APPENDIX J
VISUAL IMPACT ASSESSMENT

DRAFT VISUAL SCOPING REPORT FOR THE CONSTRUCTION OF THE OMEGA ELECTRICAL SUBSTATION CAPE WEST COAST

Prepared for

Eyethu Engineers
Overport

Prepared by

CNdV africa
environmental planning landscape architecture urban design

October 2004

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EXECUTIVE SUMMARY.

This report examines the potential visual issues that are expected to influence the construction of a new 765kV electrical substation on one of three sites on the farm Groot Oliphantskop, 6 kilometers southeast of the Koeberg Nuclear power station on the Cape West Coast.

The design of the substation is as yet not at a very advanced stage because its design will have to be site specific and will also be influenced by considerations of the findings of the environmental impact assessment process of which this visual scoping report forms part. Issues defined in this report are therefore of a general nature and may need to be revisited once the final site has been established and the design is at a sufficiently advanced stage to enable the 3 dimensional modelling and analysis of the site based on design specific data.

The substation will be very large possibly covering up to a total of up to 150 Ha. and will contain structures that may be up to 45m in height (50ha for the actual substation and a larger fenced area). The establishment of such a large platform will entail large-scale earth works and a reforming of a large area of land. This means that the substation could have a considerable visual impact on the surrounding terrain. (Addendum 1 contains some photographs that may help in visualising the scale of the proposed substation.)

The area on which the three potential sites are situated is part of an agricultural landscape used mainly for the growing of wheat. There are few specific tourist based activities in the area but the N7 highway and the R27 Coastal Road both carry heavy tourist traffic at certain times of the year, and there may be significant views of the substation from these and the other surrounding roads. The sites are also readily visible from the Atlantis railway line.

The potential visibility of the substation on each of the three sites has been analysed within the limits of the present knowledge of the size and layout of the station. Summaries of the visibility analysis can be found in figures 3, 4 and 5 in the document.

Although not always part of a scoping document, various generic mitigation strategies have been included in the report because it is felt that they need to be taken into consideration during the design phase, and may include financial implications that would best be revealed early on in the planning process.

The conclusion includes a preliminary rating of the three sites from a visual impact perspective.

1. INTRODUCTION

1.1 SCOPE OF WORK

The scope of work included in this specialist scoping report is to:

- Describe the existing visual characteristics of the proposed sites and their environs.
- Determine the area from which the proposed substation will be visible.
- Determine any potential visual impacts.
- Propose possible mitigation measures.

1.2 ASSUMPTIONS AND LIMITATIONS

The information contained in this report has been obtained from various sources:

- The original environmental assessment dated November 1996 by Ninham Shand.
- A site visit with an Eskom team.
- Conversations and communications with various Eskom officials related to the project.

The planning for the project is still not sufficiently advanced at this stage for there to have been a decision on the final siting of the substation, or the development of a final layout plan. This means that as yet it is not known precisely where the substation will be built, or exactly what it will look like. Addendum 1 contains photographs of the yard at the 765kV substation being built at Hydra that will give an impression of the way the Omega Substation will possibly look. Unfortunately no photographs were available that showed the substation from a distance.

1.3 METHODOLOGY

The following sequence was employed in this Visual Scoping Report:

- A desktop survey was made using 1:50 000 trigonometrical survey maps, 1:250 000 geological survey maps and 1:10 000 aerial photographs. These were used to identify landforms and landscape patterns, as well as to determine the viewshed.
- An extensive photographic survey of the site and surrounding areas was conducted which determined the visibility of the proposed substation from various viewpoints.
- Potential visual impacts were identified using standard criteria such as geographic viewsheds and viewing distances, as well as qualitative criteria such as importance to tourism and compatibility with the existing landscape.
- Possible mitigation measures were identified.

1.3 KEY ISSUES

Some of the issues relating to visual concerns arising from the construction of the substation are:

- The large area covered by the proposed substation.
- The anticipated height of the structures.
- The visibility of the substation from surrounding roads, including the N7 tourist route.
- Possible interference with any of the gateway views of Table Mountain when approaching Cape Town from the north.
- The visual impact on surrounding farms
- The potential impact on the nature conservation areas along the coast
- The visual impact from the new power lines entering and leaving the substation
- The potential negative visual impact during the construction phase.
- Possible mitigation measures to reduce the impacts.

2. PROJECT OVERVIEW

2.1 PROJECT HISTORY

The need for additional electricity supply to the Western Cape has been growing steadily over the last few years and is expected to continue growing into the future. The present electricity supply system is near the end of its being able to meet demand unless it is upgraded and extended.

The construction of the proposed Omega substation on the west coast is seen as essential to the continued stable supply of electricity for Cape Town and the surrounding areas into the future.

The purpose of the substation will be to:

- Act as a switching station for the existing lines in the area, including those from Koeberg nuclear power station, Muldersvlei and Acacia Park.

- Act as a termination point for the new 765kV lines from Mpumalanga from which additional power can be fed into the Southern and Western Cape regions.

The fact that the substation will need to act as a switching station for several lines means that it needs to be situated near the convergence of those lines, i.e. in the West Coast area.

An environmental impact assessment was completed in 1996 by Ninham Shand in which five possible sites were investigated in terms of their suitability from both a technical and an environmental point of view.

Three of these sites fall on the farm Groot Oliphantskop which straddles the Old Mamre Road north of the M19 near Melkbosstrand, one lies immediately adjacent to the Koeberg nuclear power station, and the last lies to the west of the N7 just north of the M19.

The findings of the report were that the site adjacent to the N7 was unsuitable, part of the reason being that it would form a visual barrier to the gateway views of Table Mountain when travelling south towards Cape Town on the N7.

At the time of writing the previous environmental impact assessment, the plan was to construct an indoor gas insulated substation that would be impervious to the effects of the environment. Due mainly to cost and technical constraints, the construction of this type of substation is no longer considered viable for the Omega substation and the plan is now to construct a low level outdoor station with a tubular bus bar arrangement. The one disadvantage of this is that the corrosive power of the salt content of the wind close to the ocean on external steel structures means that the Koeberg site is no longer a viable alternative for the substation.

This means that one of the three sites on the farm Oliphantskop is likely to be the final site. It is these three sites that are the subject of this report.

2.2 DESCRIPTION OF THE PROPOSED SUBSTATION

The entire project will require a site of approximately 120-150 Ha. this area being enclosed by three 4m high fences.

A level or stepped platform of between 60 -100 Ha. Will be created within a buffer zone inside the fence. On the outskirts of this area will be several terminal gantries which are the termination points for the various sets of lines entering or leaving the substation. These structures will be approximately 45m tall.

The greater area of the platform will be taken up by the bus bar structures which will be up to a maximum of 27m in height, and other equipment and equipment buildings that will be approximately 13m in height. This includes a number of fire safety walls.

Approaching the site from the northwest will be the 400kV lines from the Koeberg power station. The new 765kV lines from Mpumalanga will approach from the northeast.

Leaving the site towards the southeast will be the lines to Muldersvlei and Acacia Park.

As the Koeberg, Acacia Park and Muldersvlei lines already exist in the area, the final siting of the substation will entail the realignment of these lines so that they all converge on the substation.

The exact location of the final section of the new 765kV lines will also be determined in part by the siting of the substation.

3. DESCRIPTION OF THE SURROUNDING ENVIRONMENT

3.1 GENERAL DESCRIPTION

The farm Groot Oliphantskop and its surrounding terrain is one of gently sloping hills covered in wheat fields.

There are a few hills that stand out above the rest. Koeberg, to the east of the site and the N7 highway rises to 376 meters and is the tallest of these. Oliphantskop is on the farm itself and lies immediately adjacent to two of the possible sites for the substation. It rises to 240 meters.

From Oliphantskop the land slopes gently towards the sea in the west with Koeberg Nuclear power station being to the northwest, Duinefontein and Van Riebeeckstrand to the west, and the rest of Melkbosstrand and Atlantic Beach Golf Estate to the southwest. The sea is approximately 8 kilometers from the farm at its closest.

As the land nears the sea the terrain becomes more sandy until it is given over to sand dunes, the Koeberg Nature Reserve to the north of the power station being a dune reserve.

From the M19, running due north through the farm is the old Mamre Road with its historic lines of gum trees. Approximately 13 kilometers north of the site this road passes through Atlantis before going through Mamre and on to Darling.

The Atlantis railway line lies immediately to the west of the Old Mamre Road through Groot Oliphantskop Farm before turning more to the west just north of the farm

East of the farm, at a minimum distance of approximately 2.5 kilometers, the N7 between Cape Town and Malmesbury runs in a north south direction. This road is heavily used for cargo haulage and tourism to the Northern Cape and Namibia.

To the south of the site there is also a wheat farming area, however Cape Town is spreading in this direction and the area up to the M19 just south of the farm is planned for housing development in the long term.

Crossing the landscape and the farm from northwest to southeast are the existing power lines from Koeberg to Muldersvlei and Acacia Park.

There are no major rivers in the area but the land contains several watercourses most of which are perennial.

A characteristic of the landscape is the presence of several stands of mature trees, mostly pines or gum trees, which stand out above the wheat fields and line some of the roads.

3.2 VISUAL SIGNIFICANCE OF THE LANDSCAPE

The area immediately surrounding the farm Groot Oliphantskop is essentially agricultural with little in the way of tourist attractions or natural features. The N7 does however carry tourists to Namibia and the Northern Cape, and the R27 along the Coast carries tourist traffic to Langebaan and the tourist and fishing hamlets beyond Saldanha Bay. The peak tourist season for these roads is during the spring Namakwaland flower season.

The views of Table Mountain when approaching Cape Town along the N7 are considered important from the point of view of tourism with any interruption of these views being considered in a negative light.

The Old Mamre Road is of historical significance because of the lines of gum trees on either side that create a very specific atmosphere. From a cultural and historical point of view it is important that these trees be retained where possible.

Clusters of farm buildings dot the landscape and some, for example the farmstead and surrounding buildings on Groot Oliphantskop Farm, could be of historical interest.

4. POTENTIAL VISUAL IMPACTS AND ISSUES

4.1 VISIBILITY OF THE PROPOSED DEVELOPMENT

As the siting of the substation has not been finalised, this report analyses the three potential sites on the Groot Oliphantskop farm.

Because of the lack of final design data all analysis has had to be tentative although no major changes to the visibility analysis presented here are anticipated.

4.1.1 THE NORTH EAST SITE

See Figure 8 in the main body of the Draft Scoping Report.

This portion of the farm is northwest facing and ranges in height between approximately 80 and 120m above mean sea level. Oliphantskop is to the east of the proposed site, and the old Mamre Road to the West. An adjacent farm lies to the north, and to the south is the lower part of Groot Oliphantskop.

Visibility from the N7 highway

- From due west the site should be hidden by Oliphantskop. Viewing distance approximately 3 kilometers.

- From South of the site – viewed mostly by those travelling north, the substation is unlikely to be seen, although perhaps the south western corner will be partially visible from a distance of more than 6 kilometers.

- From north of the site – viewed mostly by those travelling south, partial views will be possible from north of the Uitkyk Farm turnoff. Viewing distance in excess of 3.5 kilometers.

Visibility from the M19 - from N7 to Melkbosstrand

- From N7 turnoff to Mamre Road turnoff, when travelling in both directions, Oliphantskop will probably block the visibility.

- Mamre Road turnoff - partial views of the substation will be seen when looking north. Viewing distance 1.5 kilometers.

- Mamre Road turnoff to Melkbosstrand – there will be partial views in places when looking north and northeast. Visual impact more significant for those travelling east towards the N7. Views may be partially mitigated by trees along the old Mamre Road and also along the M19. Viewing distance 2 – 5 kilometers.

Visibility from the Old Mamre Road - from the M19 to Atlantis

- The substation will be fully visible to the north for approximately 1 kilometer when approaching the site from the M19. The views of those travelling north towards Atlantis will be mostly affected.

- The road will pass directly to the west of the site for approximately 1 kilometer. The view will be greatly influenced by the height of the fill needed to create the

platform as the road passes the lowest point of the site. Views of those travelling in both directions will be affected.

- From north of the site there will be partial intermittent views from the road for approximately 6 kilometers. The visual impact will affect mainly those travelling south towards the M19.

Visibility from the M304 - from the Old Mamre Road to the N7

- There could be partial intermittent views of the higher parts of the substation along this stretch of road when travelling in both directions. Viewing distance approximately 5.5 kilometers.

Visibility from the Coastal Road – The R27 to Langebaan and Surrounding Areas

- The substation may be seen partially and intermittently along this road at a distance in excess of 5.5 kilometers.

4.1.2 THE NORTH WEST SITE

See Figure 10 in the main body of the Draft Scoping Report.

This portion of the farm is predominantly southwest facing and ranges in height between 40 and 80 meters above mean sea level. The existing power lines from Koeberg power station cross the farm just north of the proposed site and the Old Mamre Road lies to the east across some adjacent farmland. The M19 lies to the south across some farmland and the west is also bounded by an adjacent farm.

Visibility from the N7 highway

- From due west the site will be hidden by Oliphantskop. Distance to highway approximately 4 kilometers.

- From southeast of the site – viewed mostly by those travelling north there will be Intermittent and partial views from a distance of more than 4.5 kilometers.

- From northeast of the site – Viewed mostly by those travelling south, partial views are possible from north of the Uitkyk turnoff. Viewing distance more than 4.5 kilometers.

Visibility from the M19 - from N7 to Melkbosstrand

- From the N7 turnoff to the Mamre Road turnoff there will be partial but significant views at a distance of between 1.4 and 5.5 kilometers. Those travelling east will be affected more. The Old Mamre Road trees will partially mitigate this view.

- West of the Mamre Road turnoff the Substation will be seen clearly when looking north from this road at a distance of between 1,3 and 4.5 kilometers. Those travelling west will be more affect.

Visibility from the Old Mamre Road - from the M19 to Atlantis

- From the M19 turnoff to east of the site the substation will be in full view to those travelling in both directions and looking west. The distances range from between 200 meters to 1.8 kilometers.

- From east of the site northwards the substation will be in full view to those travelling south and looking west. There could be a partial mitigation of views because of the existing tree lines. The viewing distance will be 200m to in excess of 6 kilometers.

Visibility form the M304 - from the Old Mamre Road to the N7

- It is unlikely that the substation will be visible from this road although the may fleeting views to those looking south at a viewing distance in excess of 6 kilometers

Visibility from the Coastal Road – The R27 to Langebaan and Surrounding Areas

- The substation may be seen partially and intermittently at a distance in excess of 4.0 kilometers. Local topography and vegetation along the road is expected to mitigate these views.

4.1.3 THE SOUTH EAST SITE

See Figure 9 in the main body of the Draft Scoping Report.

This portion of the farm is predominantly south facing and ranges in height between 95 and 130 meters above mean sea level. The site is bounded by the Old Mamre road to the west, the M19 to the south, Oliphantskop lies to the north, and adjacent farmlands to the east.

Visibility from the N7 highway

- The site is clearly visible from the N7 from a long distance south of the site to approximately 3.4 kilometers north of the site at the Uitkyk Farm turnoff. The views will influence both those travelling north towards Malmesbury and south towards Cape Town when looking towards the sea, (west.) The gateway view of Table Mountain when travelling south will not be directly influenced.

- To the north of the Uitkyk Farm turnoff the site should not be visible because Oliphantskop should hide it.

Visibility from the M19 - from N7 to Melkbosstrand

- The site will be directly visible to those travelling in both directions along the road when looking north. For several hundred meters the site will be almost adjacent to the road across the Atlantis railway line. The viewing distance will be 200m and further.

- When adjacent to the site the fill platform may create the greatest visual impact as it will run parallel to the road and above it.

Visibility from the Old Mamre Road - from the M19 to Atlantis

- The site will once again be adjacent to the Old Mamre road for up to 1 kilometer from the turnoff from the M19.

- When adjacent to the site the fill platform may create the greatest visual impact.

- Approaching the substation from the north on the Old Mamre Road the greatest impact will be caused by the site slowly losing the visual shielding of Oliphantskop the closer one gets to the site.

- The existing trees could help to mitigate some of the visual impact from the road although the height of the fill adjacent to the road will determine this.

Visibility from the M304 - from the Old Mamre Road to the N7

- It is unlikely that the site will be visible at all from this road because of the position of Oliphantskop although partial views may exist.

Visibility from the Coastal Road – The R27 to Langebaan and Surrounding Areas

- There may be partial intermittent views at a distance in excess of 5.5 kilometers. Local topography and vegetation along the road should serve as a mitigating factor.

4.1.4 VISIBILITY FROM SURROUNDING FARMS

It is probable that some of the surrounding farmsteads will have views that will be impacted on by the substation. It is beyond the scope of this report to specifically identify these, but once the planning is at an advanced enough stage, these identified views could become the subject of possible mitigation measures. See Section 5.

4.1.5 VISIBILITY FROM THE ATLANTIS RAILWAY LINE

As with the Old Mamre Road, the railway line will run directly alongside each of the three sites for approximately one kilometer. Views from both north and south of the sites are also possible.

Views from the south of the northeast site will be limited and made partial by Oliphantskop, as will views from the north for the northeast site.

Views from both the north and the south will be open to the southwest site.

Views of both the northeast site and the southeast site may be partially mitigated by the existing tree lines, but very little mitigation exists for the southwest site.

4.1.6 VISIBILITY FROM NATURE CONSERVATION AREAS

Two nature conservation areas, the Koeberg Nature Reserve and the Blouberg Nature Reserve, fall within the potential viewshed of the proposed substation.

All views from the Blouberg Nature reserve are expected to be blocked by Blouberg which stands directly between the site and the nature reserve. No visual impact on the reserve is therefore expected

Koeberg Nature Reserve lies along the coast to the north of the Koeberg power station. There may be partial views of the proposed substation from higher lying areas within the reserve but these views will be from a distance in excess of eight kilometers and are not expected to impact significantly on the experience of the reserve.

4.2 POTENTIAL VISUAL IMPACTS

All potential visual impacts will be listed in a generic manner even though some impacts will be more applicable to one site than another. Without more exact data concerning the size, layout and density of the structures, as well as details of the form of the platform and its levels, a more in-depth analysis of the visual impacts is impossible.

The following visual impacts are anticipated:

- The influence on the rural/agricultural nature of the landscape.
- The presence of large machinery and a construction camp during the construction period. (Up to three years.)
- Dust created during construction.
- The cut-and-fill slopes needed to create the building platform.
- The potential destruction of existing vegetation, (trees) for both the substation and the realignment of the existing power lines. (This is especially true for the creation of a servitude for the 765kV line across the Old Mamre Road should the southwestern site be chosen.)
- The visual influence of the power lines converging on the substation, especially the new 765kV lines.
- The visual effect of the structures themselves.
- The fencing around the site and other security measures.
- The entrance and maintenance road/roads.
- The effect on views to and from the Groot Oliphantskop farmhouse especially should this prove to be of historical significance, (especially for the northeastern site.)
- The visual effect on the changing of the watercourses, (especially for the northwestern site.)
- The visual effect of the treatment of the remainder of the farm external to the chosen site.
- The effect of security and other lighting on the nocturnal landscape.
- The effect on the views from the surrounding farmsteads.
- The potential visual impact on the conservation areas along the coast.

4.3 “NO GO” AREAS

Based on the present available information, no specific ‘no-go’ areas have been identified for any of the three sites.

It must be stressed, however, that, although it is unlikely, further locality and design planning, as well as the implementation strategies for the design, may lead to the possibility of ’no-go’ areas being identified in the future.

5. MITIGATION MEASURES THAT SHOULD BE CONSIDERED

The role of mitigation will be critical in finding design solution that will be visually acceptable both during construction and implementation.

It is important that potential mitigation measures be taken into account during the design phase so that adequate planning can be done for their implementation, and that any potential economic implications can be examined and evaluated early in the design process.

Because of the present state of planning the following list of potential mitigation measures are once again generic in nature and not exhaustive in scope. These will have to be fleshed out and added to once sufficient design data is available.

- Placing the structures in such a way as to maximise the buffer zone between the structures and the roads/railway line.

- The retention of as much existing vegetation as possible, specifically the existing mature trees in the area.

- The use of stepping in the building platform to minimise cut-and fill areas and the lowering of the structures into the site as much as possible.

- The sculpting of the cut and fill slopes to create a visually more natural building platform.

- The re-establishment of natural looking and functioning alternative watercourses where existing watercourses will be interrupted.

- The establishment of indigenous Fynbos on the cut-and-fill slopes.

- The establishment of indigenous Fynbos within the buffer zone inside the fences and on all potential open spaces between the components of the substation. This is subject to the necessary technical and safety considerations.

- The re-establishment of either Fynbos or some agricultural activity on the remaining farmland around the substation, depending on the proposed land use. i.e. the land must not just be allowed to lie fallow and become a breeding ground for invasive species.

- The establishment of climbing plants on sections of the perimeter fencing. This is subject to safety and security considerations. Such planting should be done with specific viewpoints in mind and be used to break the monolithic nature or soften the visual impact of the development from those specific viewpoints. These viewpoints will have to be identified once construction has begun and the exact nature of the visual impacts are established.

- The establishment of tree lines in strategic places both on the property and along ridgelines on adjacent properties. Once again these tree lines should be implemented with specific views in mind. i.e. many partial views from specific places along the N7 and other roads could be mitigated in this way and larger views of the substation could be broken up using this method. This would of course, require negotiations with the adjoining landowners but if views from their

own properties could be mitigated in this way, it should not be hard to demonstrate the validity of this technique.

- The planting of tree lines around the perimeter is not indicated because the height of the structures, (up to 45m,) will not be shielded by trees at close range, and because straight lines of trees along the perimeter will only serve to emphasis the unnatural shape of the substation.

- The rehabilitation and extension of the tree lines along the Old Mamre Road and the M19 could also be used as mitigation from various viewpoints.

- Steel components within the substation should not be painted but be galvanised and allowed to oxidise naturally over time. The grey produced in this process will help to reduce the visual impact.

- Those parts of the substation that require the protection of paint should be painted in colours chosen from a palette that is matched to the natural colours found in the surrounding landscape.

- All lighting, especially perimeter security lighting must be shielded to minimise light spillage and pollution. No direct light sources must be seen from outside the site.

- Signage should be simple and unobtrusive and not be seen anywhere against the skyline.

- A concerted effort should be made to reduce the height and scale of the structures, if at all possible.

6. CONCLUSION AND RECOMMENDATIONS

The need for a substation of this magnitude has been dictated by the continuing growth in the need for electricity in the Western and Southern Cape.

The siting of the substation has been dictated partly by the existence of previous infrastructure in the area, i.e. the existence of Koeberg Power Station and the proximity of the transmission lines, and partly by technical considerations.

It may well be possible to locate the substation elsewhere but economic factors and the fact that the existing lines would have to be relocated militate against this.

Each of the three sites on Groot Oliphantskop that have been examined in this report have their own specific visual impact issues that will have to be addressed.

It is the preliminary finding of this report is that the most unsuitable site for the substation from a visual perspective will be the **Southeast site**. This is because of its proximity to the N7 and M19 and the fact that a considerable amount of Oliphantskop would need to be excavated to make place for the platform. It also rises higher than the other two sites and the 765kV lines may have to cross over the top of Oliphantskop to reach the substation causing a visual impact that would be difficult to mitigate.

The **Northwest site** may have the least visual impact in terms of the area from which the substation will be visible, but the need to create a servitude for the 765kV lines across the old Mamre Road will mean the removal of part of the historic tree lines along the road, and the existing watercourses that cross this section of the farm would be seriously impacted. The 765kV lines would need to cross the northeast site to reach the substation and so many of the visual impacts related to the use of the northeast site would be encountered in addition to the impacts that are specific to the northwest site

The **Northeast site**, being higher than the northwest site has the potential to be seen over a larger area, but the possibilities for mitigation on this site seem to be better than on the other two sites. The old Groot Oliphantskop farmhouse will however be seriously impacted by development on this site.

A detailed visual analysis will have to be undertaken once the final form and location of the substation has been decided so as to determine the nature and positioning of the various mitigation elements and development a long term visual mitigation strategy.

ADDENDUM 1
Photographs of the 765kV Yard Being Constructed at Hydra

Note:

Although photographs from external to the site were not available, these pictures give an idea of the size of the various components of the substation. Note the humans in some of them to get a sense of scale. None of the components pictured here approach the 45m that may be used for the terminal gantries at Omega.

Photographs of the 765kV yard being constructed at Hydra substation