Strategy, intend to construct a Nuclear Power Station that will come on line between 2012-2014.

The site selection for this Power Station commenced in the 1980's when studies were initiated to identify suitable sites along the entire South African coastline. Five sites have been subsequently identified as meeting the primary selection criteria of seismic stability.

This visual study is initial in its scope and it is intended to identify the visual attributes of each site to assist in the selection of a preferred location from a visual perspective.

- The findings of this study will be included in the Scoping Report submitted to Eskom by the lead consultant Arcus Gibb.

This report is a visual scanning exercise which identifies the key issues, general visibility and characteristics of the receiving visual setting. This report will direct the focus of the Visual Impact Assessment study to follow.

1.2 Nuclear Site Alternatives

This report's function is to identify from a visual impact perspective, and in collaboration with other specialists, preferred sites following the initial site visits carried out during 26-30 March and 10-12 July 2007.

The five sites chosen are shown on **Figure 1** and are:

- Thyspunt and Bantamsklip in the Southern Cape near Francis Bay and Pearly Beach respectively;
- Adjacent on the north side of Koeberg in the Western Cape; and
- Schulpfontein and Brazil in the Northern Cape south of Kleinsee.

1.2.1 The Visual Impact Assessment in Context

This visual scan is intended to assess the extent of the visual intrusion on the existing landscape of the Nuclear Power Plant and ancillary structures for each of the five sites. The sites will be ranked according to the intensity of their visual intrusion on the surrounding areas and their setting in the context of the macro landforms.

1.3 Study Approach

This report will be complimented at a later stage by a Visual Impact Assessment, which will assess in detail, aspects of the visual impact of the sites.

This report, therefore, is the first of two visual assessment phases – the general site ranking of the alternatives and a visual impact assessment of the alternative sites.

1.3.1 The Study Approach and Method

The approach required visits to each site to experience the sense of place and the setting. The landform and views to the site from adjacent land, both near and far, was noted as was the nearest communities.

The attributes for each site are described and notes added on how the project will visually alter these.

Visual assessment criteria are defined which allows each to be allocated a rating of the change in visual intensity that the Power Station will bring to each site.

Three visual intensity ratings, namely High, Medium and Low, are allocated to a set of visual criteria. This is done and aggregated to allow comparisons of the visual intrusion of the Power Station for each site.

1.3.2 Assumptions made regarding the Site

The study area includes the farm on which the Power Plant is to be located and beyond to the estimated limit of the viewshed.

The power lines from the Power Station will in most cases be aligned to go directly inland from the site boundary. The assessment of the visual intrusion of these transmission lines is the subject of another study.

The visual impact of the transmission lines is assumed to have equal impact on all sites and therefore at this level of study will not be taken to influence the ranking of each site.

1.3.3 Limitations of this Study

The purpose of this visual assessment is to identify the visual attributes of each site and to identify related visual issues. This information is used to rank the sites in the order of expected visual impacts.

This study does therefore not develop and model viewsheds and the visual absorption capacities of the landscape.

2 DESCRIPTION OF AFFECTED ENVIRONMENT

The extent of the visual impact of linear structures will depend on the following characteristics of the receiving environment:

- Topography: varied or uniform and open, i.e. plains or closed hilly viewsheds
- Vegetation cover: grassland, savanna, forest
- Land use: pasture, irrigated land, agricultural holdings, suburban conservation areas
- Landscape diversity: a combination of the above
- Landscape character: sense of place, scenic quality

The sites occur in distinct geographical areas, the West, South and East Coast of South Africa. Each area has different land types and vegetation which will influence the visual impact experienced by a Nuclear Power Station at that location.

2.1 Topography

Thyspunt

The rocky shoreline is oriented almost west north-west and east south-east. The landform inland 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, Thyspunt and Figure 2a, Section A-A Thyspunt.

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. The undulating vegetated dunes between this zone and the coastline is approximately 70-80 m high which drop to a terrace 20 m above the rocky shore.

Further inland from the dune field the landform rises evenly to a low hill that has its long axis orientated east-west with high points of 160 m and 140 m. 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 which have views southwards to the coastline.

Bantamsklip

The rocky shoreline is orientated east-west and the landform rises to a sandy vegetated terrace that rises from 16 m near the Coast Road R43 to 40 m at the road some 2 km inland. This narrow sandy coastal plain rises to a plateau height of approximately 195 m.

This plateau has been incised by the Haelkraalrivier and other drainage lines that discharge on the coast. Four prominent high points along the southern edge of the plateau remain Wolfhuiskop 274 m, Hagekraal 212m, Carruthers Hill 196 m and Buffelsjagberg 311m. Refer to Figure 3, Bantamsklip.

Implications for the Project

The steadily sloping landform to the coastline south of the road (R43) offers no visual screening of the proposed Power Plant. The high points on the plateau edge will look down onto the proposed plant.

Koeberg

The coastal plain of low dunes is at an elevation of approximately 40-50 m and extends from the coast to the R27 Coast Road 3 km inland. The coastline is orientated north north-west and south south-east. Eastward of the R27 the landform rises uniformally to a 100 m elevation approximately 6 km inland from the coast. Refer to Figure 4, Koeberg.

Implications for the Project

The flat landform offers no visual screening of the proposed plant for great distances up and down the coast and inland.

Schulpfontein

The coastline is north-south and from the rocky shore the landform rises to general flat terrace approximately 10 m above the sea level. Refer to Figure 5, Schulpfontein.

From thereon the land rises steadily to the coast road some 2 km due east. The landform rises at a gradient of approximately 1:50 from the coast to the road.

Implications for the Project

The sloping landform from the road to the coast offers some foreshortening of the distance which will assist in reducing the scale of the plant when viewed from the coastal road.

Any visual screening of the Plant from the coast road will need to be earth berms stabilised by endemic vegetation.

The varied slope near the coast will necessitate more earthworks to provide the platform for the Power Station – visual issues result from the cut slopes and the placement of spoil material.

Brazil

This site is similar to Schulpfontein since it is a few kilometres north. The difference being that the landslope from the road to the coast has slight undulations, particularly along the coastal road. This provides an effective screen to some views of the coast over short distances when travelling north or south along the coastal road. Refer to Figure 6, Brazil.

Implications for the Project

The raised landform near the coastal road, i.e. on the eastern boundary, will partially and entirely screen views of the plant on the coast over short distances for vehicles travelling the road.

Any visual screening of the plant from the coast road will need to be earth berms stabilised by endemic vegetation.

The varied slope near the coast will necessitate more earthworks to provide the platform for the Power Station – visual issues result from the cut slopes and the placement of spoil material.

2.2 Vegetation

Thyspunt

The dune field has been stabilised nearer the coast by vegetation, both indigenous and exotic.

The vegetation on the windward side of the dune are wind pruned and dense.

The vegetation in the "slack", the valley between the dunes, is also relatively dense, but taller 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 Power Plant. The taller trees in the "slack" have no screening effect, because these are below the dune height.

The vegetation provides no variation to affect the visibility of the Power Plant.

Bantamsklip

The previously extensive dune field is now mostly covered with Strandveld vegetation with some exotic species interspersed. This is of low (300 mm) to medium (500 mm) height and sparsely spaced.

The Walker Bay Forestry Nature Reserve's eastern boundary is common to Eskom and covers approximately 33 % property south of Route R43. The area is fenced to prevent use of the area by visitors and to protect the Strandveld vegetation which is colonising the dunes.

Implications for the Project

The low to medium height of the vegetation and the relatively open spacing of the large plants will afford little "green" screening of the proposed Plant from the Coast Road R43. However, this vegetation can, if encouraged to grow to a height of approximately 2 m along the boundary fence along to the road, this will assist in visually screening the proposed Plant.

Koeberg

The windswept dunes are being colonised with a sparse cover of low Strandveld vegetation. There are no tall bushes and the grass and other specialised vegetation is rarely taller than 400 mm.

Implications for the Project

The low vegetation will offer no visual screening of the Plant from views seaward from the surrounding communities, the R27, 2.5 km eastwards, the R403, 9.5 km eastwards and the N7, 14.5 km eastwards.

Schulpfontein

The semi-succulent sparsely spaced Namaqualand vegetation cover the landform that rises gently at an almost uniform slope of 1:75 near the shore to 1:25 to the coast road.

Implications for the Project

There can be no vegetation screening of the Power Plant by existing vegetation. Constructed soil berms will provide any screening needed.

Brazil

The same vegetative and landform exists on this farm some 10 km to the north of Schulpfontein.

2.3 Sense of Place, Character, Visibility and Land Use

The attributes of sense of place, character, visibility and land use are briefly described in Table 1: Attributes and Visual Significance of the Five Sites.

This enables a comparison to be made between the five sites.

The criteria for the rating of the visual significance in the context of adjacent land use and regional uniqueness is based on the following:

Table 1a: Visual Significance Rating Criteria for Sites in the context of Adjacent Land Use and Coastal Uniqueness

CONTEXT	SIGNIFICANCE RATING CRITERIA		
	HIGH	MEDIUM	LOW
Adjacent land use	Is compatible with surrounding land use	Has some association with land use	Is not compatible with surrounding land use
Regional coastal uniqueness	Totally natural area not disturbed by human activity	Partially disturbed by human activity	Noticeably disturbed by human activity

Based on the above, the five sites can be ranked as follows:

Table 1b: Rating of Sites Visual Significance in context of Adjacent Land Use and Coastal Uniqueness

Site	Visual significance rating	
	Adjacent land use	Regional coastal uniqueness
Thyspunt	High	High
Bantamsklip	High	High
Koeberg	Medium	Medium
Schulpfontein	High	High
Brazil	Medium	Medium

Thyspunt, Bantamsklip and Schulpfontein have high significance ratings due to their regional coastal uniqueness and compatibility with adjacent land use, in this case natural relatively undisturbed areas.

Koeberg and Brazil sites are associated with adjacent land uses of power generation and diamond mining respectively while their coastal uniqueness is altered by earlier human activity.

3 VISUAL ASSESSMENT OF VISUAL SENSITIVITY OF EACH OF THE FIVE SITES

3.1 Criteria for Sensitivity Rating

The criteria for visual sensitivity rating for each of the site attributes, namely Sense of Place, Character, Land Use, and Visibility are set out in Table 2: Visual Assessment Criteria for Intensity Rating.

These criteria are used to rate the characteristics of each site with regard to the intensity of the impact on visual sensitivity in the event of a Power Plant being established.

Intensity of impact is defined as degree of negative visual impact associated with that criteria.

3.2 Ranking of Sites according to Visual Sensitivity

The ranking of the visual sensitivity of the five sites in order of most sensitive to least sensitive is based on the criteria set out in Table 2.

The results show that:

Schulpfontein is the most sensitive to visual change because of its high visibility, the total change to the ambience of the site and the view onto the site is totally unobstructed with ratings of 4 (high) and 1 (low).

Bantamsklip and Thyspunt are the next sensitive to change in their visual characteristics with ratings of 3H, 2M and 3H, 1L respectively. Both have high visibility, but mainly from along the coastal edge. Thyspunt cannot be seen from any local or major roads, but visual intrusion on character and visibility to local communities is high as for Bantamsklip.

Brazil (2H, 2M, 1L) is fourth due to its medium visibility as a result of low landforms partially obscuring the site from the coast road, but the visual intrusion on the site character is high. Communities do not really feature, because there are none that will be directly visually exposed to views of the Plant. This, however, may change in the long term.

Koeberg (2H, 2M, 1L) is the least visually sensitive site, because distance from major roads e.g. R27, 2.5 km, R403, 9.5 km and N7, 14.5 km. The visual intrusion on the character of the landscape is tempered by the presence of Koeberg Nuclear Power Station and the many transmission lines that converge on the area. The visibility of the site will be high, because of the existing communities of Dynefontein and Atlantis.

Table 2: Visual Assessment Criteria for Intensity Rating

Visual Assessment Criteria	Visual Intensity Rating		
	High	**Medium**	**Low**
Visibility from major roads	Highly visible due to alignment of road and within 1 km	Partially visible from road approximately 2 km from site	Low visibility due to distance of greater than 3 km
Visibility from surrounding landscape	Not obscured by natural landform	Partially obscured by landform	Mostly obscured by landform
Visual intrusion on landscape character and sense of place	Dominates sense of place and changes landscape character significantly	Partially influences sense of place	Has little effect on sense of place
Significance of visual intrusion	Totally changes the ambience of the site area and surrounding landscape by dominant visual presence	Partially alters the ambience of the site area and surrounding landscape by noticeable presence	Marginally alters the ambience of the site area and surrounding landscape by visual presence
Visibility from existing communities	View of site totally unobstructed	View of site partially obstructed due to intervening landforms or built structures	View mostly obstructed by intervening landforms or built structures

Table 3: Summary of Visual Criteria Rating for Five Nuclear Power Station Sites

Visual Assessment Criteria	Intensity Rating Of Sites				
	Thyspunt	**Bantamsklip**	**Koeberg**	**Schulpfontein**	**Brazil**
Visibility from nearest road	L	M	L	H	M
Visibility from surrounding landscape	L	M	H	H	M
Visual intrusion on landscape character and sense of place	H	H	M	H	H
Significance of visual intrusion	H	H	M	H	H
Visibility from existing communities	H	H	H	L	L
Sites in order of sensitivity to visual impact of a New Nuclear Power Plant 1 – most sensitive 5 – least sensitive	H – 3 M – 0 L – 2 3	H – 3 M – 2 L – 0 2	H – 2 M – 2 L – 1 5	H – 4 M – 0 L – 1 1	H – 2 M – 2 L – 1 4

4 CONCLUSIONS AND RECOMMENDATIONS

The visual setting and therefore the visual quality is different for each site. However, the proximity of some sites to each other provide a landscape similarity and therefore a simple grouping into three types. These are the Northern Cape sites (Brazil and Schulpfontein), the Western Cape site (Koeberg) and the Southern / Eastern Cape sites (Bantamsklip and Thyspunt).

To rank the sites in terms of visual sensitivity will be subjective because all are highly sensitive due to their location within natural coastal areas. It is therefore necessary to supplement the selection criteria to include the general visibility of the site from critical viewpoints such as roads and communities and to add a significance criteria based on the number of people who at present will be exposed to a view of the plant's structure.

This means there will be a ranking according to general visibility of the site and one related to the number of persons who will be exposed to direct views of the Power Plant's structure.

The ranking of the sites relative to visibility, from most sensitive to least sensitive is Schulpfontein, Brazil, Bantamsklip, Thyspunt and Koeberg.

The ranking of the sites relative to the number of persons exposed to direct views of the plant's structure, from most number of people to least number of people is Bantamsklip, Thyspunt, Koeberg, Schulpfontein and Brazil.

Bantamsklip and Thyspunt both have direct views from communities which reside along the coast and there are no screening elements to obscure their views.

The Koeberg site, while on flat, low vegetation land on the coast, the communities are to the south and only the "front" rows of houses at Duynefontein have direct views firstly of Koeberg Power Station and beyond. From the R27 and the N7 intervening elements such as trees, power lines and an undulating landform assist to obscure views from these roads. The landscape character is also industrial in nature.

Therefore, in conclusion, the site which is the least visually sensitive is Koeberg.

Further the preliminary assessment of the 5 sites indicates, in terms of their visual sensitivity to accommodate a proposed Nuclear Power Station and the ancillary structures (the water intake harbour and the lighting) that:

- the visual impact will be high, because of the large scale and form of the structure;
- the visual impact will be significant for all sites, except Koeberg, because the sense of place will be irreversibly changed;
- the character of all the sites will be altered irreversibly; and
- that the overall visual impact on the site and immediate surroundings within a 5 km radius will be negative to a degree to which it is considered to be significant.