Eskom Holdings SOC Limited

PROPOSED SALDANHA BAY NETWORK STRENGTHENING PROJECT, WESTERN CAPE PROVINCE

VISUAL IMPACT ASSESSMENT REPORT

AUGUST 2016

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1 INTRODUCTION

1.1 GENERAL

This Visual Impact Assessment report (VIAr) forms part of the Scoping and Environmental Impact Assessment that is being undertaken for the proposed Saldanha Bay Network Strengthening Project by Savannah Environmental (Pty) Ltd on behalf of Eskom Holdings SOC Limited.

This VIAr has been prepared for inclusion in the project EIA report following the approval of the Scoping report.

In terms of the amended National Environmental Management Act (NEMA) Act No. 107 of 1998, the proposed development requires environmental authorisation. A key impact to be assessed comprises the visual impact that the facility will have on surrounding areas.

The site investigation was undertaken in August 2016. The key issue regarding the timing of the site investigation is that it is undertaken during a period of clear weather. This enables key landscape features to be identified more easily over the greatest distance and for the assessor to consider the project under the worst case conditions in terms of likely maximum impact.

1.2 PROJECT BACKGROUND

Eskom Holdings SOC Ltd (to be referred to as Eskom hereafter) is proposing the Saldanha Bay Network Strengthening Project which involves the proposed construction of a new Distribution substation (Dx), Transmission substation (Tx), 2X 400kV Power Lines and associated upgrade and extension of the Aurora Substation. The proposed Saldanha Bay Network Strengthening Project is located in the Saldanha Bay area, approximately 130km north west of Cape Town, in the Western Cape Province. The closest towns to the study area are Saldanha Bay, Langebaan and Vredenburg.

1.3 PROJECT LOCATION

The proposed infrastructure will be developed between the existing Aurora and Blouwater Substations.

The Blouwater Substation is located approximately 1.6km east of ArcelorMittal South Africa, Saldanha Works (ArcelorMittal) which is approximately 7km to the east north east of Saldanha.

The existing Aurora Substation is located approximately 20km east of ArcelorMittal.

The general study area is indicated on **Map 1, Project Location**. This map indicates the Study Area which is the area within which all the elements of the project are located.

1.3 BACKGROUND OF SPECIALIST

Jon Marshall qualified as a Landscape Architect in 1978. He is also a certified Environmental Impact Assessment Practitioner of South Africa. He has been involved in Visual Impact Assessment over a period of approximately 30 years. He has developed the necessary computer skills to prepare viewshed analysis and three dimensional

modelling to illustrate impact assessments. He has undertaken visual impact assessments for major buildings, mining projects, industrial development, and infrastructure and has been involved in the preparation of visual guidelines for large scale developments.

A brief Curriculum Vitae outlining relevant projects is included as **Appendix I.**

1.4 BRIEF AND RELEVANT GUIDELINES

The brief is to assess the visual impact that the facility will have on surrounding areas.

Work was undertaken in accordance with the following guideline documents;

a. The Government of the Western Cape Guideline for Involving Visual and Aesthetic Specialists in EIA Processes (Western Cape Guideline), which is the only local relevant guideline, setting various levels of assessment subject to the nature of the proposed development and surrounding landscape, and

b. The Landscape Institute and Institute of Environmental Management and Assessment (UK) Guidelines for Landscape and Visual Impact Assessment which provides detail of international best practice (UK Guidelines).

Refer to **Appendix II** for the Western Cape Guideline.

Together these documents provide a basis for the level and approach of a VIA as well as the necessary tools for assessment and making an assessment legible to stakeholders.

1.5 ISSUES IDENTIFIED AT THE SCOPING STAGE

The following issues were identified during the scoping phase of the project:

a) The visibility of the facility to, and potential visual impact on farmsteads that have been identified as potentially being impacted.
b) The visibility of the facility to, and potential visual impact on sections of the R27, R45, R399 and local roads that have been identified as potentially being impacted.
c) The visibility of the facility to, and potential visual impact the towns of Langebaan, Saldanha and Vredenburg that have been identified as potentially being impacted.
d) The visibility of the facility to, and potential visual impact on the West Coast National Park, the Elandsfontein Private Nature Reserve and areas of high natural scenic quality.
e) The visibility of the facility to, and potential visual impact on the coastal strip and particularly areas that are important for tourism and recreational use.
f) The possible impact of lighting associated with the project.

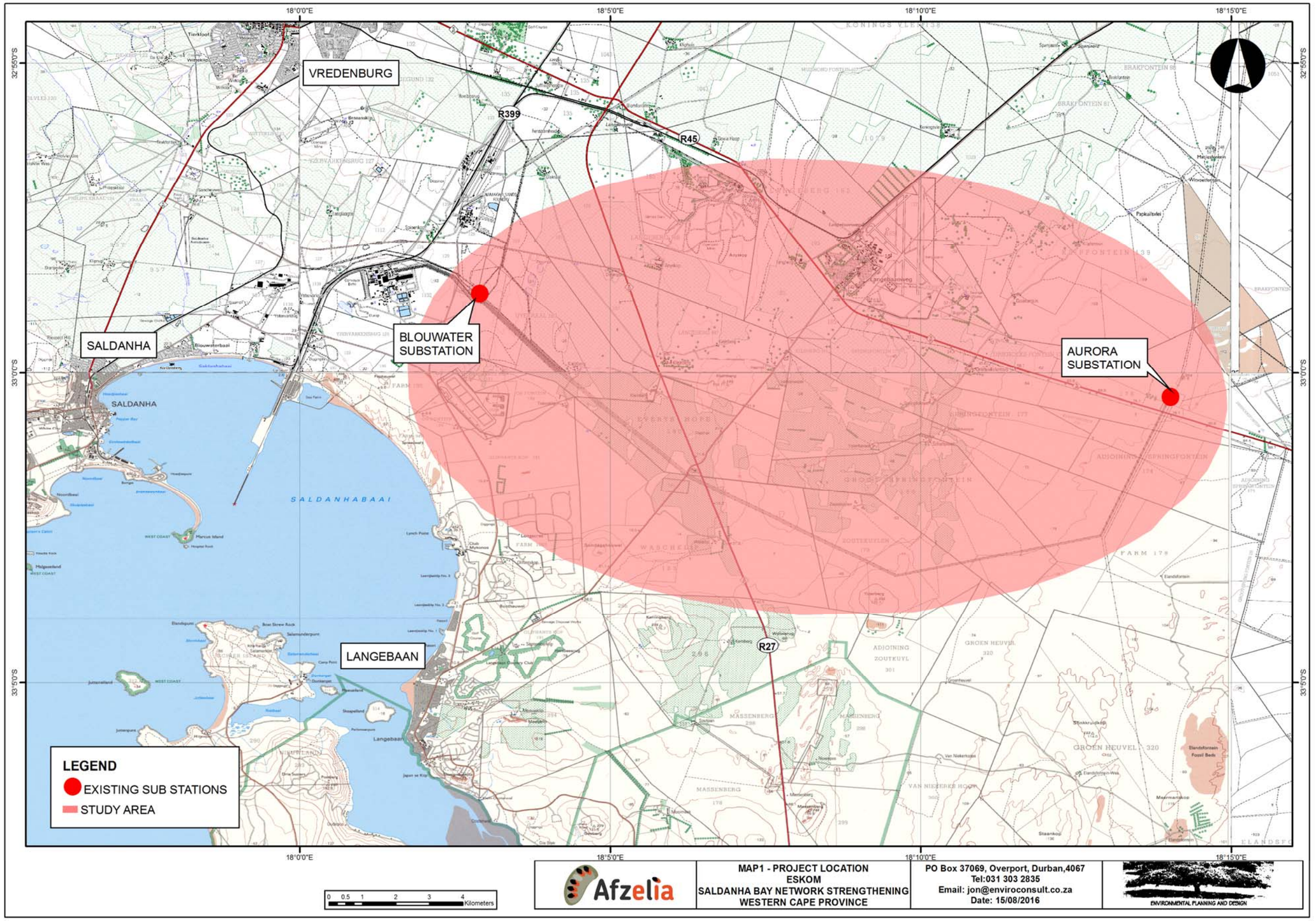
These issues will be considered in the context of the Landscape Character Areas, visual effects identified and possible cumulative influence of other possible infrastructure projects that are planned in the vicinity.

Possible mitigation measures will also be identified.

1.6 MAPPING AND REPORT STRUCTURE

Maps referred to in each section of the report are included at the end of each section unless referenced as an appendix.

MAP 1, SITE LOCATION



2. PROJECT DESCRIPTION

2.1 PROJECT MOTIVATION

Eskom Holdings SOC Ltd is responsible for the provision of reliable and affordable power to its consumers in South Africa. Electricity from non-renewable sources cannot be stored and therefore must be used as it is generated. It is, therefore, required that electricity must be efficiently transmitted from the point of generation to the end user.

If Eskom is to meet its mandate and commitment to supply the ever-increasing needs of end-users, it has to plan, establish and expand its infrastructure of generation capacity and transmission power lines on an on-going basis. As part of the envisaged developments in the Saldanha Bay area, Eskom has been prompted to re-assess the capability of the existing electricity network in the area in order to meet the forecasted load requirements from industrial customers, the Industrial Development Zone (IDZ), local distributors and also to facilitate the integration of renewable generation. Power to the Saldanha Bay area is supplied from Aurora Substation which is located 28km east of Saldanha Bay. Aurora Substation supplies Blouwater, ArcelorMittal South Africa, Saldanha Works and Smelter distribution Substations. From the load forecast for the area, it is evident that there will be a constraint at Aurora Substation in the next five year period. The projected new load of approximately 200 MVA that will be realised in the area together with the natural load growth will increase Aurora Substation demand from 517 MVA to approximately 890 MVA in year 2030. The firm capacity in the area will be exceeded in 2018 if the additional loads are to be supplied from Aurora Substation. The transformation capacity is also insufficient to evacuate all of the potential renewable generation planned in the area, amounting to 2 885 MW.

The purpose of the proposed project is to:

- Improve the reliability of the existing network within the Saldanha area
- Ensure that transmission capacity keeps up with both electricity generation capacity and electricity demand within the area
- Create additional Transmission network capacity to be able to supply the increasing electricity demand.

Technically feasible **alternative substation (Dx & Tx) positions and transmission power line alignments** have been identified for investigation within a broader study area during this EIA process.

2.2 PROJECT DESCRIPTION

As part of its capacity expansion and grid strengthening programme, Eskom is proposing the Saldanha Bay Network Strengthening Project, which includes the construction of a new Distribution substation (Dx), new Transmission substation (Tx), 2x 400kV Power Lines and associated upgrade and extension of the Aurora Substation.

The following elements are proposed;

a) Construction of a new 400/132kV Transmission Substation in the Saldanha Bay area with a planned capacity of 3 x 500 MVA transformers. The transmission substation footprint will be 600m x 600m. Three possible sites have been identified all of which are located in the vicinity of the Blouwater Substation (approx. 3km east) and adjacent to the R27 regional road that crosses the study area. The transmission substation footprint will be 600m x 600m.
b) Construction of a new 132/66/11kV Distribution Substation near the current Blouwater Substation in the Saldanha Bay area. The distribution substation footprint will be 160m x 300m. Three possible sites are being investigated within this EIA process, the identified sites are all located within 1km east of the existing Blouwater Substation with a foot print of 120m x 120m. The authorised substation will replace the existing Blouwater Substation which is planned to be decommissioned.
c) The construction of two 400kV power lines (approximately 35 - 40 km) from the Aurora Substation to the new proposed distribution and transmission substations. A servitude of 55m is required for each power line.
d) Three 132kV servitudes (31m each) are required to integrate the new 132/66/11kV substation into the proposed 400/132kV main transmission station.
e) 132kV and 66kV servitudes are required to integrate the high voltage lines into the new proposed 132/66/11kV substation.

Table 2 lists the typical components of a sub-station and their functions.

Table 2, Sub-station components and their functions

Equipment	Function
Transformers	To step-down or step-up voltage and transfer power from one current to another. The windings of such large transformers are immersed in transformer oil, which is a highly refined mineral oil that is stable at high temperatures and has excellent electrical insulating properties. Its functions are to insulate, suppress corona and arcing, and to serve as a coolant for transformers
Circuit breakers	Automatic switching during normal or abnormal conditions
Feeder bay	Steelwork housing for circuits
Reactors	Equipment for the efficient operation of long transmission power lines as they compensate the voltage on power lines to avoid uncontrolled voltage rise, especially on lightly loaded lines
Isolators	Equipment for de-energising a circuit for maintenance and repair
Busbars	Incoming and outgoing circuits of the same voltage tie into a common node called a busbar, which consists of a number of tubular conductors made of aluminium
Oil holding dams	For containment of accidental oil spills from transformers
Loop-in lines	Incoming power lines (connected to busbars)

Equipment	Function
Loop-out lines	Outgoing power lines (connected to busbars)
Telecommunication mast	Equipment used for remote communication with the sub-station
Buildings	Administrative office, control room, ablution blocks, equipment and storage areas
Lighting	For safety and security as well as for night-time emergency operations and maintenance

The main elements that are likely to contribute to visual impact include;

a **The transformers** are probably the most visually solid element within a sub-station. The entire structure including an oil reservoir is likely to be in the order of 8m high within the 400/132kV Transmission Substation and 4m high within the 132/66/11kV Distribution Substation.

b **The busbars** that carry the overhead cable between the proposed sub-stations and external power lines. Due to their number and height, these are likely to be the most obvious elements within the proposed substations. The highest bus bars will be associated with the 400kV connections within the 400/132kV Transmission Substation, these will be in the order of 22.5m high. Bus bars within the proposed 132/66/11kV Distribution Substation will be in the order of 15m high.

c. **Minor buildings** including ablutions, an office and staff rest room will be included within each substation. These will be single storey structures.

d. A **Communications Mast** is likely to be the tallest element within the proposed 400/132kV Transmission Substation. This element is likely to be in the order of 75m high

e. **Lighting,** two types of outdoor lighting will be installed within the proposed substations, Security lighting and floodlighting;

i. Security lighting will be installed on the perimeter fence of substations, illuminating the 10 meter area between the fences. The installation consists of a 60W LED luminaire installed on a 4m pole every 20 meters. The security lighting is only switched on in the event of a fence alarm or if maintenance is required.

ii. Floodlighting will be installed within the HV yard of the 400/132kV Transmission Substation. The lighting consists of 1000W HPS luminaires installed on masts approximately 36m high to give an average illumination of 10 lux within the HV yard. The lighting is only switched on when entering the HV yard. There is no indication of lighting frequency only on when people in the yard. It is possible that the site may not be permanently manned, although there may be permanent on-site security staff.

f. **Transmission Lines** including;

i. 2 x 400 kV transmission lines from the Aurora sub-station to tie into the proposed transmission and distribution sub-stations. These transmission lines will be in the order of 36m high.

ii. 132kV transmission lines to integrate the new 132/66/11kV substation into the proposed 400/132kV main transmission station. These transmission lines will be in the order of 28m high.

2.3 LAYOUT ALTERNATIVES

The extent of the study area and the selection of the alternative power line alignment and Substation positions gave consideration to aspects such as broad environmental impacts, social impacts, technical feasibility and cost. A number of technically viable and cost effective corridors and substation sites were identified **(refer to Maps 2 and 3**).

2.3.1 Alternative Substation Sites

Alternative substation sites identified by Eskom for investigation within a broader study area are based on technical criteria. The criteria used in selecting these alternative sites include, amongst others, the proximity to the load centre to achieve shorter power line lengths, access during construction and operation, as well as avoiding obvious environmentally sensitive features/areas.

Three Distributions substation (Dx) sites (Dx Site A, Dx Site B and Dx Site C) are being investigated within this EIA process, the identified sites are all located within 1km east of the existing Blouwater Substation with a foot print of 120m x 120m. The authorised substation will replace the existing Blouwater Substation.

Like the Dx substation **three** technically feasible sites for the **Transmission Substation (Tx)** is also being investigated as part of the EIA process (Tx Site A, Tx Site D and Tx Site F). All three sites are located in the vicinity of the Blouwater Substation (approx. 3km east) and adjacent to the R27 regional road that crosses the study area. The transmission substation footprint will be 600m x 600m.

2.3.2 Alternative Power Line Corridors

The following criteria were considered by Eskom in the identification of technically feasible corridors for 2x 400kV Power Lines:

- As far as possible, the number and magnitude of angles along the transmission lines should be minimised in order to allow the use of less expensive and visually less-intrusive tower types.
- Crossing over of existing major power lines should be avoided as far as possible as this increases the potential for technical incidents during operation.
- The alignment should cater for known topographical/terrain constraints of the tower types to be used, and soil conditions for the foundations in terms of geotechnical suitability and costs.
- The proposed alignment should provide for the need of appropriate access roads to the servitude and tower positions for both construction and maintenance/operation phases.
- Care should be taken to avoid the following as far as tower positioning and access road construction are concerned:
  - extensive rock outcrops;

    - rugged terrain
    - active clay soil, vleis and floodplains;
    - potential unstable side-slope terrain; and
    - eroded and unstable areas.
- Other issues which technically affect the location of a Transmission power line include:
    - agricultural lands, in particular those under irrigation
    - water bodies
    - crossing points with roads, rail and telecommunication lines at off-set angles less than 60°.
- The following obvious and observable environmental issues were taken into account:
    - human settlements and communities;
    - land use (where possible)
    - passing between water bodies (bird flight paths usually extend between water bodies)
    - ecologically sensitive areas
    - scenic areas with high visual/aesthetic quality and
    - untransformed indigenous vegetation.

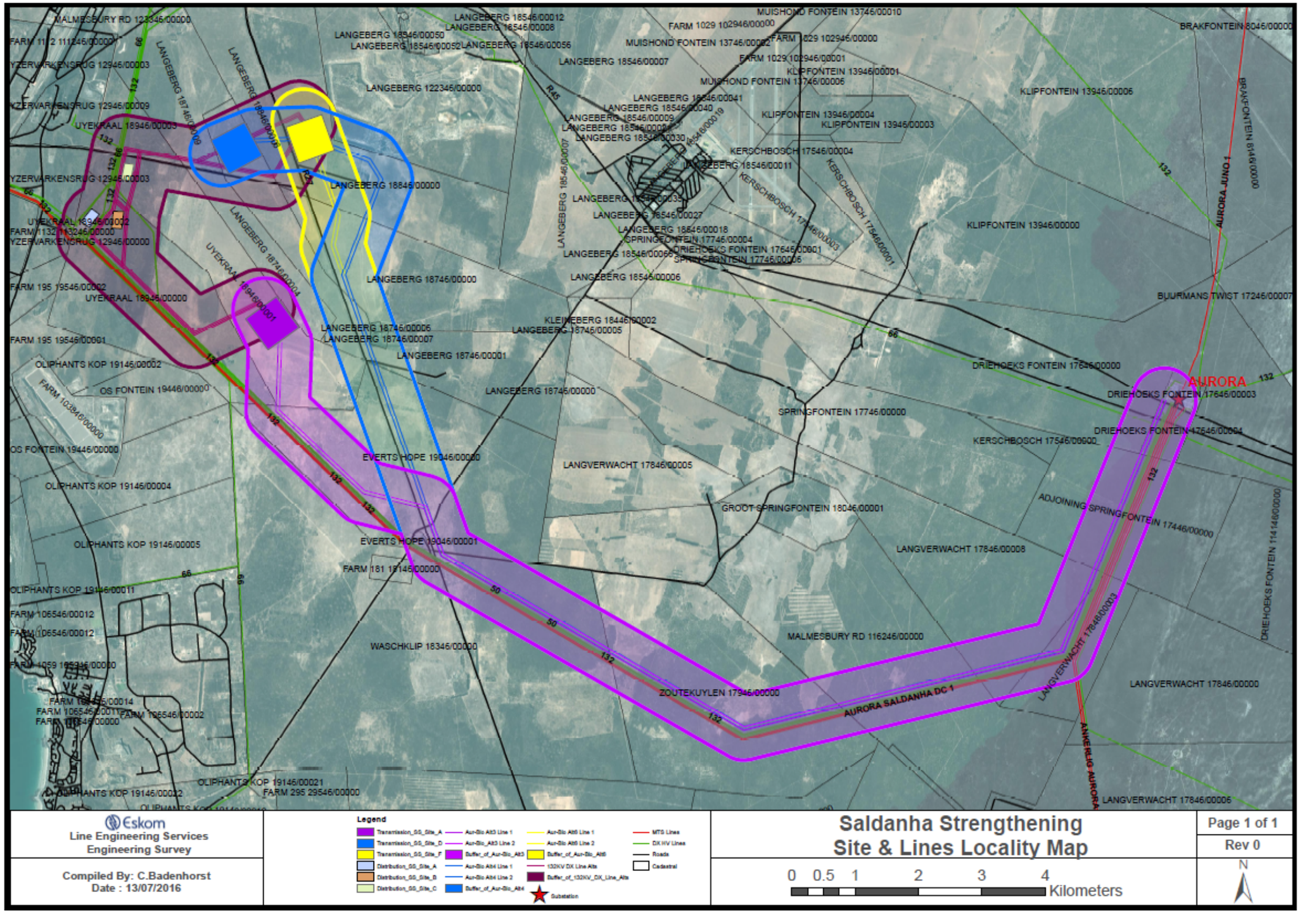
Three possible alignments have been identified for detailed investigation in the EIA:

Alternative 3 power line corridor is indicated as the purple line on Map 2. This route is approximately 22km in length and is proposed to exit from the existing Aurora Substation which is situated approximately 12km north west of the town of Hopefield, parallel to the existing Aurora/Blouwater 132kV power line. Where the existing power line crosses the R27 regional road, the proposed power line alignment deviates slightly from the existing line, running parallel to the R27 road for a stretch of 1km in order to avoid existing buildings, then follows the existing line to the proposed transmission substation Site A.

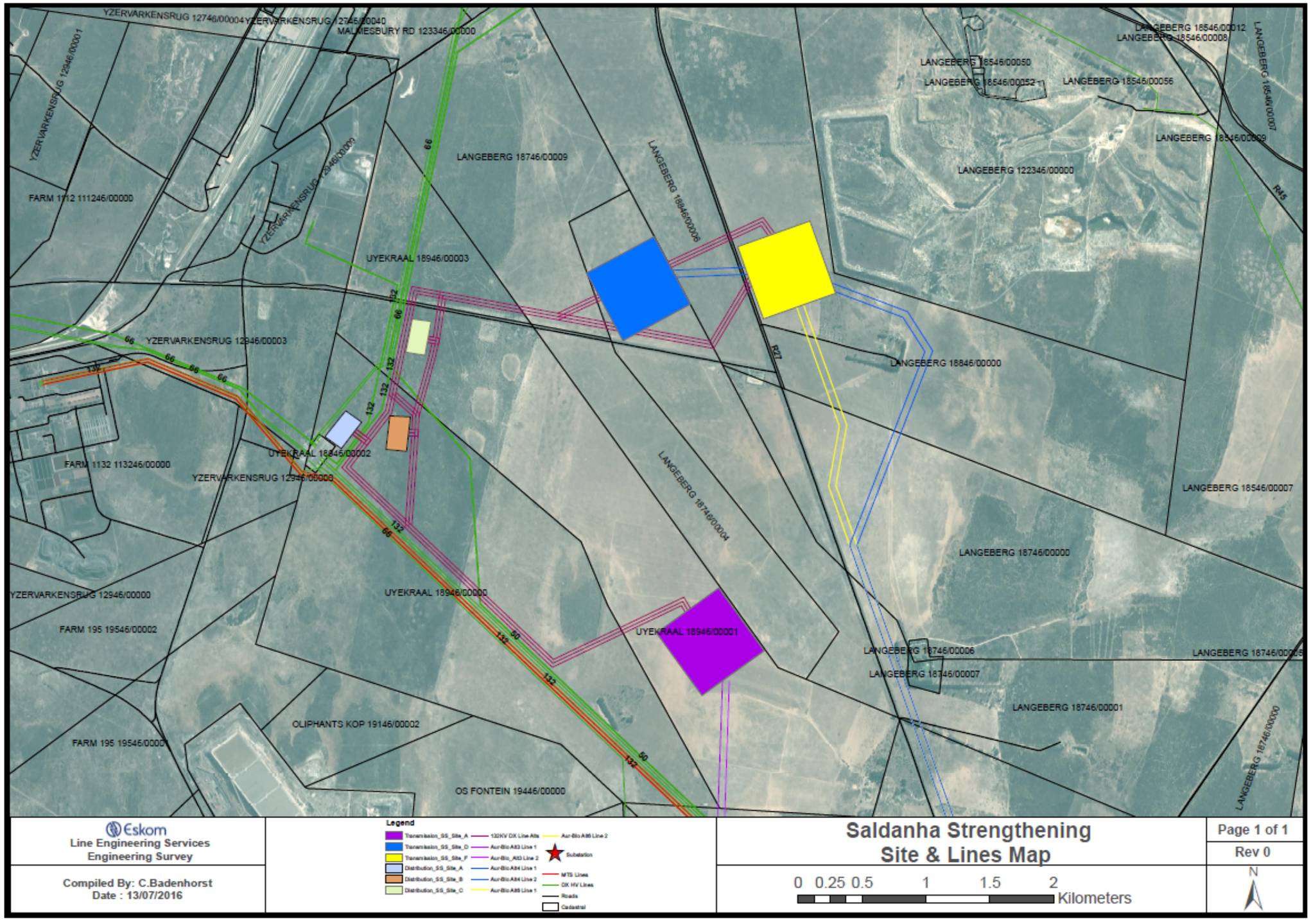
Alternative 4 power line corridor is indicated as the blue line on Map 2. This route is approximately 25km in length and is proposed to exit from the existing Aurora Substation which is situated approximately 12km north west of the town of Hopefield, parallel to the existing Aurora/Blouwater 132kV power line. Where the existing power line crosses the R27 regional road, the proposed power line alignment deviates, running parallel to the R27 road for a stretch of approximately 6km after which is changes direction to the north, then the north west and then the west for short distances before crossing the R27 to the proposed transmission substation Site D.

Alternative 6 power line corridor is indicated as the yellow line on Map 2. This route is approximately 25km in length and is proposed to exit from the existing Aurora Substation which is situated approximately 12km north west of the town of Hopefield, parallel to the existing Aurora/Blouwater 132kV power line. Where the existing power line crosses the R27 regional road, the proposed power line alignment deviates, running parallel to the R27 road for a stretch of approximately 7km to the proposed transmission substation Site F.

MAP 2, DX SUBSTATION SITES AND 400kV OVERHEAD POWER LINE ALTERNATIVES



MAP 3, TX & DX SUBSTATION SITES AND 132kV OVERHEAD POWER LINE ALTERNATIVES



3 DESCRIPTION OF RECEIVING ENVIRONMENT AND RECEPTORS

3.1 LANDSCAPE CHARACTER

Landscape character is defined as “a distinct, recognisable and consistent pattern of elements in the landscape that makes one landscape different from another”.

Landscape Character is a composite of a number of influencing factors including;

- Landform and drainage
- Nature and density of development
- Vegetation patterns

3.2.1 Landform and Drainage

The study area is comprised of the west coast coastal plain. It is generally flat with limited undulations and ridgelines.

The landform rises relatively rapidly from the coastline to 60 - 70m amsl which is maintained to the foot of more mountainous area approximately 70km inland.

The elevation does rise to approximately 150m amsl in the north around the town of Vredenburg and to the south of Langebaan.

The Berg River is the main drainage feature located towards the north of the study area. This river has cut a broad valley through the landform reducing levels in the vicinity of the river channel to below 10m amsl.

The extent of open, relatively flat land surrounding the proposed development could mean that the proposed development may be visible over an extensive area.

The depressed Berg River Valley and the more rugged land around Vredenburg and south of Langebaan are likely to be the only significant landform contribution to possible screening of the proposed development.

Map 4 indicates the landform and drainage of the study area.

3.2.2 Nature and Density of Development

Built development within the study area can be divided into the following;

- **Urban development** including the towns of Hopefield, Langebaan, Saldanha, Vredenburg, and Velddrift. These are relatively small rural towns with reasonably good infrastructure. Views of the broader landscape are probably only possible from the edges of urban development areas.

- **Agricultural development** in the study area is largely comprised of pasture for livestock production. This results in an open landscape within which the main elements that are likely to influence visibility of the proposed power line are the minor ridgelines located within the vicinity. Isolated farmsteads are located around the maize/wheat fields that include farmhouses, workers accommodation, storage and farm working areas. The farm houses and accommodation areas are often surrounded by trees that were possibly planted as wind breaks as well as for ornamental reasons.

- **Industrial Development** including oil storage, paper production and steel production have all been attracted to the area around the port of Saldanha Bay. The necessary infrastructure to supply power and support these heavy industries is also evident throughout the landscape.

Coastal areas to the west of the study area are also developed as tourist destinations. Mykonos, Langebaan and areas to the south particularly around the lagoon are tourism areas of possible national importance.

Two major conservation areas are located to the south east of the study area, these include;

- The West Coast National Park which is a formally protected area, and
- The Elandsfontein Private Nature Reserve which is a private nature reserve.

These areas are largely covered with natural Fynbos which produces a very open landscape.

Map 5 indicates the landcover of the study area.

3.2.3 Vegetation Patterns

The land cover type of the region is dominated by *shrubland and low fynbos*, homogenous in appearance and is typical of the arid Karoo biome. The low growth form and stunted appearance is directly attributable to the low rainfall (less than 300mm per annum) and semi-desert climate within the region. The National Botanical Institute differentiates between seven major Vegetation types within the study area. Whilst botanically these may be differentiable, from a broader landscape perspective they all have very similar characteristics in that they are characterised as low growing shrubland with little or no tall woody vegetation. This means that the natural vegetation of the area is generally not a limiting factor in terms of views and visibility.

The following vegetation types have modified areas of the natural vegetation cover

- Small plantations of alien invasive trees associated with small community settlements and farmsteads. In certain areas these invasive species have colonised areas that are not agriculturally productive such as boundary lines and adjacent to arterial roads (R45). Where they occur, these isolated patches of alien vegetation provide significant visual screening.

- Areas that have been cleared for agricultural use that generally consist of cultivated areas. This forms the largest type of vegetation cover within the study area.

- Patches of ornamental vegetation associated with farmsteads.

- Urban vegetation primarily consists of street trees and ornamental garden vegetation and this does plat a role in limiting the visibility of the proposed development.

Map 6 indicates the natural vegetation types of the study area that have been overlaid with cultivated areas. This indicates that the majority of natural vegetation

cover is located to the east of the study area with smaller pockets of natural vegetation to the centre and on the western edge.

3.2.4 Landscape Character Areas, Visual Absorption Capacity (VAC) and Significance

Landscape Character Areas (LCAs) are defined as “single unique areas which are the discrete geographical areas of a particular landscape type”.

The overriding character differentiating factors within the subject landscape appear to be landform /drainage and development.

These factors appear to divide the landscape into four discrete areas including;

a) **Urban areas**. These are generally inward looking drawing little character influence from external areas. It is unlikely that the proposed development will have much influence on these areas other than perhaps the edges of the urban areas that face onto sections of the proposed development.
b) **The Coastal Plain**. This area is relatively flat with generally short vegetation. This LCA is therefore unlikely to provide significant visual absorption capacity and the proposed development is likely to be highly visible. The visibility of the development may be slightly offset by the fact that there are numerous industrial elements that are obvious in the landscape including heavy industry and electrical and railway infrastructure.
c) **The Coastal Uplands** are a series of relatively minor hills that occur on the Coastal Plain to the south of Langebaan and north of Saldanha. These are important for two reasons;
    a. The landform provides opportunities for elevated views over the development from the section overlooking the Coastal Plain. The landform also screens views of the coastal plain from areas to the north and south.
    b. The protected areas of Elandsfontein Private Nature Reserve and the West Coast National Park are located on the upland area to the south of Langebaan. The extent of natural vegetation, undulating landform and views towards Langebaan and the Lagoon give this area a special sense of place
d) **The coastal strip**. This can be differentiated from the rest of the coastal plain due to its proximity to the sea and the fact that a large portion of the land use is tourism and recreation orientated. There are however also industrial elements present particularly orientated towards coastal activities such as oil and gas and fishing.
    The area immediately adjacent to the coast generally falls to the west towards the sea and is steeper than the remainder of the coastal plain. Because of this the general outlook is generally to the west over the sea although elements in the immediate hinterland to the east are also likely to sit prominently in the periphery of views. It is likely however that development inland will not be prominent from coastal areas due to the landform and a general focus towards the sea.

Images of the identified LCAs sourced from google earth are presented in Plates 1 to 4 inclusive. These Landscape Character Areas were ground truthed during the site visit.

See Map 7 for the Initial LCA Analysis.

3.3 VISUAL RECEPTORS

Visual Receptors are defined as “individuals and / or defined groups of people who have the potential to be affected by the proposal”.

It is also possible that an area might be sensitive due to an existing use. The nature of an outlook is generally more critical to areas that are associated with recreation, tourism and in areas where outlook is critical to land values.

3.3.1 Identified visual receptors

It is possible that a place might be sensitive due to an existing use. The nature of an outlook is generally more critical to areas that are associated with recreation, tourism and in areas where outlook is critical to land values.

This section is intended to highlight possible Receptors within the landscape which due to use could be sensitive to landscape change. They include;

- Area Receptors include;
  - Urban areas and particularly the edges of urban areas overlooking the proposed development area.
  - Protected areas including the West Coast National Park and the Elandsfontein Private Nature Reserve. These are important tourist attractions that are focused on the natural environment. Views of the surrounding natural landscape are therefore likely to be important.
  - Any other areas of the Coastal Strip LCA that have specific tourism related importance particularly around the town of Langebaan.
- Point Receptors that include;
  - Home / Farmsteads that are scattered throughout the area. It is likely that the focus for this area is agricultural production. Unless farms have diversified into the tourism market it is unlikely that this group of receptors will be overly sensitive to the likely landscape change as long as it does not impact on agricultural productivity.
- Linear Receptors or routes through the area that include
  - The R27 Coastal Route between Cape Town and Saldanha Bay which is a very important tourist route particularly during the spring when visitors travel the route specifically for the display of flowering plants.
  - The R45 which is the inland route between Cape Town and Saldanha. This route also carries a measure of tourism related traffic but is probably more important as a regional business route when compared to the R27.
  - The R399 which is the main route heading inland towards Calvinia. Like the R45 traffic using this route is likely to include a mixture of business and tourism related users.

- A number of tertiary roads that form links between the regional routes indicated above. These also are likely to carry a mixture of traffic. They are however likely to carry more local traffic than the other routes.

3.3.2 Likely significance of visual receptors

The significance of a change in a view for a visual receptor is likely to relate to use.

Uses such as guest houses, recreation and tourism related areas are likely to rely on the maintenance of an outlook for successfully attracting guests and users. Residential areas could depend on outlook for the enjoyment of the area by residents and for maintaining property values. A route that is particularly important for tourism may also be dependent on outlook for the maintenance of a suitable experience for users.

The assessment indicates;

- Views from the identified roads could be impacted by the proposed development. As these routes are likely to have a proportion of tourism related traffic, the affected sections of these roads could be sensitive to change.
- There are a number of small home / farmsteads that could be impacted by the proposed development.
- It is possible that the natural, protected areas to the south of the project area could be sensitive to change.
- Areas of the Coastal Strip LCA particularly those important for tourism and recreation are also likely to be sensitive to further industrialisation of the landscape. However, from the site visit it seems highly unlikely that the proposed development will impact on this area.

IDENTIFIED LANDSCAPE CHARACTER AREAS (LCAs)

URBAN LCA

COASTAL PLAIN LCA

COASTAL UPLAND LCA

COASTAL STRIP LCA

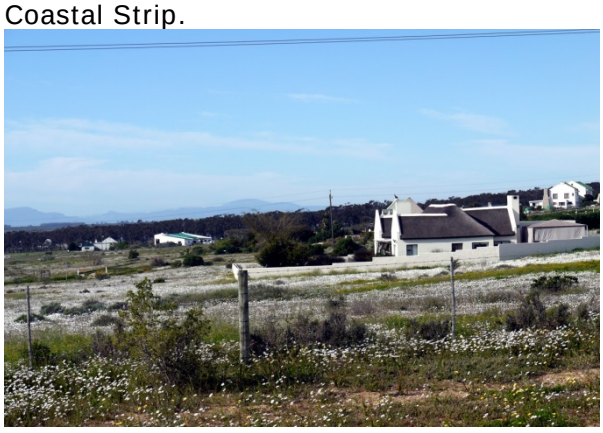
POSSIBLE SENSITIVE RECEPTORS

The West Coast National Park.

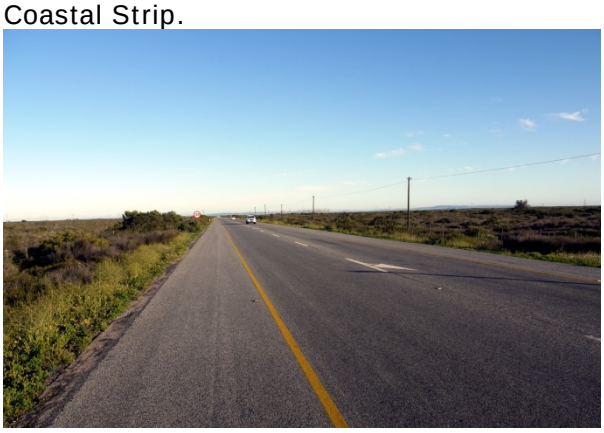
Homesteads.

Coastal Strip.

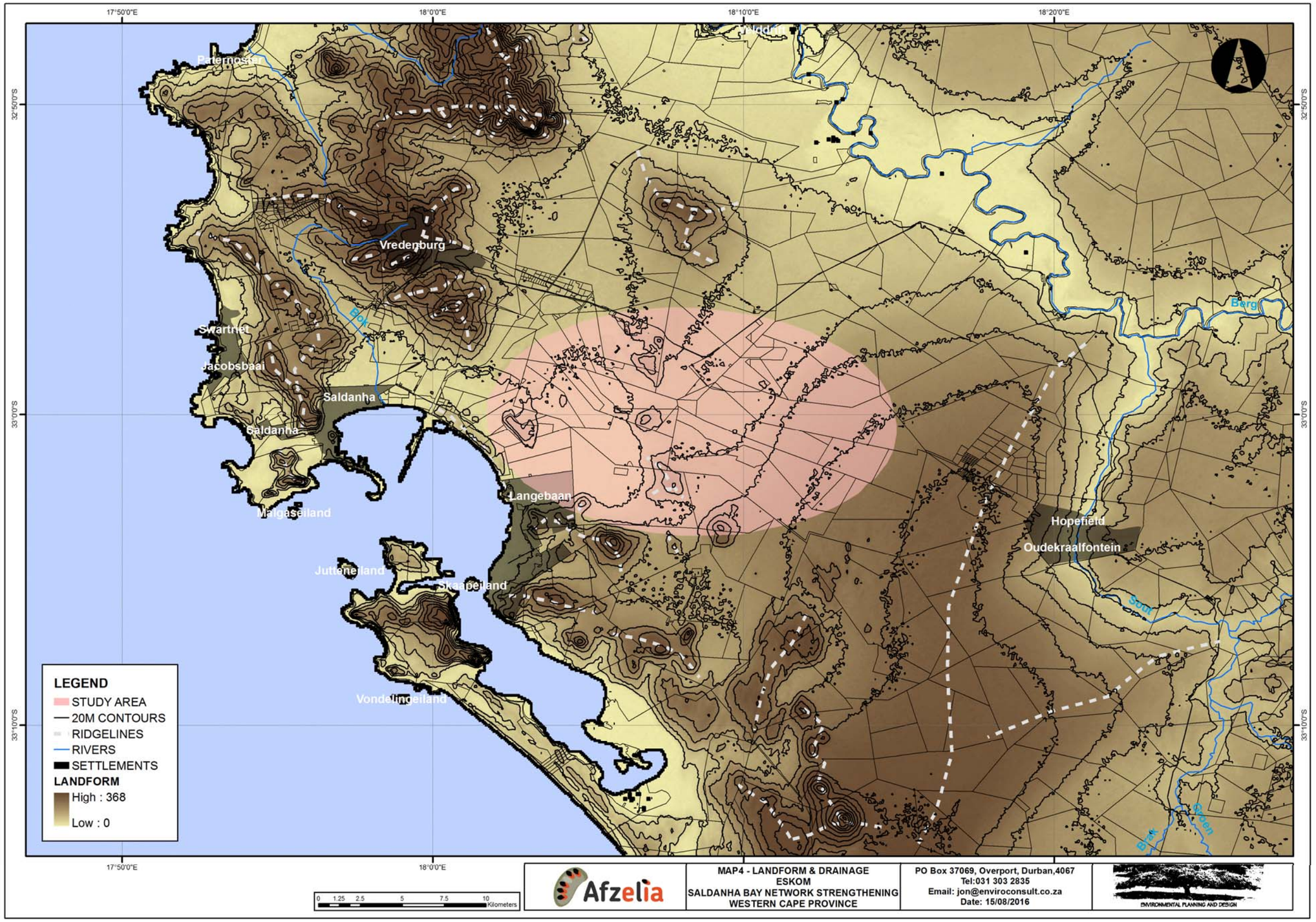
Coastal Strip.



Urban Edges.



Roads.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Afzelia
MAP4 - LANDFORM & DRAINAGE
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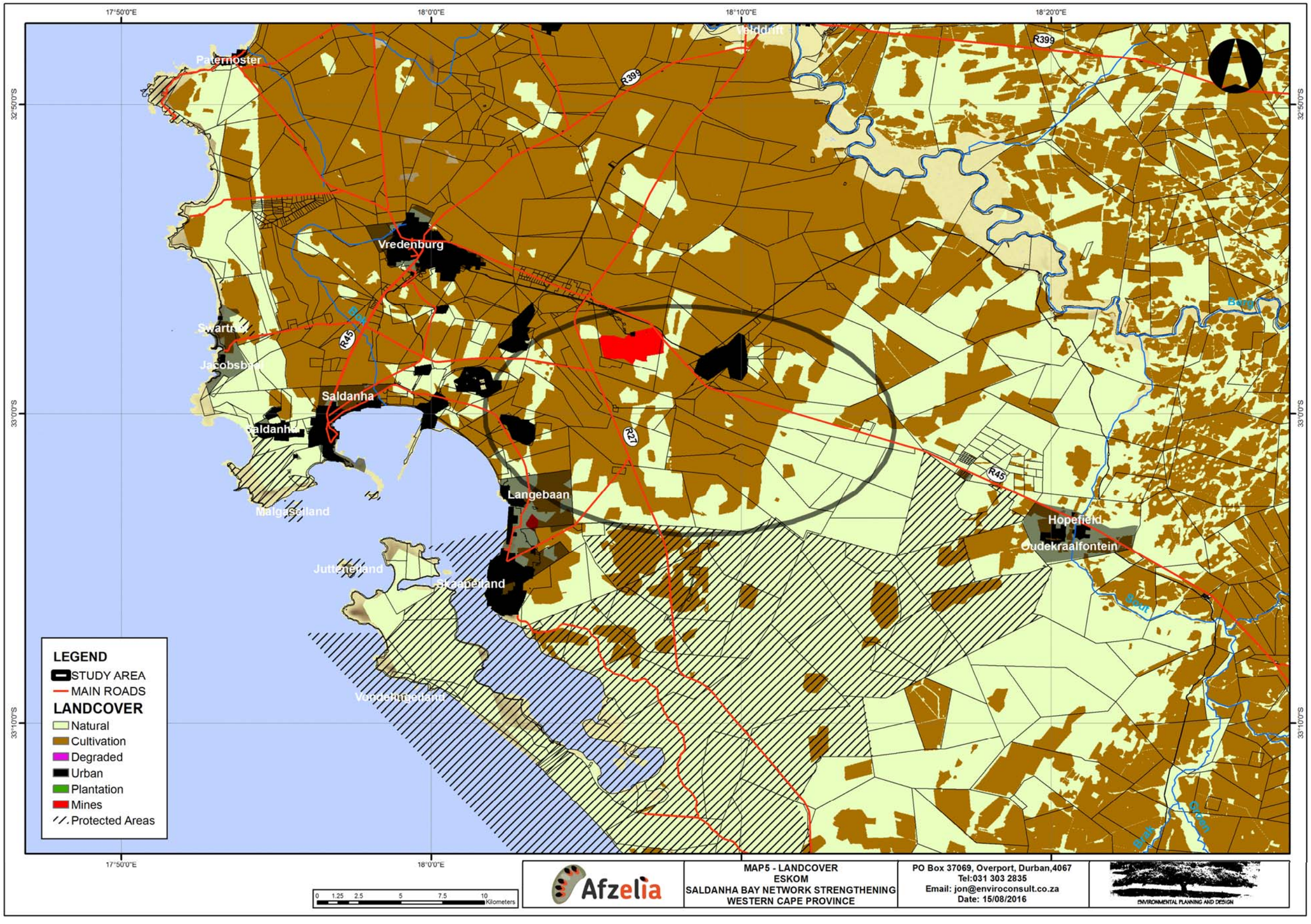
Date: 15/08/2016
ENVIRONMENTAL PLANNING AND DESIGN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Vondeltuineiland
Hopefield
Oudekraalfontein
R399
R45
R27
Berg
Sout
Elands
Bay
LEGEND
STUDY AREA
MAIN ROADS
LANDCOVER
Natural
Cultivation
Degraded
Urban
Plantation
Mines
Protected Areas
0 1.25 2.5 5 7.5 10 Kilometers
Afzelia
MAP5 - LANDCOVER
ESKOM
SALDANHA BAY NETWORK STRENGTHENING
WESTERN CAPE PROVINCE
PO Box 37069, Overport, Durban,4067
Tel:031 303 2835
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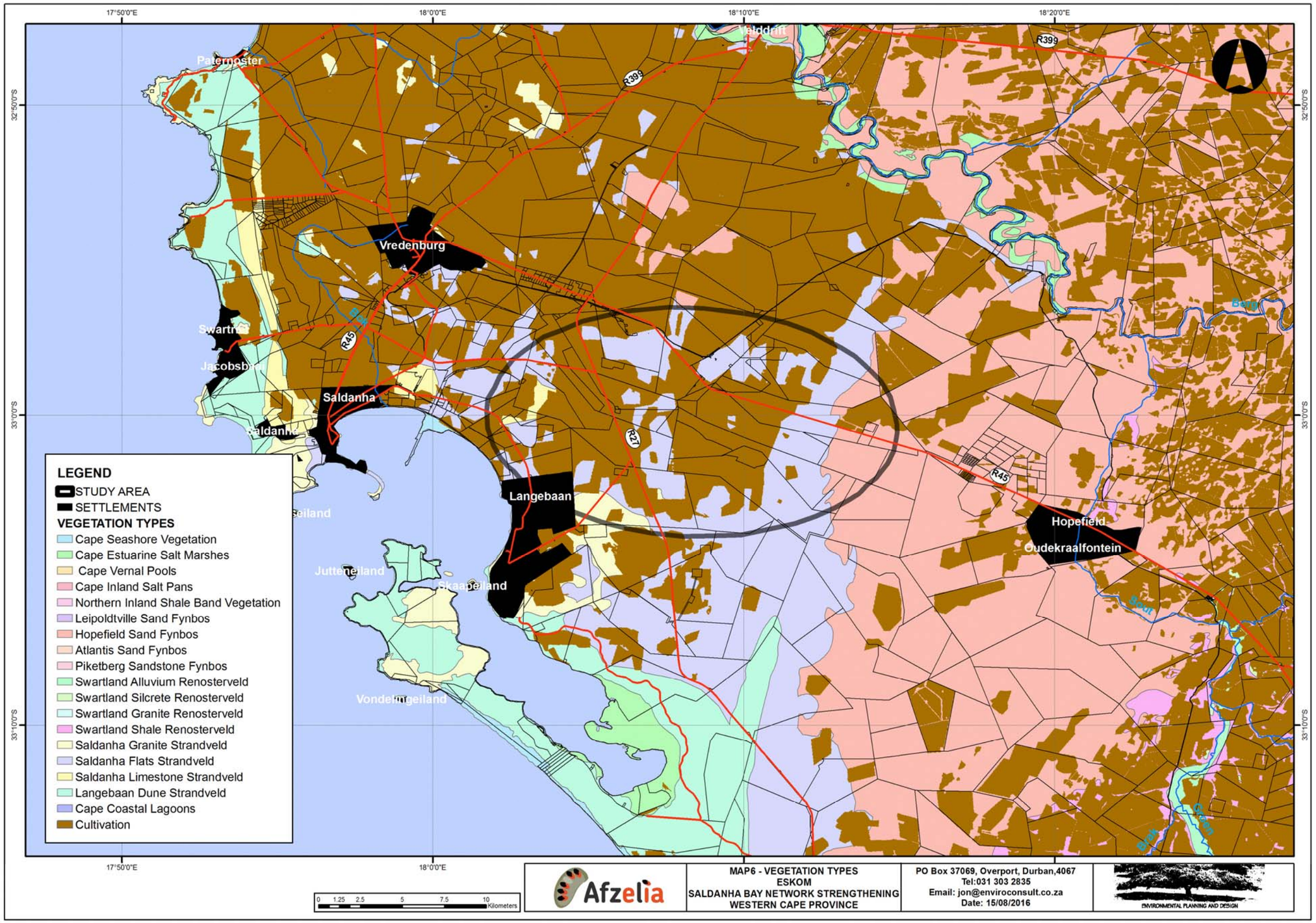
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Skaapeiland
Vondelingeiland
LEGEND
STUDY AREA
SETTLEMENTS
VEGETATION TYPES
Cape Seashore Vegetation
Cape Estuarine Salt Marshes
Cape Vernal Pools
Cape Inland Salt Pans
Northern Inland Shale Band Vegetation
Leipoldtville Sand Fynbos
Hopefield Sand Fynbos
Atlantis Sand Fynbos
Piketberg Sandstone Fynbos
Swartland Alluvium Renosterveld
Swartland Silcrete Renosterveld
Swartland Granite Renosterveld
Swartland Shale Renosterveld
Saldanha Granite Strandveld
Saldanha Flats Strandveld
Saldanha Limestone Strandveld
Langebaan Dune Strandveld
Cape Coastal Lagoons
Cultivation
0 1.25 2.5 5 7.5 10 Kilometers
Afzelia
MAP6 - VEGETATION TYPES
ESKOM
SALDANHA BAY NETWORK STRENGTHENING
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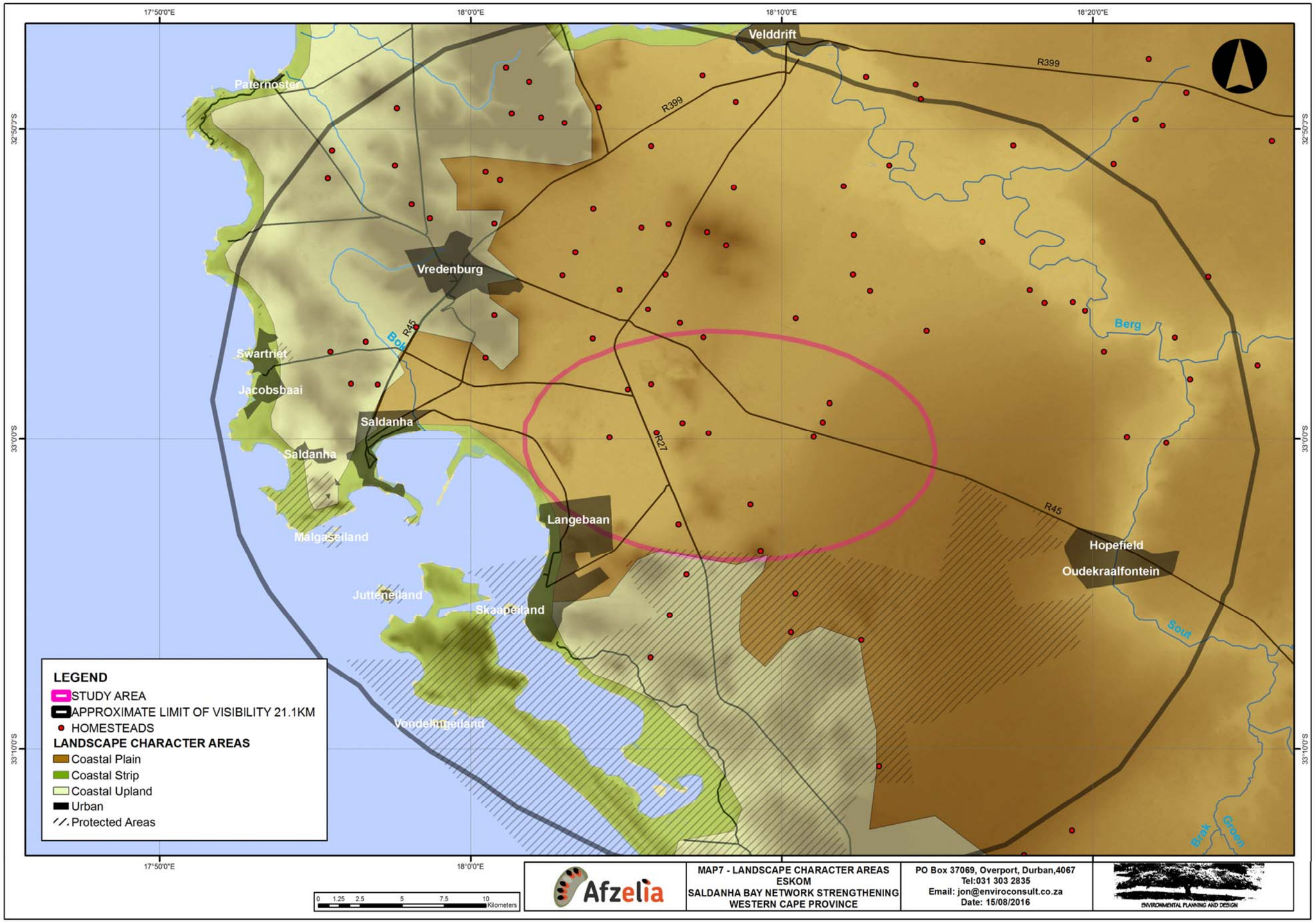
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Hopefield
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Sout
Brak
Groen
LEGEND
STUDY AREA
APPROXIMATE LIMIT OF VISIBILITY 21.1KM
HOMESTEADS
LANDSCAPE CHARACTER AREAS
Coastal Plain
Coastal Strip
Coastal Upland
Urban
Protected Areas
0 1.25 2.5 5 7.5 10 Kilometers
Afzelia
MAP7 - LANDSCAPE CHARACTER AREAS
ESKOM
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4 THE NATURE OF POTENTIAL VISUAL IMPACTS

4.1 GENERAL

Impacts could include general degradation of the relatively natural landscape in which the development is proposed as well as change of view for affected people and / or activities:

a. General landscape change or degradation. This is particularly important for protected areas where the landscape character might be deemed to be exceptional or rare. However it can also be important in non-protected areas particularly where landscape character is critical to a specific broad scale use such as tourism areas or for general enjoyment of an area. This is generally assessed by the breaking down of a landscape into components that make up the overall character and understanding how proposed elements may change the balance of the various elements that are visible. The height, mass, form and colour of new elements all help to make new elements more or less obvious as does the structure of an existing landscape which can provide screening ability or texture that helps to assimilate new elements.
b. Change in specific views for specific receptors for which the character of a view may be important for a specific use or enjoyment of the area.
    - Visual intrusion is a change in a view of a landscape that reduces the quality of the view. This can be a highly subjective judgement. Subjectivity has however been removed as far as is possible by classifying the landscape character of each area and providing a description of the change in the landscape that will occur due to the proposed development. The subjective part of the assessment is to define whether the impact is negative or positive. Again to make the assessment as objective as possible, the judgement is based on the level of dependency of the use in question on existing landscape characteristics.
    - Visual obstruction is the blocking of views or foreshortening of views. This can generally be measured in terms of extent.

    Due to the nature of the proposed development, visual impacts for receptors are expected to relate to intrusion.

4.2 THE NATURE OF LIKELY VIEWS OF THE DEVELOPMENT

The proposed project includes two areas of work including;

1. Development of a new 400/132kV DX substation and a new 132/66kV TX substations
2. Development of 2 x 400kV overhead transmission lines and new 3 x double circuit 132kV overhead transmission lines;

4.2.1 Substations

Initial activities are only likely to be visible from the immediate vicinity of the site and particularly from adjacent roads. During the latter half of the construction period as larger steel structures are erected, the infrastructure will become obvious over a wider area.

Visual implications of development of the proposed sub-station can be gauged from viewing existing infrastructure.

Plates 1 to 4 inclusive indicate the nature of views of the various elements that are likely to fall within the substations from close range where detail is visible and industrial nature of the steel structures is obvious.

From a distance however, due to the transparency of a large proportion of the structures, the influence of a sub-station generally reduces. **Plate 7** indicates a view of the existing Hector 400/132kV Sub-Station in KwaZulu-Natal. This indicates that from a distance of 1.5 – 2km the impact has reduced significantly. The detail of the majority of equipment is not obvious and the eye generally reads the stronger colours associated with vegetation and landform. Other than the extent of the compound, the most obvious elements are the pylons that support conductors linking into and out of the sub-station.

4.2.2 Substation Lighting

It is possible that floodlighting will be used in the HV Yards. Typically this is mounted on high masts.

When it is on it will provide a pool of bright within the yard. This will be obvious from a distance as a pool of bright light. It is possible that if the floodlighting is not designed appropriately that there will be light spillage outside the yard area. It is also possible if lighting is not orientated correctly that bulbs will be obvious from surrounding areas causing glare to affect sensitive receivers.

It is possible that floodlighting in the HV Yards may be turned off when there is no one present. Visibility at night could therefore depend on how often people are in the HV Yards.

Often the boundary of substations is lit with security lights mounted on poles. This lighting is often required to light a corridor between a perimeter and inner security fence that may run around a substation site. Security lighting may be a continual requirement during hours of darkness or can be turned on if there is an intruder alarm or during patrols.

Substations are also usually equipped with a communications tower which due to its height may require an aviation warning light.

The nature of the lighting will make the site obvious during hours of darkness when it is on.

Subject to the light fittings selected and the lighting design is also possible for glare from tall mast lighting and security lighting to spill into surrounding areas.

4.2.3 400kV Overhead Transmission Lines

This includes the construction of two 400kV Power lines from the existing Aurora Substation to the new proposed Dx and Tx substations.

Other than alignment information no detail has been provided regarding the height, spacing or type of towers that are to be used. Towers could be Cross Rope, Self Supporting or Guyed. Typically these towers range from approximately 32m to 40m in height.

Overhead transmission lines are likely to appear in the landscape progressively.

Initial construction is unlikely to have a significant visual impact. Initially work will take place around each tower. Activities will be obvious over limited areas only. The most obvious elements are likely to include;

- Storage of poles / pylons for tower construction.
- Trucks and mobile cranes.

As work progresses, towers will become obvious in the landscape. Work is likely to take place on a limited number of towers at any one time which means that during construction, towers will gradually appear in the landscape on a progressive basis.

By the end of the construction process, when cables have been strung between towers, the full visual impact of the project will be experienced. The operational phase is highly unlikely to result in any significant additional impact. It is possible however, that crews will be visible from time to time undertaking maintenance on individual towers.

Overhead power lines are a familiar sight within the region. Typically, from a distance, the towers are more obvious than the overhead conductors. This is because the towers are reasonably substantial structures whereas the overhead conductors have a relatively small diameter. Whilst the overhead conductors are generally not highly visible from a distance, under certain conditions, they can be made more obvious by reflected sunlight.

Plates 8 to 11 inclusive are photographs of existing overhead 400kV power lines, indicating the types of impact that might be expected when the system is in operation, these generic pictures aim to illustrate approximate scales and distances. From these photographs the following conclusions can be drawn;

a) The lines are obvious in the landscape at a distance of 1km to 5km.
b) Set against the dark landscape backdrop the pylons are more obvious than when set against a lighter coloured sky
c) At a long distance of up to 5-7km the lines are not highly conspicuous but the servitudes are obvious due to clearance.
d) At a short distance (1-2km) the lines are highly conspicuous as they cross ridgelines.
e) The lines are not highly conspicuous as they cross the ridgelines at a distance of 5-6km.

4.2.4 132kV Overhead Power Lines

132kV overhead power lines are likely to be strung between either lattice towers constructed with galvanised steel sections or monopoles that are typically placed at changes in direction, at high points on the alignment and at spacing along the power line up to 250m apart. Towers used at changes in direction usually have a larger cross section in order to take directional loads imposed by the line.

Plate 12 indicates a view along the line of a 132kV overhead power line. The view is taken during a period of good visibility along the line of towers which have a spacing of +/- 250m. In total 9 towers are visible along the line before it connects to a line running at right angles. The last tower in the line which is a solid pole structure is just visible at +/-2.5km.

From the photograph and considering the backdrop, the following conclusions can be drawn:

a) Due largely to the lattice structure and matt grey colour of the galvanised steel from which it is constructed, visibility of overhead power line structures reduces significantly with distance.

b) The visual mass of the overhead power line is unlikely to be obvious from distances greater than 2.5km.

c) It was noted on site that the existing 132kV overhead power line is not visible from a distance of approximately 5km from the power line.

It is possible that monopoles may be used in place of lattice towers depending on the site-specific conditions.

Due to the fact that from close views lattice towers tend to read as a more solid structure and the cross section of pole used for a monopole is significantly smaller than the cross section of a lattice tower, monopoles tend to be less imposing from close up. From a distance however lattice towers are more visually permeable and the more solid monopole structure is generally more obvious.

Despite the observations above, the general visibility of monopoles and lattice towers is likely to be similar.

4.2.5 Location of elements relative to existing infrastructure

Subject to the alternative constructed, the proposed 400kV power line may be viewed in the context of existing similar structures.

As all 400kV power line alternatives exit the existing Arora Substation they will be aligned beside existing 400kV overhead power lines for approximately 14.9km. This section of the alignment crosses both agricultural and natural land between the R45 and the R27.

At the R27 the alternative alignments diverge. After a minor deviation to avoid existing buildings, Alternative Alignment 3 re-joins the existing power line servitude that runs across open agricultural land from the south east to the north west towards Saldanha. Alternative 3 runs close to this existing servitude as it approaches TX Substation Site Alternative A.

On meeting the R27, Overhead Power Line Alternatives 4 and 6 turn to the north east running parallel and close to the R27 for approximately 6.4km. Alternative 6 enters the TX Substation Site Alternative A is located approximately 900m to the west of the F which is located close to the eastern side of the R27.

Overhead Power Line Alternatives 4 makes a minor deviation to the east of the R27 in order to provide the necessary space to turn and cross the R27 before it enters TX Substation Alternative D which is located to the west of the R27 and immediately north of the road into Saldanha.

The proposed TX substation Alternative F is located approximately 900m to the west of the R27 and in close proximity to existing overhead power line servitudes.

Proposed TX substation Alternatives D and F are located in close proximity to the R27 as well as the local road linking the R27 to the R399.

The proposed alternative DX substation sites are located in a group to the west of the TX substation alternatives.

DX substation Alternative A is located immediately to the north of the existing Blouwater Substation which is relatively well screened by minor undulations in the landform. From observations made on site, the top of the busbars within the existing substation are visible from adjacent minor roads to the north and west, however, the substation is not highly obvious.

DX Substation Alternative A and Alternative B which are located approximately 350m to the east of the existing substation and would also be afforded a degree of screening by existing landform.

DX substation Alternative C is located immediately adjacent to the local road that joins the R27 to the R399 Vredenburg to Saldanha Road. This substation is likely to be highly obvious from this road.

The selection of TX substation Alternative D or F will require new power line servitudes running beside the local road linking the R27 to the R399 to link the TX and DX substations. The selection of TX substation Alternative A will result in the necessary 132kV overhead power line connection to the DX substation running beside existing overhead power line servitudes and away from roads.

Plate 1 - Sub-station Busbars maximum height 22.5m

Plate 2 – Transformer approximate height 8m

Plate 3 - Transformer showing oil reservoir and fans for cooling

Plate 4 - Sub-station & Communication Tower

Plate 5 - 400 kV Double Circuit Transmission Line Towers 36m high

Plate 6 - 132 kV Transmission Line Towers 28m high

Plate 7, Distance view (1.5-2.0km) of the existing Hector 400kV Sub Station near Hammersdale. Note the 400kV towers entering the site are the tallest most obvious elements from this distance.

Plate 8 - Existing 400kV overhead transmission lines, obvious in the landscape at a distance of 1km to approximately 3-4km. Set against the dark landscape backdrop the towers are more obvious than when set against a lighter coloured sky

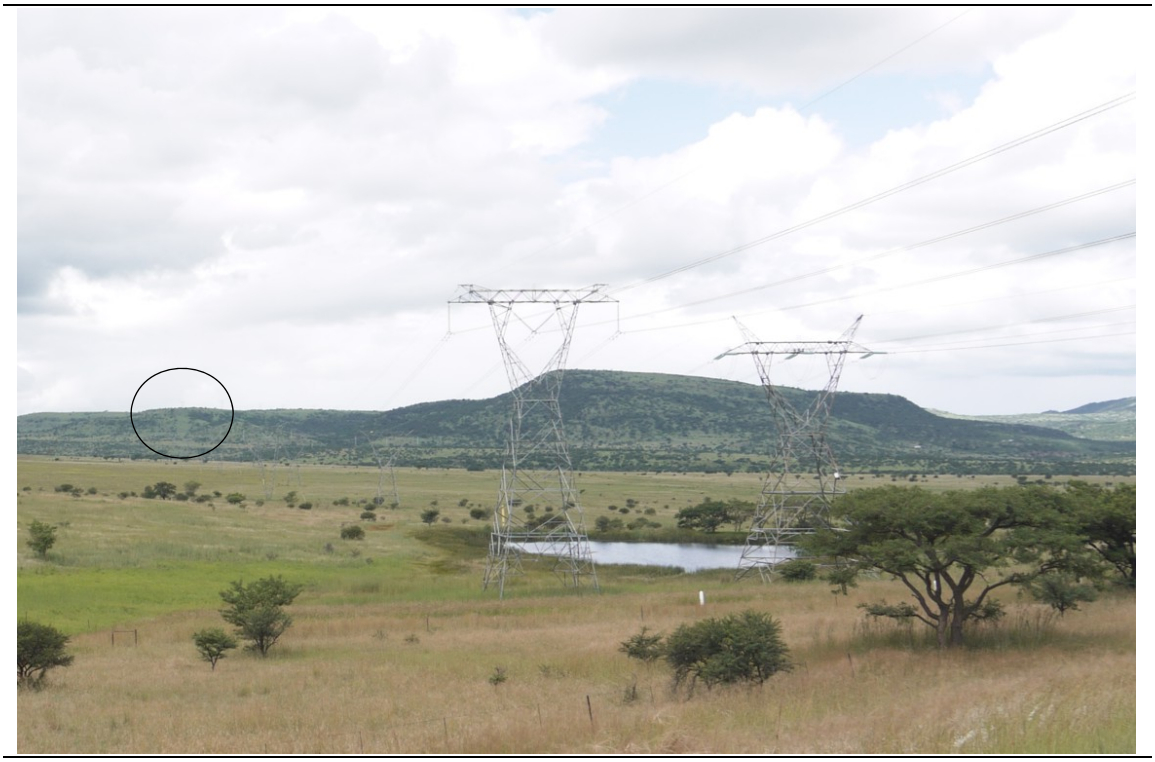


Plate 9 - Existing 400kV overhead transmission lines. Clearance of the servitude is the most obvious landscape change at a distance (approximately 5-7km)

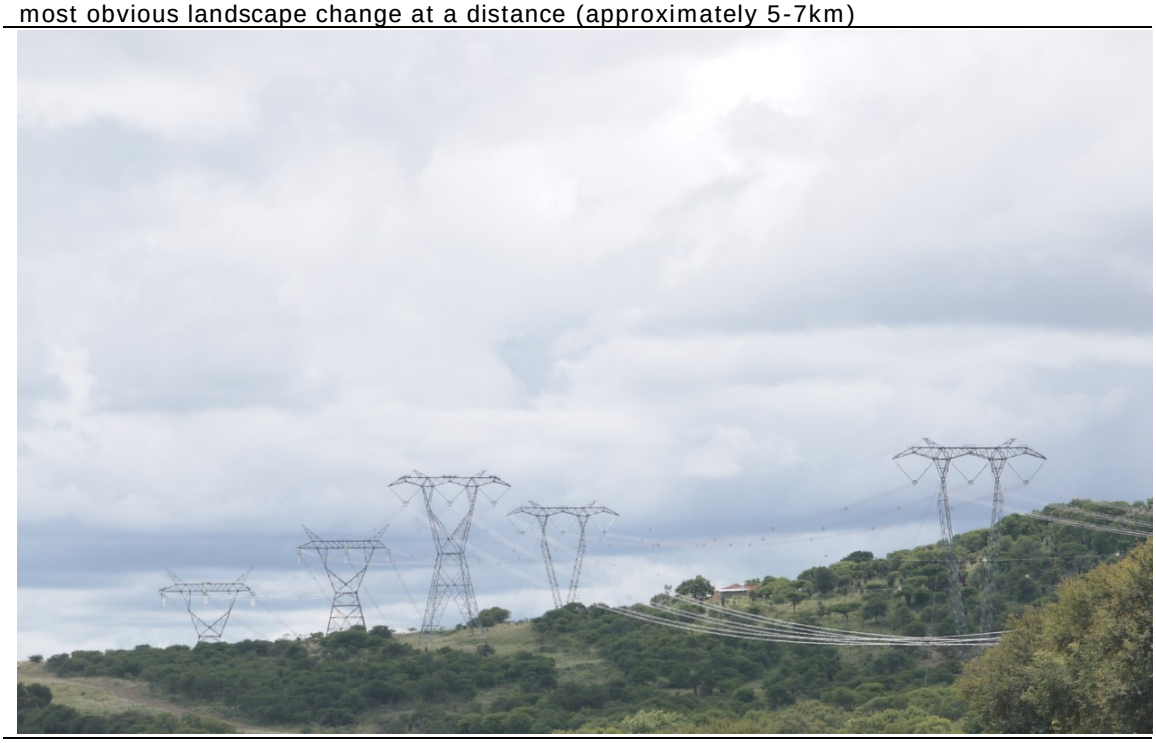


Plate 10 - Existing 400kV double overhead transmission lines are highly obvious as they cross ridgelines from short distance (approximately 1km).

Plate 11 - Existing 400kV overhead transmission lines. Towers are obvious in the mid distance (approximately 2-3km) but are not highly conspicuous at a distance (approximately 5-6km) as they cross the ridgeline.

Plate 12 - A view along the line of a monopole 132kV overhead power line. Note towers on the horizon approximately 2.5km away are just visible.

Plate 13, Viewpoint 1 - a view along the existing power line servitudes looking west from the Aurora Substation. The proposed 400kV overhead power line alternatives will run close to and parallel with these existing power lines.

Plate 14, Viewpoint 2 - A view looking towards the existing power line servitudes pictured in plate 13 from a distance of 3km. Note the power lines that are located on the horizon are just visible but not obvious.

Plate 15, Viewpoint 3 - A view looking along the existing power line servitudes to the north towards TX Substation Alternative A from close to the R27 road crossing. Proposed power line alternative 3 will run close to and parallel with these existing power lines.

Plate 16, Viewpoint 4 - A view looking along the R27 from close to the point that alternative 400kV power line alternatives 4 and 6 join the road looking north. These alternative alignments will result in 400kV power lines running close to and parallel with the right hand side of the road.

Plate 17, Viewpoint 5 - A view looking west towards the site for alternative TX substation A from the R27. The substation will be seen at a distance of approximately 900m approximately centre image and to the left of ArcelorMittal South Africa, Saldanha Works which are the structures to right of the image. The proposed substation will be seen in the context of ArcelorMittal South Africa, Saldanha Works and the existing HV power lines in the area.

Plate 18, Viewpoint 6 - A view looking north along the R27 towards TX substation alternative sites D and F from a distance of approximately 2km. Alternative F will be seen centre of image immediately behind the first row of trees approximately 400m from the road edge. Alternative D will be seen on the right hand side of the road approximately 40m from the road edge. The 400kV overhead power line will be seen on the right hand side of the road and will cross the road into alternative substation F.

Plate 19, Viewpoint 7 - A view looking north along the R27 towards TX substation alternative sites D from a distance of approximately 400m. Alternative D will be seen just behind the two parked police cars centre image and approximately 40m from the road edge.

Plate 20, Viewpoint 7 - A view looking north along the R27 towards TX substation alternative sites F from a distance of approximately 1000m. Alternative F will be seen approximately centre image, set back approximately 400m from the R27 and at its closest 20m from the minor road connection the R27 to the R399.

Plate 21, Viewpoint 8 - A view looking south from the local road that connects the R27 and R399 looking at the existing Blouwater DX Substation (centre image to RHS of two 400kV towers). The existing substation is largely screened by minor undulations in the landform. Alternative DX substation A will also be well screened from this viewpoint. Alternative B is also likely to be partially screened. Alternative C will be highly obvious from this road being located approximately 100m from the viewpoint and just to the left of centre of the image.
TX substation A will connect to the new DX substation via a 132kV line that will largely follow the power line servitudes in the image.

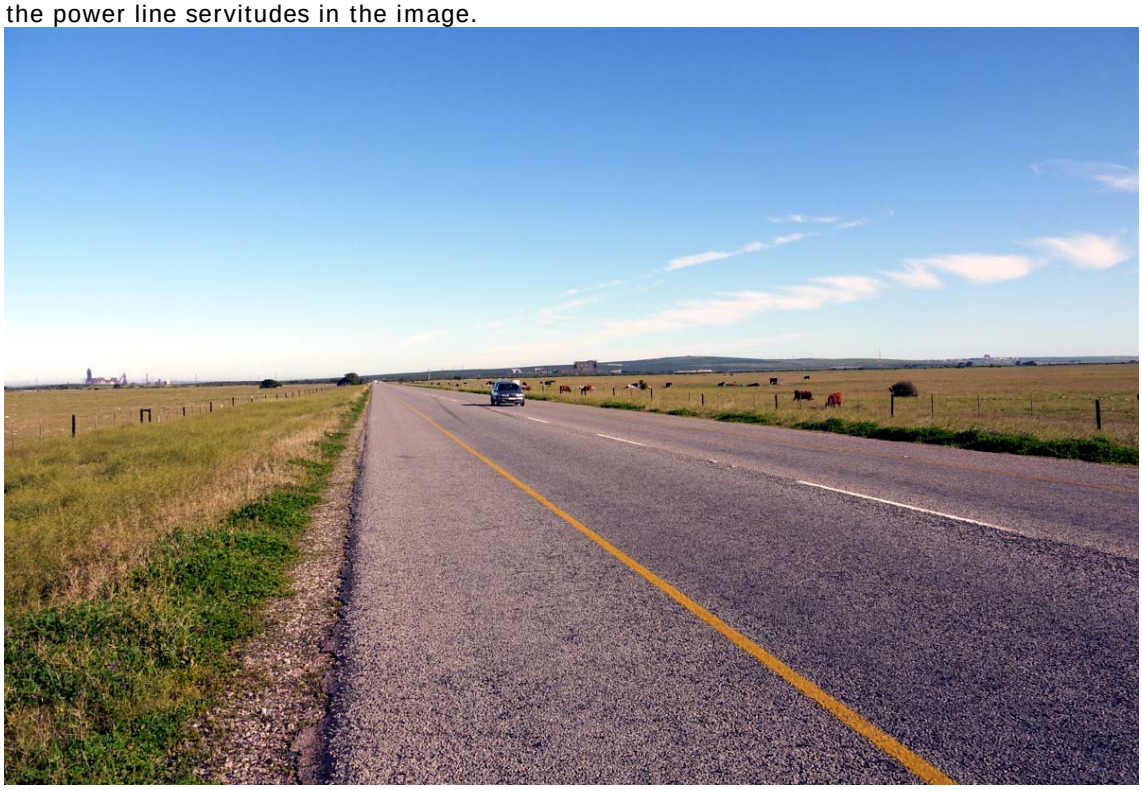


Plate 22, Viewpoint 9 - A view looking west along the local road that connects the R27 and R399. TX substation alternatives D and F will require 132kV power line running along the RHS of the road.

Plate 23, Viewpoint 10 - A view looking north from the Saldanha to Langebaan Road close to Mykonos towards the TX substation alternatives at a distance of approximately 4km. Note, existing 400kV overhead power lines are not obvious. Proposed infrastructure is also unlikely to be obvious from this viewpoint.

5 VISIBILITY OF THE PROPOSED DEVELOPMENT

5.1 ZONES OF THEORETICAL VISIBILITY

Zones of Theoretical Visibility (ZTV) are defined as “a map usually digitally produced showing areas of land within which a development is theoretically visible”.

ZVTs of the proposed development have been assessed using Arc Spatial Analyst GIS.

The assessment is based on terrain data that has been derived from satellite imagery. This data was originally prepared by NASSA and is freely available on the CIAT-CCAFS website (http://www.cgiar-csi.org). This data has been ground-truthed using a GPS as well as an online mapping programme.

Whilst the ZTV has been calculated from terrain data only, existing vegetation and development could have a significant modifying effect on the areas indicated.

In generating the ZTV coverage, the following heights have been used to represent the maximum height of the elements within each section of the proposed development;

- TX Substations 22.5m (approximate height of bus bars)
- 400 kV overhead power lines 36.0m (approximate tower height)

5.2 ASSESSMENT LIMITS

5.2.1 General

The GIS based assessment of Zones of Theoretical Visibility does not take the curvature of the earth or reduction in scale due to distance into account.

In order to provide an indication of the likely limit of visibility due to this effect a universally accepted navigational calculation (**Appendix V**) has been used to calculate the likely distance that the proposed structures might be visible over. This indicates that in a flat landscape a structure 36m high (height of tallest structures, 400kV power lines) could be visible at a distance of approximately 21.4km.

This indicates that the proposed project could be visible for up to 21.4km (Approximate Limit of Visibility)

5.2.2 Specific limits

Analysis undertaken in section 4 however indicates that due to the low visual bulk of structures that are generally comprised of relatively small section steel or lattice steel structures, the various elements are likely to be obvious over a limited distance.

Conclusions drawn from Section 4 from on-site observations indicate that the following specific limits are appropriate:

Project Element	Approximate Limit of Visual Influence
400kV overhead power lines	3.0km
132kV overhead power lines	2.5km
TX 400/132kV Sub-Station	2.0km
DX 132/66kV Sub-Station	1.0km

The proposed project elements may be visible beyond these distances up to the limit of visibility indicated in Section 5.1, however, they are unlikely to be obvious to the naked eye and they are highly unlikely to have significant influence over landscape character.

5.3 APPROACH TO THE ASSESSMENT

Zones of theoretical Visibility have been prepared for the three TX substation and 400kV overhead power line alternatives. These are presented in **Appendix IV** for information.

As noted above however, due to the transparency and small section of the majority of components, the area over which visual impacts are likely to be obvious is significantly smaller than the plotted ZTV.

The approximate limit of visual influence has been overlaid onto the ZTV mapping. From this it is obvious that, due to the relatively flat topography, the level of visibility is indicated as relatively high within all the approximate limits of visual influence.

For clarity and in order that impacted areas and receptors are clear, **Maps 8 to 13** inclusive presented in the body of the report indicate the approximate limit of visual influence only. Outside the areas indicated, it is possible that the various elements will be visible, however, it is unlikely that they will have any significant impact in terms of landscape character change.

5.4 VISIBILITY

5.4.1 400/132kV TX Substation and 400kV Overhead Power Line Alternatives

Maps 8 to 10 inclusive indicate the areas over which these elements are likely to be visible from.

a) **Power line Alternative 3 with TX Substation Site A (Map 8).** From the Aurora Substation, this power line alternative follows the existing HV power line servitude for the majority of its alignment. At the crossing of the R27 the alignment diverges from the existing alignment and runs parallel with the road for a short distance before it crosses the road and re-joins the existing power line servitude on the western side of the road.

   The TX Substation site alternative A is located approximately 900m from the R27 at its closest point. It will be viewed against the backdrop of existing HV power lines.

   From TX Substation A, the 132kV overhead power line that will link into the new Blouwater 132/66 kV DX substation will also be aligned beside the existing HV overhead power lines.

   As proposed power lines will be largely aligned away from roads and beside existing power lines, whilst they will be visible from a short section of the R45 and approximately 10km of the R27, they are unlikely to significantly increase the impact of existing overhead power lines as experienced from these roads.

The proposed DX Substation Alternative A will be visible from approximately 4km of the R27. It will be seen at a distance from the road which will also help to reduce its impact.

There are six homesteads within the approximate limit of visual influence one of which is within 500m of the proposed substation.

b) **Power line Alternative 4 with TX Substation Site D (Map 9).** From the Aurora Substation, this power line alternative follows the existing HV power line servitude as far as the R27 from where it turns northwards to run close to and parallel with the R27 for approximately 7km. Towards the northern end of the alignment the corridor diverges from the road for approximately 900m before it turns to the west to cross the R27 before it enters the TX Substation which is located approximately 600m to the west of the road.

The proposed TX substation site is also located close to the edge of a minor road that links the R27 to the R399. This road is a main link for motorists driving to Saldanha from the south.

From TX Substation Site D the 132kV overhead power line that will link into the new Blouwater 132/66 kV DX substation will be aligned close to and parallel with the minor link road described above.

The new 400kV power lines will be visible from approximately 14km of the R27 and will highly obvious from approximately 7km of this road.

The new 132kV power line will be highly obvious to approximately 3km of the link road.

There are eight homesteads within the approximate limit of visual influence, three of which are within 300m of the power lines. One of these is surrounded on three sides by the power proposed lines.

c) **Power line Alternative 6 with TX Substation Site F (Map 10).** From the Aurora Substation, this power line alternative follows the existing HV power line servitude as far as the R27 from where it turns northwards to run close to and parallel with the R27 for approximately 6.7km before entering the TX Substation which is also located close to the eastern side of the road.

From TX Substation Site F the 132kV overhead power line that will link into the new Blouwater 132/66 kV DX substation will cross the R27 and will be aligned close to and parallel with the minor link road described above.

The new 400kV power lines will be visible from approximately 14km of the R27 and will highly obvious from approximately 7km of this road.

The new 132kV power line will be visible from approximately 3km of the R27 and highly obvious to approximately 1km of this road. This power line will also be highly obvious to approximately 3km of the link road.

There are eight homesteads within the approximate limit of visual influence, two of which are within 300m of the power lines and one of which is within 600m of the substation.

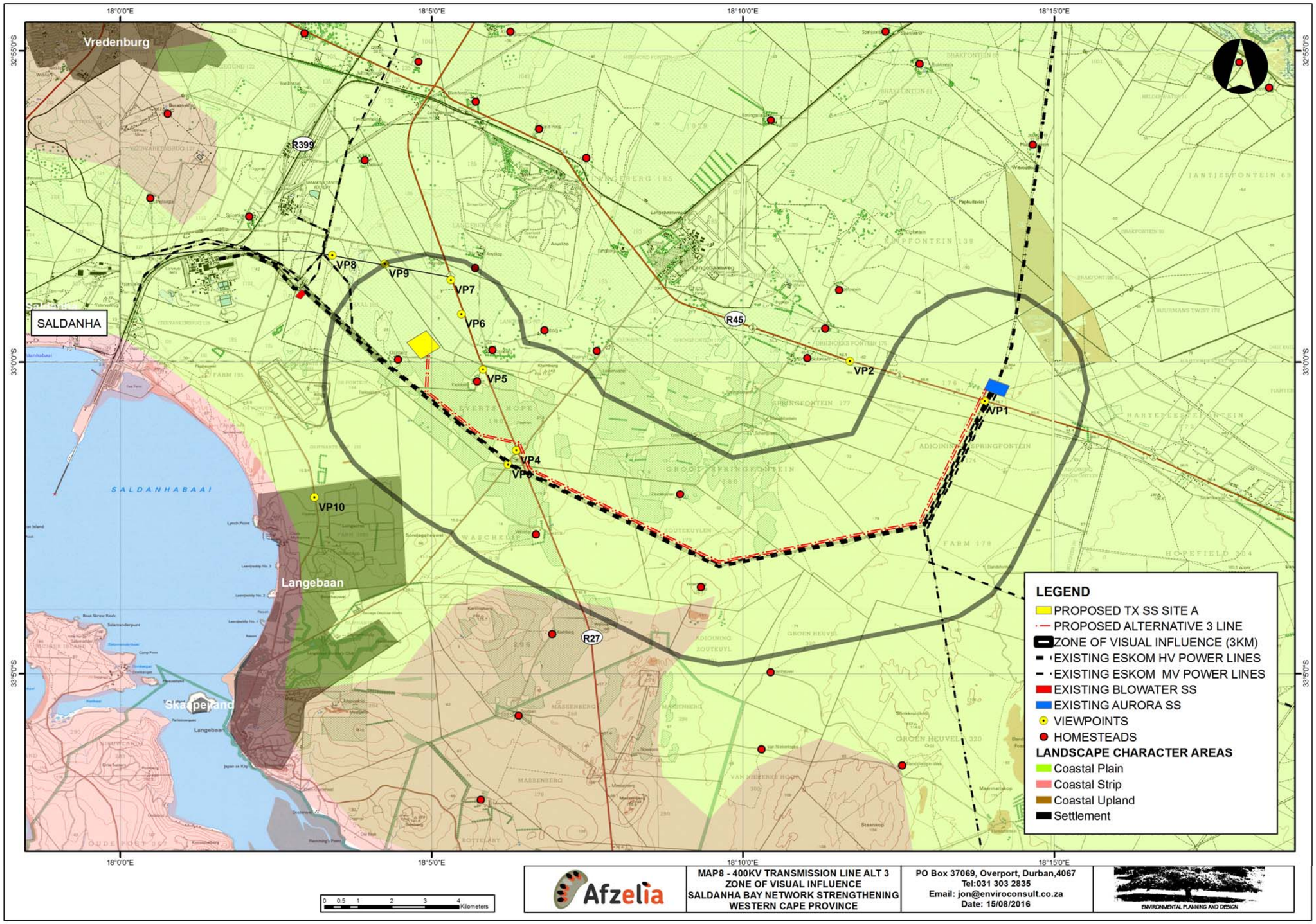
5.4.2 132/66kV TX Substation Alternatives

Maps 11 to 13 inclusive indicate the areas over which these elements are likely to be visible from.

a) **132/66kV TX Substation Alternative A (Map 11).** This alternative is located immediately north of the existing Blouwater Substation that will be de-commissioned on completion of the new DX substation. From the site visit it was noted that the existing substation is barely visible from surrounding minor roads largely due to minor undulations in the landform and distance (**Plate 21, Viewpoint 8**). TX Substation Alternative A is likely to be screened to a similar degree as the existing substation.

b) **132/66kV TX Substation Alternative B (Map 12).** This alternative is located approximately 400m to the east north east of the existing Blouwater Substation and 800m south of the minor road linking the R27 and R399. TX Substation Alternative B is likely to be slightly more obvious to users of the minor road to the north than the existing substation. It is however also likely to be partially screened.

c) **132/66kV TX Substation Alternative C (Map 13).** This alternative is located approximately 900m to the north east of the existing Blouwater Substation and 50m south of the minor road linking the R27 and R399. TX Substation Alternative B is likely to be highly obvious to users of the minor road to the north. It is however also likely to be partially screened.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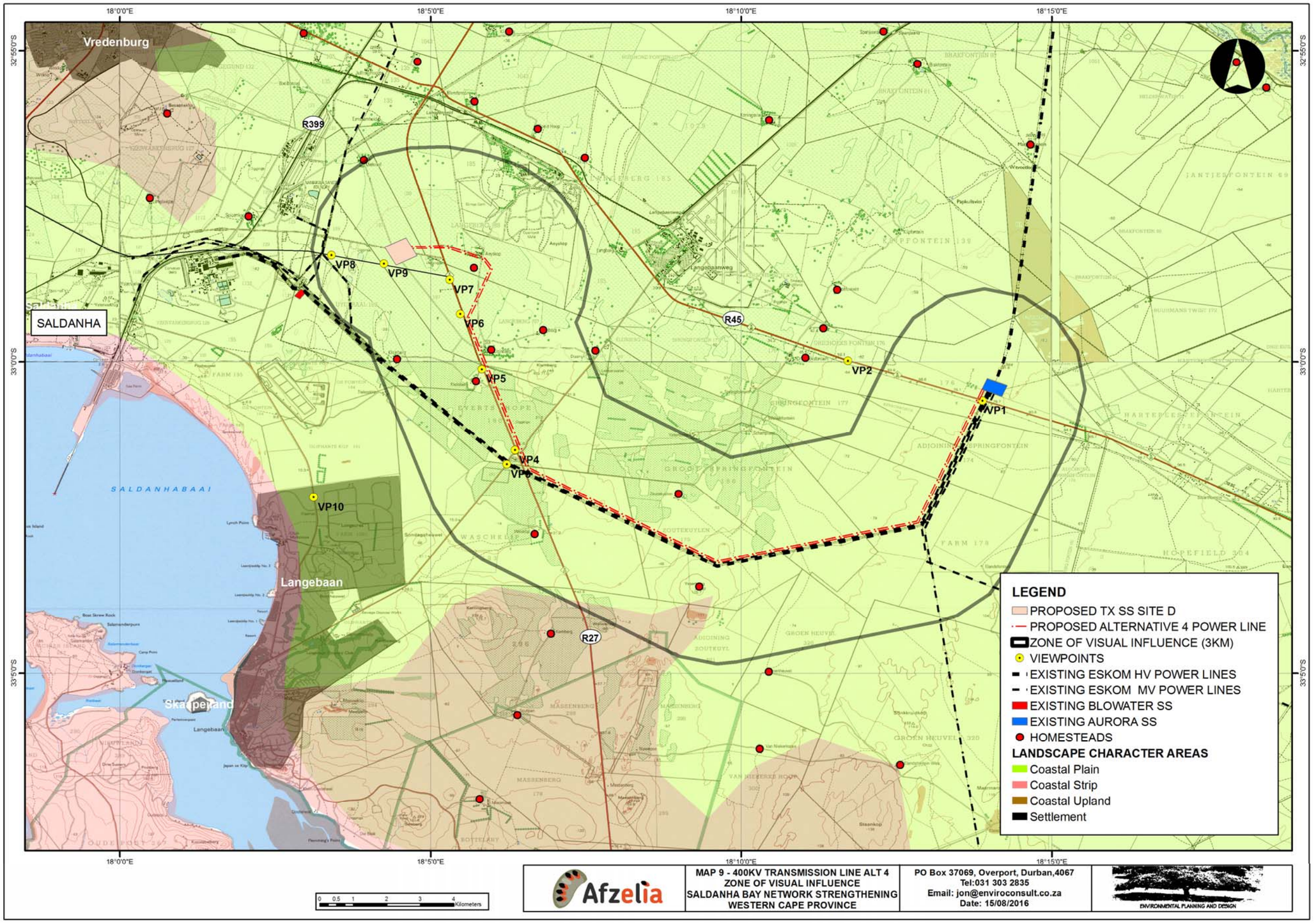
VP10
R45
R27
Langebaan
Skaapeiland
Langebaan
LEGEND
PROPOSED TX SS SITE A
PROPOSED ALTERNATIVE 3 LINE
ZONE OF VISUAL INFLUENCE (3KM)
EXISTING ESKOM HV POWER LINES
EXISTING ESKOM MV POWER LINES
EXISTING BLOWATER SS
EXISTING AURORA SS
VIEWPOINTS
HOMESTEADS
LANDSCAPE CHARACTER AREAS
Coastal Plain
Coastal Strip
Coastal Upland
Settlement
0 0.5 1 2 3 4 Kilometers
Afzelia
MAP8 - 400KV TRANSMISSION LINE ALT 3
ZONE OF VISUAL INFLUENCE
SALDANHA BAY NETWORK STRENGTHENING
WESTERN COAST PROVINCE
PO Box 37069, Overport, Durban,4067
Tel:031 303 2835
Email: jon@enviroconsult.co.za
Date: 15/08/2016
ENVIRONMENTAL PLANNING AND DESIGN


18°0'0"E
18°5'0"E
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Vredenburg
R399
SALDANHA
SALDANHABAAI
VP1
VP2
VP4
VP5
VP6
VP7
VP8
VP9
VP10
R45
R27
Langebaan
Skaapeiland
Langebaan
LEGEND
PROPOSED TX SS SITE D
PROPOSED ALTERNATIVE 4 POWER LINE
ZONE OF VISUAL INFLUENCE (3KM)
VIEWPOINTS
EXISTING ESKOM HV POWER LINES
EXISTING ESKOM MV POWER LINES
EXISTING BLOWATER SS
EXISTING AURORA SS
HOMESTEADS
LANDSCAPE CHARACTER AREAS
Coastal Plain
Coastal Strip
Coastal Upland
Settlement
0 0.5 1 2 3 4 Kilometers
Afzelia
MAP 9 - 400KV TRANSMISSION LINE ALT 4
ZONE OF VISUAL INFLUENCE
SALDANHA BAY NETWORK STRENGTHENING
WESTERN CAPE PROVINCE
PO Box 37069, Overport, Durban,4067
Tel:031 303 2835
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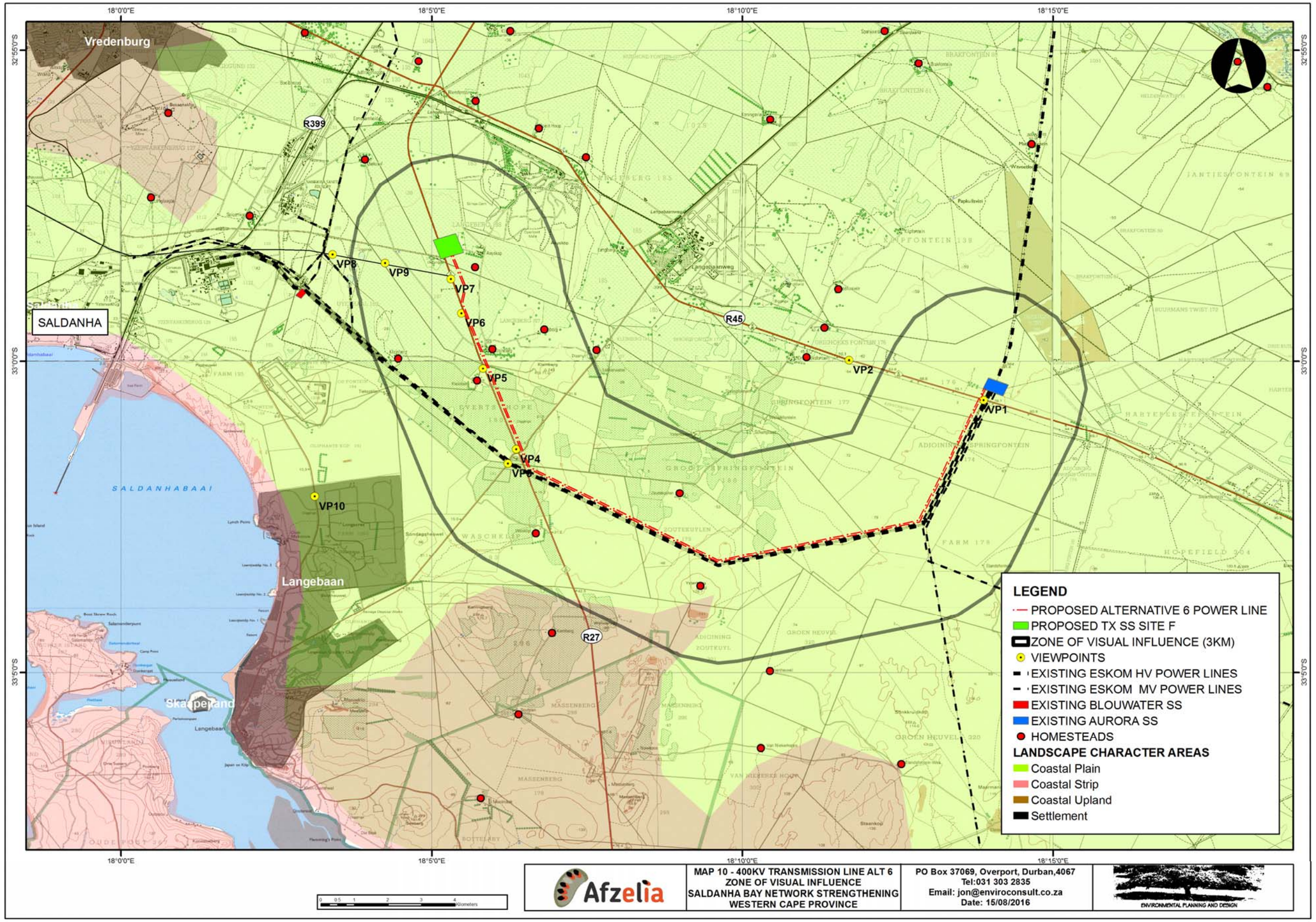
Date: 15/08/2016
ENVIRONMENTAL PLANNING AND DESIGN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Vredenburg
R399
SALDANHA
SALDANHABAAI
VP1
VP2
VP3
VP4
VP5
VP6
VP7
VP8
VP9
VP10
R45
R27
Langebaan
Skaapekraal
LEGEND
PROPOSED ALTERNATIVE 6 POWER LINE
PROPOSED TX SS SITE F
ZONE OF VISUAL INFLUENCE (3KM)
VIEWPOINTS
EXISTING ESKOM HV POWER LINES
EXISTING ESKOM MV POWER LINES
EXISTING BLOUWATER SS
EXISTING AURORA SS
HOMESTEADS
LANDSCAPE CHARACTER AREAS
Coastal Plain
Coastal Strip
Coastal Upland
Settlement
Afzelia
MAP 10 - 400KV TRANSMISSION LINE ALT 6
ZONE OF VISUAL INFLUENCE
SALDANHA BAY NETWORK STRENGTHENING
WESTERN CAPE PROVINCE
PO Box 37069, Overport, Durban,4067
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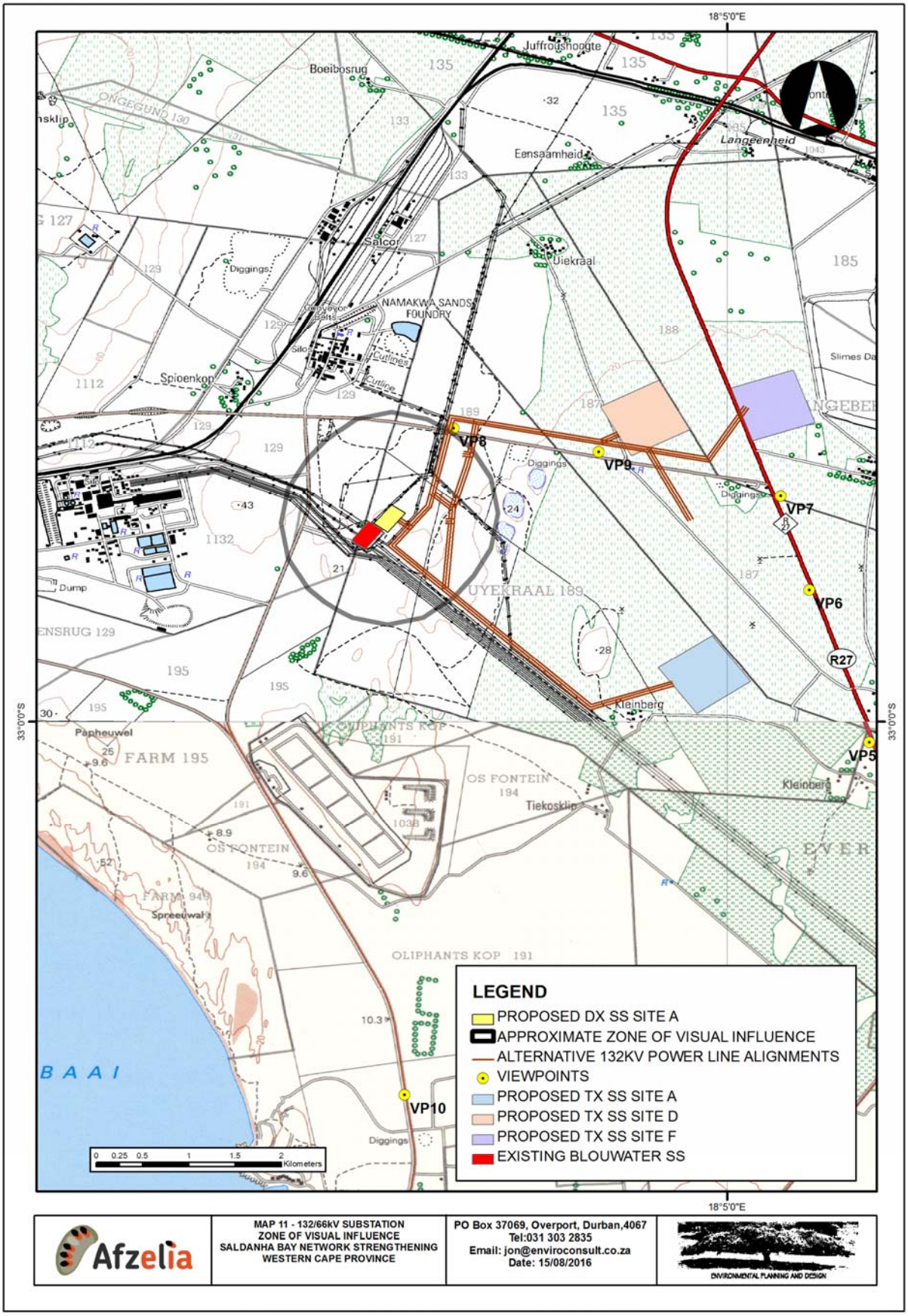
ENVIRONMENTAL PLANNING AND DESIGN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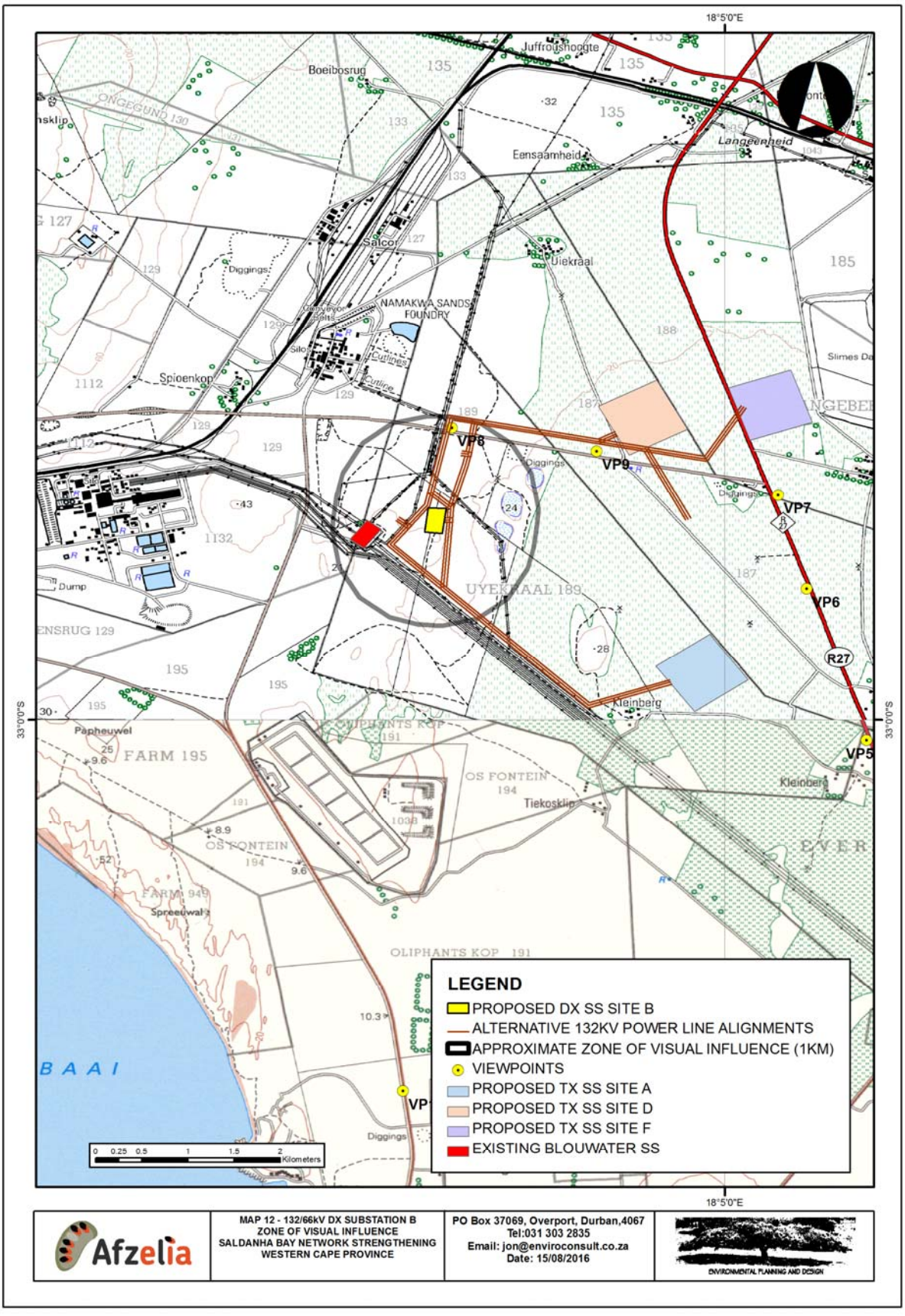
Langeenheid
Salcor
Diggings
Uiekraal
NAMAKWA SANDS FOUNDRY
Spioenkop
VP8
VP9
VP7
VP6
VP5
VP10
R27
Kleinberg
Papheuwel
FARM 195
OS FONTEIN 194
Tiekosklip
OLIPHANTS KOP 191
UYEKRAAL 189
Spreeuwal
BAAI
0 0.25 0.5 1 1.5 2 Kilometers
LEGEND
PROPOSED DX SS SITE A
APPROXIMATE ZONE OF VISUAL INFLUENCE
ALTERNATIVE 132KV POWER LINE ALIGNMENTS
VIEWPOINTS
PROPOSED TX SS SITE A
PROPOSED TX SS SITE D
PROPOSED TX SS SITE F
EXISTING BLOUWATER SS
Afzelia
MAP 11 - 132/66kV SUBSTATION
ZONE OF VISUAL INFLUENCE
SALDANHA BAY NETWORK STRENGTHENING
WESTERN CAPE PROVINCE
PO Box 37069, Overport, Durban,4067
Tel:031 303 2835
Email: jon@enviroconsult.co.za
Date: 15/08/2016
ENVIRONMENTAL PLANNING AND DESIGN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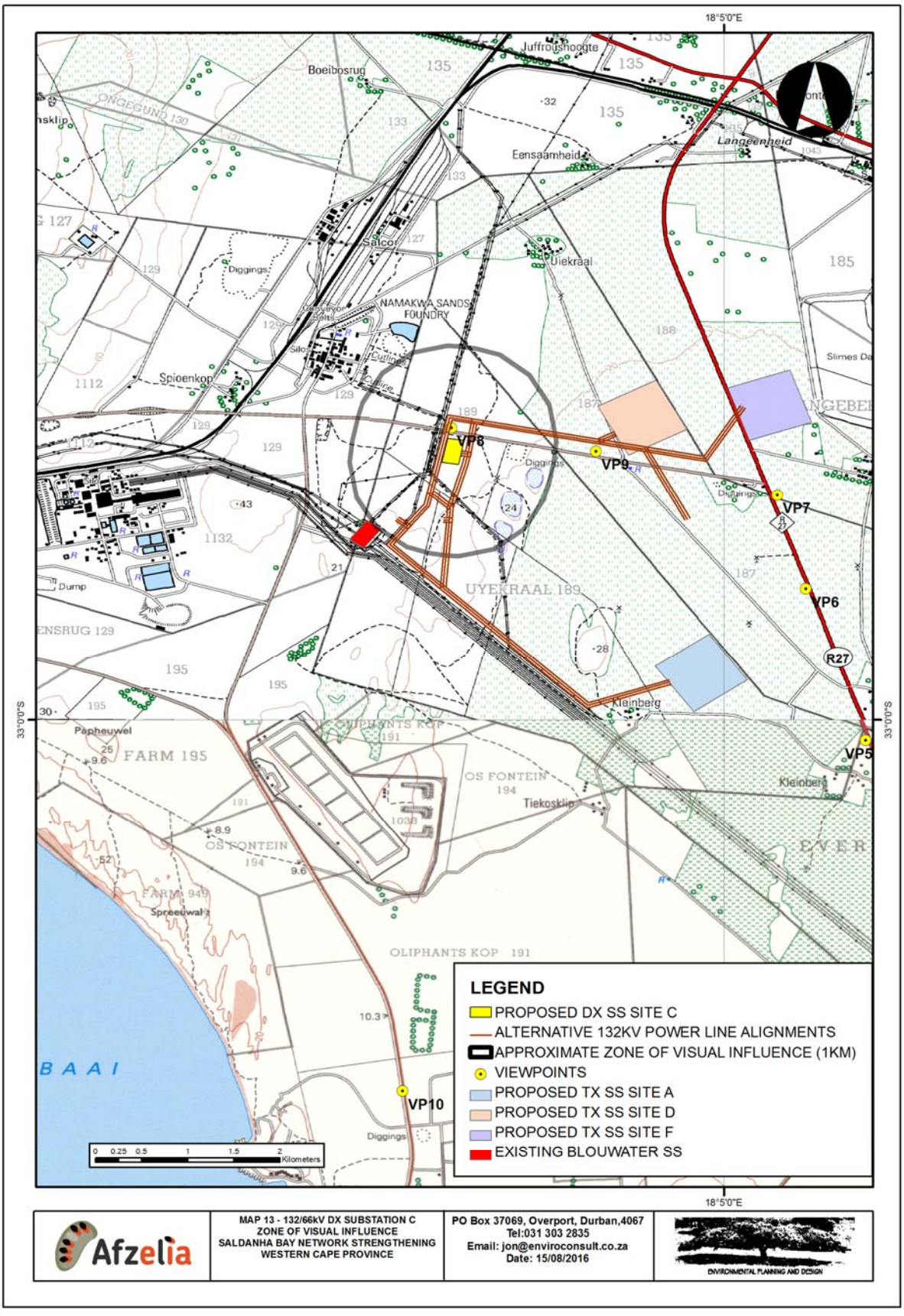
Diekraal
NAMAKWA SANDS FOUNDRY
Spioenkop
Diggings
Cutting
Silo
VP8
VP9
VP7
VP6
VP5
R27
Dump
UYEKRAAL 189
Kleinberg
Papheuwel
FARM 195
OS FONTEIN 194
Tiekosklip
OLIPHANTS KOP 191
FARM 949
Spreeuwal
B A A I
0 0.25 0.5 1 1.5 2 Kilometers
LEGEND
PROPOSED DX SS SITE B
ALTERNATIVE 132KV POWER LINE ALIGNMENTS
APPROXIMATE ZONE OF VISUAL INFLUENCE (1KM)
VIEWPOINTS
PROPOSED TX SS SITE A
PROPOSED TX SS SITE D
PROPOSED TX SS SITE F
EXISTING BLOUWATER SS
Afzelia
MAP 12 - 132/66kV DX SUBSTATION B
ZONE OF VISUAL INFLUENCE
SALDANHA BAY NETWORK STRENGTHENING
WESTERN COPE PROVINCE
PO Box 37069, Overport, Durban,4067
Tel:031 303 2835
Email: jon@enviroconsult.co.za
Date: 15/08/2016
ENVIRONMENTAL PLANNING AND DESIGN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Juffroushoogte
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Eensaamheid
Langeenheid
Salcor
Diggings
Uiekraal
NAMAKWA SANDS FOUNDRY
Spioenkop
VP8
VP9
VP7
VP6
R27
VP5
VP10
UYEKRAAL 189
FARM 195
OS FONTEIN 194
OLIPHANTS KOP 191
Papheuwel
Dump
Kleinberg
Tiekosklip
Spreeuwal
BAAI
0 0.25 0.5 1 1.5 2 Kilometers
LEGEND
PROPOSED DX SS SITE C
ALTERNATIVE 132KV POWER LINE ALIGNMENTS
APPROXIMATE ZONE OF VISUAL INFLUENCE (1KM)
VIEWPOINTS
PROPOSED TX SS SITE A
PROPOSED TX SS SITE D
PROPOSED TX SS SITE F
EXISTING BLOUWATER SS
Afzelia
MAP 13 - 132/66kV DX SUBSTATION C
ZONE OF VISUAL INFLUENCE
SALDANHA BAY NETWORK STRENGTHENING
WESTERN CAPE PROVINCE
PO Box 37069, Overport, Durban,4067
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ENVIRONMENTAL PLANNING AND DESIGN

6 VISUAL IMPACT ASSESSMENT

The previous section of the report identified specific areas where visual impacts may occur. This section will quantify these impacts in their respective geographical locations and in terms of the identified issues (see Section 1.5).

The methodology for the assessment of potential visual impacts includes:

- The **nature**, which shall include a description of what causes the effect, what will be affected and how it will be affected.
- The **extent**, wherein it will be indicated whether the impact will be local (limited to the immediate area or site of development) or regional:
    - local extending only as far as the development site area – assigned a score of 1;
    - limited to the site and its immediate surroundings (up to 10 km) – assigned a score of 2;
    - will have an impact on the region – assigned a score of 3;
    - will have an impact on a national scale – assigned a score of 4; or
    - will have an impact across international borders – assigned a score of 5.
- The **duration**, wherein it will be indicated whether:
    - the lifetime of the impact will be of a very short duration (0–1 years) – assigned a score of 1;
    - the lifetime of the impact will be of a short duration (2-5 years) - assigned a score of 2;
    - medium-term (5–15 years) – assigned a score of 3;
    - long term (> 15 years) - assigned a score of 4; or
    - permanent - assigned a score of 5.
- The **magnitude**, quantified on a scale from 0-10, where a score is assigned:
    - 0 is small and will have no effect on the environment;
    - 2 is minor and will not result in an impact on processes;
    - 4 is low and will cause a slight impact on processes;
    - 6 is moderate and will result in processes continuing but in a modified way;
    - 8 is high (processes are altered to the extent that they temporarily cease); and
    - 10 is very high and results in complete destruction of patterns and permanent cessation of processes.
- The **probability** *of occurrence*, which shall describe the likelihood of the impact actually occurring. Probability will be estimated on a scale, and a score assigned:
    - Assigned a score of 1–5, where 1 is very improbable (probably will not happen);
    - Assigned a score of 2 is improbable (some possibility, but low likelihood);
    - Assigned a score of 3 is probable (distinct possibility);
    - Assigned a score of 4 is highly probable (most likely); and
    - Assigned a score of 5 is definite (impact will occur regardless of any prevention measures).
- The **significance**, which shall be determined through a synthesis of the characteristics described above (refer formula below) and can be assessed as low, medium or high.
- The **status**, which will be described as either positive, negative or neutral.
- The degree to which the impact can be reversed.
- The degree to which the impact may cause irreplaceable loss of resources.
- The *degree* to which the impact can be *mitigated.*

- The **significance** is determined by combining the criteria in the following formula:
    - S=(E+D+M)P; where S = Significance weighting, E = Extent, D = Duration, M = Magnitude, P = Probability

The **significance weightings** for each potential impact are as follows:

- < 30 points: Low (i.e. where this impact would not have a direct influence on the decision to develop in the area),
- 30-60 points: Medium (i.e. where the impact could influence the decision to develop in the area unless it is effectively mitigated),
- > 60 points: High (i.e. where the impact must have an influence on the decision process to develop in the area).

6.2 ASSESSMENT

The following assessment focuses on the issues identified during the scoping process which include:

1) General landscape change and degradation of natural / rural characteristics;
2) The visibility of the facility to, and potential visual impact on homesteads that have been identified as potentially being impacted;
3) The visibility of the facility to, and potential visual impact on sections of the R27, R45, R399 and local roads that have been identified as potentially being impacted;
4) The visibility of the facility to, and potential visual impact the towns of Langebaan, Saldanha and Vredenburg that have been identified as potentially being impacted;
5) The visibility of the facility to, and potential visual impact on the West Coast National Park, the Elandsfontein Private Nature Reserve and areas of high natural scenic quality;
6) The visibility of the facility to, and potential visual impact on the coastal strip and particularly areas that are important for tourism and recreational use; and
7) The possible impact of lighting associated with the project.

These issues will be considered in the context of the Landscape Character Areas, visual effects identified and possible cumulative influence of other infrastructure in the vicinity.

6.3 VISUAL IMPACT ASSESSMENT

6.3.1 General landscape change and degradation of natural / rural characteristics.

Nature of impact:	
The affected landscape is not a highly natural area. It is also not a particularly cohesive rural landscape. Current landscape character is affected by major industrial operations as well as strategic electrical infrastructure. It might be best characterised as urban fringe, where the main land uses are rural but there is also a major urban influence provided by infrastructure that is generated by the urban area. All alternatives will add similar amounts of additional infrastructure into the area.	
	Without mitigation

Extent	**All Alternative Schemes** Site and immediate surroundings **(2).**
Duration	**All Alternative Schemes** Long term **(4)**
Magnitude	**All Alternative Schemes** Small to minor **(1)**
Probability	**All Alternative Schemes** Improbable **(2)**
Significance	**All Alternative Schemes** Low **(14)**
Status	The further loss of rural character is likely to be seen in a **negative** light by tourists and visitors.
Irreplaceable loss	As the development may be removed at some time in the future, **it will not cause an irreplaceable loss**. However because it is unlikely that the project will be dismantled in the medium to long term, it could be viewed as an irreplaceable loss by sensitive stakeholders.
Can impacts be mitigated?	Mitigation is not possible.
Mitigation / Management: None possible.	
Cumulative Impacts: **Power line Alternative 3 with TX Substation Site A** Low **Power line Alternative 4 with TX Substation Site D** Medium **Power line Alternative 6 with TX Substation Site F** High **DX Substation Site A** Very Low **DX Substation Site B** Low **DX Substation Site C** Low **See appendix V for detail.**	
Residual Risks: Should the proposed infrastructure become redundant in the future, residual risk relates to the various elements being left in place and rehabilitation / re-use of the affected areas not occurring.	

6.3.2 The visibility of the facility to, and potential visual impact on homesteads that have been identified as potentially being impacted.

Nature of impact: The impact relates to further industrialisation of the outlook from homesteads.

	Without mitigation
Extent	**Power line Alternative 3 with TX Substation Site A** Site and immediate surroundings **(2)** **Power line Alternative 4 with TX Substation Site D** Site and immediate surroundings **(2)** **Power line Alternative 6 with TX Substation Site F** Site and immediate surroundings **(2)**
Duration	Long term **(4).**
Magnitude	**Power line Alternative 3 with TX Substation Site A** Low to moderate **(5)** **Power line Alternative 4 with TX Substation Site D** Moderate **(6)** **Power line Alternative 6 with TX Substation Site F** Moderate **(6)**
Probability	Probable (**3**)**.**
Significance	**Power line Alternative 3 with Substation Site A** Medium **(33)** **Power line Alternative 4 with TX Substation Site D** Medium **(36)** **Power line Alternative 6 with TX Substation Site F** Medium **(36)**
Status	The further loss of rural character is likely to be seen in a **negative** light by residents particularly those in closest proximity to the development.
Irreplaceable loss	As the development may be removed at some time in the future, **it will not cause an irreplaceable loss**. However because it is unlikely that the project will be dismantled in the medium to long term, it could be viewed as an irreplaceable loss by sensitive stakeholders.
Can impacts be mitigated?	**No mitigation is possible**
Mitigation / Management: Mitigation of the ultimate impact is not possible due to the scale and nature of the development.	
Cumulative Impacts: **Power line Alternative 3 with Substation Site A** Medium significance. **Power line Alternative 4 with TX Substation Site D** Medium significance. **Power line Alternative 6 with TX Substation Site F** Medium significance. **See appendix V for detail.**	
Residual Risks: The residual risk relates to loss of natural landscape being obvious on decommissioning of the proposed project. In order to minimise this impact, it is	

critical that existing natural landscape areas in and around the development are maintained and protected and that effective rehabilitation is undertaken during and after construction as well as on closure.

6.3.3 The visibility of the facility to, and potential visual impact on sections of the R27, R45, R399 and local roads that have been identified as potentially being impacted.

Nature of impact:
The introduction of electrical infrastructure including a major substation and HV overhead power lines in close proximity to the R27 as well as MV overhead power lines in close proximity to a minor road will further industrialise the landscape as seen from the road.

These roads are important for local and regional tourism.

	Without mitigation	With mitigation
Extent	**Power line Alternative 3 with TX Substation Site A** Site and immediate surroundings **(2)** **Power line Alternative 4 with TX Substation Site D** Site and immediate surroundings **(2)** **Power line Alternative 6 with TX Substation Site F** Site and immediate surroundings **(2)** **DX Substation Site A** Local **(1)** **DX Substation Site B** Local **(1)** **DX Substation Site C** Site and immediate surroundings **(2)**	All as without mitigation.
Duration	Long term **(4)**	All as without mitigation.
Magnitude	**Power line Alternative 3 with TX Substation Site A** Minor **(2)** **Power line Alternative 4 with TX Substation Site D** Low to Moderate **(5)** **Power line Alternative 6 with TX Substation Site F** Moderate **(6)** **DX Substation Site A**	**Power line Alternative 3 with TX Substation Site A** Minor **(2)** **Power line Alternative 4 with TX Substation Site D** Low to Moderate **(5)** **Power line Alternative 6 with TX Substation Site F** Moderate **(5)**

	Small **(0)** **DX Substation Site B** Small to minor **(1)** **DX Substation Site C** Minor **(2)**	
Probability	**Power line Alternative 3 with TX Substation Site A** Improbable **(2)** **Power line Alternative 4 with TX Substation Site D** Probable **(3)** **Power line Alternative 6 with TX Substation Site F** Highly probable **(4)** **DX Substation Site A** Very improbable **(1)** **DX Substation Site B** Improbable **(2)** **DX Substation Site C** Probable **(3)**	**Power line Alternative 3 with TX Substation Site A** Improbable **(2)** **Power line Alternative 4 with TX Substation Site D** Probable **(3)** **Power line Alternative 6 with TX Substation Site F** Probable **(3)**
Significance	**Power line Alternative 3 with TX Substation Site A** Low **(16)** **Power line Alternative 4 with TX Substation Site D** Medium **(33)** **Power line Alternative 6 with TX Substation Site F** Medium **(48)** **DX Substation Site A** Very Low **(5)** **DX Substation Site B** Low **(112)** **DX Substation Site C** Low **(24)**	**Power line Alternative 3 with TX Substation Site A** Low **(16)** **Power line Alternative 4 with TX Substation Site D** Medium **(33)** **Power line Alternative 6 with TX Substation Site F** Medium **(33)**
Status	The further loss of rural character is likely to be seen in a **negative** light by residents, visitors and tourists using roads particularly those in closest proximity to the development.	
Irreplaceable loss	As the development may be removed at some time in the future, **it will not cause an irreplaceable loss**. However because it is unlikely that the project will be dismantled in the medium to long	

	term, it could be viewed as an irreplaceable loss by sensitive stakeholders.
Can impacts be mitigated?	Impacts associated with TX substation alternatives particularly on the R27can be partly mitigated through screen planting. It is not appropriate to mitigate the impact of the DX substation alternatives on the minor road to the north as vegetation in this area is relatively natural.

Mitigation / Management:

Planning:
- Plan screen planting.

Construction:
- Minimise disturbance;
- Undertake screen planting.

Operations:
- Maintain screen planting.

Cumulative Impacts:

Power line Alternative 3 with TX Substation Site A
Low significance.

Power line Alternative 4 with TX Substation Site D
Medium significance.

Power line Alternative 6 with TX Substation Site F
High significance.

DX Substation Site A
Very Low significance.

DX Substation Site B
Low significance.

DX Substation Site C
Low significance.

See appendix V for detail.

Residual Risks:
Should the proposed infrastructure become redundant in the future, residual risk relates to the various elements being left in place and rehabilitation / re-use of the affected areas not occurring.

6.3.4 The visibility of the facility to, and potential visual impact the towns of Langebaan, Saldanha and Vredenburg.

Nature of impact:
The edges of all of these settlements are outside the approximate limit of visual influence of the development. Whilst elements may be visible to the careful viewer, they will not be obvious to the casual viewer. This issue is therefore not likely to be significant.

	Without mitigation	With mitigation
Extent	**All Alternatives** Site and immediate surroundings **(2)**	

Duration	**All Alternatives** Long term **(4)**	
Magnitude	**All Alternatives** Small to minor **(1)**	
Probability	**All Alternatives** Improbable **(2)**	
Significance	**All Alternatives** Low **(14)**	
Status	The further loss of rural character is likely to be seen in a **negative** light by residents, visitors and tourists particularly those in closest proximity to the development.	
Irreplaceable loss	No irreplaceable loss.	
Can impacts be mitigated?	Mitigation is not necessary.	
Mitigation / Management: None required		
Cumulative Impacts: No cumulative impact.		
Residual Risks: No residual risk.		

6.3.5 The visibility of the facility to, and potential visual impact on the West Coast National Park, the Elandsfontein Private Nature Reserve and areas of high natural scenic quality.

Nature of impact:
These areas are outside the approximate limit of visual influence of the development. Whilst elements may be visible to the careful viewer, they will not be obvious to the casual viewer. This issue is therefore not likely to be significant.

	Without mitigation	**With mitigation**
Extent	**All Alternatives** Site and immediate surroundings **(2)**	
Duration	**All Alternatives** Long term **(4)**	
Magnitude	**All Alternatives** Small to minor **(1)**	
Probability	**All Alternatives** Improbable **(2)**	
Significance	**All Alternatives** Low **(14)**	
Status	The further loss of rural character is likely to be seen in a **negative** light by residents, visitors and tourists particularly those in closest proximity to the development.	

Irreplaceable loss	No irreplaceable loss.
Can impacts be mitigated?	Mitigation is not necessary.
Mitigation / Management: None required.	
Cumulative Impacts: No cumulative impact	
Residual Risks: Should the proposed infrastructure become redundant in the future, residual risk relates to the various elements being left in place and rehabilitation / re-use of the affected areas not occurring.	

6.3.6 The visibility of the facility to, and potential visual impact on the coastal strip and particularly areas that is important for tourism and recreational use.

Nature of impact:
These areas are outside the approximate limit of visual influence of the development. Topography also generally screens the development from this area. The development is therefore highly unlikely to be visible.

	Without mitigation	With mitigation
Extent	**All Alternatives** Site and immediate surroundings **(2)**	
Duration	**All Alternatives** Long term **(4)**	
Magnitude	**All Alternatives** Small **(0)**	
Probability	**All Alternatives** Very improbable **(1)**	
Significance	**All Alternatives** Very Low **(6)**	
Status	The further loss of rural character is likely to be seen in a **negative** light by residents, visitors and tourists particularly those in closest proximity to the development.	
Irreplaceable loss	No irreplaceable loss.	
Can impacts be mitigated?	Mitigation is not necessary.	
Mitigation / Management: None required		
Cumulative Impacts: No cumulative impact.		
Residual Risks: No residual risk.		

6.3.7 The possible impact of lighting associated with the project

Nature of impact:

It is likely that lighting will be associated with all substations and will include;

- Security lighting at the fence line;
- Operational lights (occasional lights to ensure on site safety around staff areas) associated with offices and staff rest / ablution facilities; and
- Working lights (flood lighting) associated with HV yards in order that urgent maintenance can be undertaken.

	Without mitigation	**With mitigation**
Extent	**All Substations** Site and immediate surroundings **(2)**	**All Substations** Site and immediate surroundings **(2)**
Duration	**All Substations** Long term **(4)**	**All Substations** Long term **(4)**
Magnitude	**TX Substations** Low **(4)** **DX Substations** Low **(2)**	**TX Substations** Low **(2)** **DX Substations** Small **(0)**
Probability	**All Substations** Probable **(3)**	**All Substations** Improbable **(2)**
Significance	**TX Substations** Low to medium **(30)** **DX Substations** Low **(24)**	**TX Substations** Low **(16)** **DX Substations** Low **(12)**
Status	Residents in close proximity to substations are likely to view lighting as a negative issue. It is also likely that night time visitors to protected areas might view lighting as a negative issue. Other people who are not in close proximity to substations at night for any length of time are likely to see lighting as a neutral issue.	All stakeholders are likely to see occasional lighting as a neutral issue.
Irreplaceable loss	No irreplaceable loss	No irreplaceable loss
Can impacts be mitigated?	The impact can be partly mitigated through careful design and use of lighting.	

Mitigation / Management:

Planning:

Plan lighting to:

a. Minimise the use of lighting to absolute necessities.
b. Investigate the use of an infra-red security lighting and camera system with normal security lighting coming on only when there is a security breach.
c. Break the HV Yard lighting up into different circuits so only the area to be accesses or worked in is lit.

Ensure that lighting specification and design is undertaken to minimise light pollution on surrounding areas. This should include:

a. Ensuring that there is no light spill outside the HV yard / fence line.
b. Ensuring that all fittings are hooded to prevent glare.

Construction:

Ensure that planned measures are implemented.

Ensure that temporary lighting used during construction minimises light spill and

avoids glare particularly for adjacent roads. Operations: Maintain lighting and ensure that the planned scheme is not amended or extended in a way that would extend light pollution.
Cumulative Impacts: **All TX Substation alternatives** Low to medium significance. **See appendix V for detail.**
Residual Risks: No residual risk.

7 IMPACT STATEMENT

7.1 VISIBILITY

Whilst it may be possible to see the tallest elements for a distance in excess of 21km, in reality and due to the relative transparency of structures and relatively small steel sections that will be used in the development, the distance over which the various elements are likely to be obvious and influence landscape character is significantly smaller. The following approximate limits of visual influence were defined:

Project Element	Approximate Limit of Visual Influence
400kV overhead power lines	3.0km
132kV overhead power lines	2.5km
TX 400/132kV Sub-Station	2.0km
DX 132/66kV Sub-Station	1.0km

7.2 LANDSCAPE CHARACTER AREAS AND VISUAL ABSORPTION CAPACITY

The overriding character differentiating factors within the subject landscape appear to be landform /drainage and development.

These factors appear to divide the landscape into four discrete areas including;

a) **Urban areas**. These are generally inward looking drawing little character influence from external areas. It is unlikely that the proposed development will have much influence on these areas other than perhaps the edges of the urban areas that face onto sections of the proposed development.
b) **The Coastal Plain**. This area is relatively flat with generally low vegetation. This LCA is therefore unlikely to provide significant visual absorption capacity and the proposed development is likely to be highly visible. The visibility of the development may be slightly offset by the fact that there are numerous industrial elements that are obvious in the landscape including heavy industry and electrical and railway infrastructure.
c) **The Coastal Uplands** are a series of relatively minor hills that occur on the Coastal Plain to the south of Langebaan and north of Saldanha. These are important for two reasons:
    a. The landform provides opportunities for elevated views over the development from the section overlooking the Coastal Plain. The landform also screens views of the coastal plain from areas to the north and south.
    b. The protected areas of Elandsfontein Private Nature Reserve and the West Coast National Park are located on the upland area to the south of Langebaan. The extent of natural vegetation, undulating landform and views towards Langebaan and the Lagoon give this area a special sense of place
d) **The coastal strip**. This can be differentiated from the rest of the coastal plain due to its proximity to the sea and the fact that a large portion of the land use is tourism and recreation orientated. There are however also industrial elements present particularly orientated towards coastal activities such as oil and gas and fishing.

The area immediately adjacent to the coast generally falls to the west towards the sea and is steeper than the remainder of the coastal plain. Because of this the general outlook is generally to the west over the sea although elements in the immediate hinterland to the east are also likely to sit prominently in the periphery of views. It is likely however that development inland will not be prominent from coastal areas due to the landform and a general focus towards the sea.

7.3 VISUAL IMPACT

The proposed development will occur within the Coastal Plain LCA as defined above. This is an area where rural land uses currently provide the main landscape character influencing elements. However, rural characteristics are diluted to a large degree in areas by infrastructure development including existing electrical infrastructure.

The main sensitive areas including the edges of urban areas, the coastal strip and protected areas to the south all fall outside the areas of visual influence noted above and are therefore highly unlikely to be impacted to any significant degree.

The main visual issues relate to roads that run through the area that are important for tourism related traffic as well as local homesteads. The assessment found that:

Power line Alternative 3 with TX Substation Site A will largely impact sections of the R27 and local roads that are already impacted by electrical infrastructure including major HV power line servitudes. This alternative will be largely viewed in the context of this existing infrastructure.

It is likely that this alternative will impact six homesteads. However, these homesteads are already impacted by electrical infrastructure.

Power line Alternative 4 with TX Substation Site D, over approximately half its length this power line alternative will run parallel with and close to existing HV power lines. However over its western most section, this alternative power line will diverge from existing power line servitudes and will run close to and parallel to the R27 creating impacts along a new 7.5km section of this road.

This alternative will also require a new 132kV power line to run parallel and close to a section of local road.

Whilst the proposed TX substation will be set back from the R27 which will help to mitigate impacts on this road, it will also be located close to a local road.

Power line Alternative 6 with TX Substation Site F, will generally have similar visual impacts as Powerline Alternative 4 with TX Substation Site D. However, because Substation D is close to the R27, visual impact on the R27 is anticipated to be greater.

Visual impacts associated with the proposed DX substation alternatives are anticipated as relatively low.

DX substation alternative A being located furthest from local roads and immediately adjacent to the existing Blouwater Substation is likely to be barely visible from local

roads and surrounding areas. Alternative B is likely to be slightly more visible and Alternative C will be highly obvious from a small section of a local road.

It is possible that substation lighting could have impacts on local homesteads and roads, however, this it should be possible to mitigate this to only occur for occasional periods.

7.4 CUMULATIVE IMPACTS

As **Power line Alternative 3 with TX Substation Site A** largely impacts areas that are already impacted by electrical infrastructure, this alternative does not significantly extend existing impacts. It is likely however to intensify visual impacts particularly for one homestead.

Power line Alternative 4 with TX Substation Site D and **Power line Alternative 6 with TX Substation Site F** will significantly extend the visual impact of electrical infrastructure.

Lighting, particularly associated with substations, could add to the extent of the lit area that is visible from protected areas to the south. However, this can be mitigated through careful design and operation.

7.5 CONCLUSION

Because **Power line Alternative 3 with TX Substation Site A** does not significantly extend the visual impacts associated with existing electrical infrastructure this is the alternative favoured on visual grounds.

Both **Power line Alternative 4 with TX Substation Site D** and **Power line Alternative 6 with TX Substation Site F** would significantly extend impacts of electrical infrastructure particularly on the R27 which is an important tourist route used by visitors to the West Coast. It is suggested that these should only be considered if there are significant biodiversity issues that are likely to outweigh the importance of visual perceptions of the area.

Because it will largely be screened by landform, DX Substation alternative A is also preferred on visual grounds.

REFERENCES

Guidelines for involving visual and aesthetic specialists in EIA processes, Author; Bernard Oberholzer. Published by the Provincial Government of the Western Cape: Department of Environmental Affairs and Development Planning, 2005

Guidelines for landscape and visual impact assessment (third edition), authors; the Landscape Institute and Institute of Environmental Assessment and Management, published by E & FN Spon, 2013.

Methods of Environmental Impact Assessment, edited by; Peter Morris and Riki Therivel, Oxford Brookes University, UCL Press, 2000.

Visual Impact Assessment Guidebook, Second Edition. Province of British Colombia. January 2001

APPENDIX I

SPECIALIST'S BRIEF CV

Name JONATHAN MARSHALL
Nationality British
Year of Birth 1956
Specialisation Landscape Architecture / Landscape & Visual Impact Assessment / Environmental Planning / Environmental Impact Assessment.

Qualifications

Education
Diploma in Landscape Architecture, Gloucestershire College of Art and Design, UK (1979)
Environmental Law, University of KZN (1997)

Professional
Chartered Member of the Landscape Institute (UK)
Certified Environmental Assessment Practitioner of South Africa.
Member of the International Association of Impact Assessment, South Africa

Languages

English	-	Speaking	-	Excellent
	-	Reading	-	Excellent
	-	Writing	-	Excellent

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Key Experience

Jon qualified as a Landscape Architect (Dip LA) at Cheltenham (UK) in 1979. He has been a chartered member of the Landscape Institute UK since 1986. He has also been a Certified Environmental Assessment Practitioner of South Africa since 2009.

During the early part of his career (1981 - 1990) He worked with Clouston (now RPS) in Hong Kong and Australia. During this period he was called on to undertake visual impact assessment (VIA) input to numerous environmental assessment processes for major infrastructure projects. This work was generally based on photography with line drawing superimposed to illustrate the extent of development visible.

He has worked in the United Kingdom (1990 - 1995) for a major supermarket chain and prepared CAD based visual impact assessments for public enquiries for new green field store development. He also prepared the VIA input to the environmental statement for the Cardiff Bay Barrage for consideration by the UK Parliament in the passing of the Barrage Bill.

His more recent VIA work (1995 to present) includes a combination of CAD and GIS based work for a new international airport to the north of Durban, new heavy industrial operations, overhead electrical transmission lines, mining operations in West Africa and numerous commercial and residential developments.

VIA work undertaken during the last eighteen months includes assessments for proposed new mine developments in Ghana and Guinea, numerous solar plant projects for Eskom and private clients, proposed wind farm development and a proposed tourism development within the Isimangaliso Wetland Park World Heritage Site .

Jon has also had direct experience of working with UNESCO representatives on a candidate World Heritage Site and has undertaken LVIAs within and adjacent to other World Heritage Sites.

Relevant Visual Impact Assessment Projects

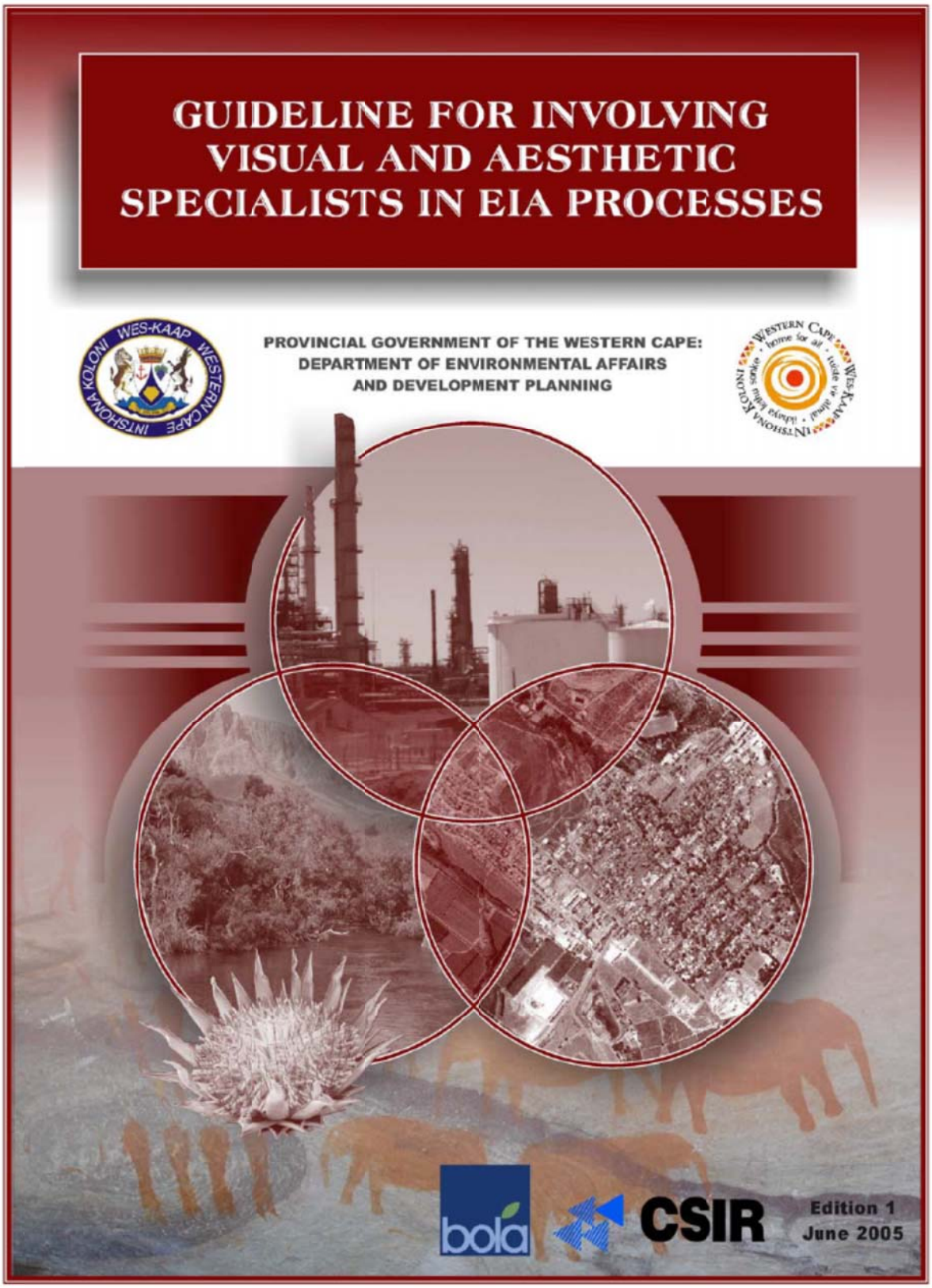
1. **Bhangazi Lake Tourism Development** – Visual impact assessment for a proposed lodge development within the Isimangaliso Wetland Park World Heritage Site. This work is ongoing.
2. **Quarry Development for the Upgrade of Sani Pass –** Visual Impact Assessments for two proposed quarry developments on the edge of the uKhalamba-Drakensburg World Heritage Site.
3. **Mtubatuba to St Lucia Overhead Power Line** – Visual Impact Assessment for a proposed power line bordering on the Isimangaliiso Wetland Park World Heritage Site for Eskom.
4. **St Faiths 400/132 kV Sub-Station and Associated Power Lines** - Visual Impact Assessment for a proposed new major sub-station and approximately 15km of overhead power line for Eskom.
5. **Clocolan to Ficksburg Overhead Power Line** – Visual Impact Assessment for a proposed power line for Eskom.
6. **Solar Plant Projects including Photovoltaic and Concentrating Solar Power Plants** – Numerous projects for Eskom and private clients in the Northern Cape, Limpopo, Mpumalanga and the Free State.
7. **Moorreesburg Wind Farm.** Visual impact assessment for a proposed new wind farm in the Western Cape.
8. **AngloGold Ashanti, Dokyiwa (Ghana)** – Visual Impact Assessment for proposed new Tailings Storage Facility at a mine site working with SGS as part of their EIA team.
9. **Camperdown Industrial Development** - Visual Impact Assessment for proposed new light industrial area to the north o Camperdown for a private client.
10. **Wild Coast N2 Toll Highway** – Peer review of VIA undertaken by another consultant.
11. **Gamma to Grass Ridge 765kv transmission line** – Peer review of VIA undertaken by another consultant.
12. **Gateway Shopping Centre Extension (Durban)** – Visual Impact Assessment for a proposed shopping centre extension in Umhlanga, Durban.
13. **Kouroussa Gold Mine (Guinea)** – Visual impact assessment for a proposed new mine in Guinea working with SGS as part of their EIA team.
14. **Mampon Gold Mine (Ghana)** - Visual impact assessment for a proposed new mine in Ghana working with SGS as part of their EIA team.
15. **Telkom Towers** – Visual impact assessments for numerous Telkom masts in KwaZulu Natal
16. **Dube Trade Port, Durban International Airport** – Visual Impact Assessment for a new international airport.
17. **Sibaya Precinct Plan** – Visual Impact Assessment as part of Environmental Impact Assessment for a major new development area to the north of Durban.
18. **Umdloti Housing** – Visual Impact Assessment as part of Environmental Impact Assessment for a residential development beside the Umdloti Lagoon to the north of Durban.
19. **Tata Steel Ferrochrome Smelter** - Visual impact assessment of proposed new Ferrochrome Smelter in Richards Bay as part of EIA undertaken by the CSIR.
20. **Diamond Mine at Rooipoort Nature Reserve near Kimberley** – Visual impact assessment for a proposed diamond mine within an existing nature reserve for De Beers.
21. **Durban Solid Waste Large Landfill Sites –** Visual Impact Assessment of proposed development sites to the North and South of the Durban Metropolitan Area. The project utilised 3d computer visualisation techniques.
22. **Hillside Aluminium Smelter, Richards Bay -** Visual Impact Assessment of proposed extension of the existing smelter. The project utilised 3d computer visualisation techniques.

23. **Estuaries of KwaZulu Natal Phase 1 and Phase 2 –** Visual character assessment and GIS mapping as part of a review of the condition and development capacity of eight estuary landscapes for the Town and Regional Planning Commission. The project was extended to include all estuaries in KwaZulu Natal.
24. **Signage Assessments** – Numerous impact assessments for proposed signage developments for Blast Media.
25. **Signage Strategy** – Preparation of an environmental strategy report for a national advertising campaign on National Roads for Visual Image Placements.
26. **Zeekoegatt, Durban** - Computer aided visual impact assessment. Acted as advisor to the Province of KwaZulu-Natal in an appeal brought about by a developer to extend a light industrial development within a 60 metre building line from the National N3 Highway.
27. **La Lucia Mall Extension** - Visual impact assessment using three dimensional computer modelling / photo realistic rendering and montage techniques for proposed extension to shopping mall for public consultation exercise.
28. **Redhill Industrial Development** - Visual impact assessment using three dimensional computer modelling / photo realistic rendering and montage techniques for proposed new industrial area for public consultation exercise.
29. **Avondale Reservoir** - Visual impact assessment using three dimensional computer modelling / photo realistic rendering and montage techniques for proposed hilltop reservoir as part of Environmental Impact Assessment for Umgeni Water.
30. **Hammersdale Reservoir** - Visual impact assessment using three dimensional computer modelling / photo realistic rendering and montage techniques for proposed hilltop reservoir as part of Environmental Impact Assessment for Umgeni Water.
31. **Southgate Industrial Park, Durban** - Computer Aided Visual Impact Assessment and Landscape Design for AECI.
32. **Sainsbury's Bryn Rhos (UK)** - Computer Aided Visual Impact Assessment/ Planning Application for the development of a new store within the Green Wedge North of Swansea.
33. **Ynyston Farm Access (UK)** - Computer Aided Impact Assessment of visual intrusion of access road to proposed development in Cardiff for the Land Authority for Wales.
34. **Cardiff Bay Barrage (UK)** - Concept Design, Detail Design, Documentation, and Visual Input to Environmental Statement for consideration by Parliament in the debate prior to the passing of the Cardiff Bay Barrage Bill. The work was undertaken for Cardiff Bay Development Corporation.
35. **A470, Cefn Coed to Pentrebach (UK)** - Preparation of frameworks for the assessment of the impact of the proposed alignment on the landscape for The Welsh Office.
36. **Sparkford to Illchester Bye Pass (UK)** - The preparation of the landscape framework and the draft landscape plan for the Department of Transport.
37. **Green Island Reclamation Study (Hong Kong)** - Visual Impact Assessment of building massing, Urban Design Guidelines and Masterplanning for a New Town extension to Hong Kong Island.
38. **Route 3 (Hong Kong)** - Visual Impact Assessment for alternative road alignments between Hong Kong Island and the Chinese Border.
39. **China Border Link (Hong Kong)** - Visual Impact Assessment and initial Landscape Design for a new border crossing at Lok Ma Chau.
40. **Route 81, Aberdeen Tunnel to Stanley (Hong Kong)** - Visual Impact Assessment for alternative highway alignments on the South side of Hong Kong Island.

APPENDIX II

GUIDELINES FOR INVOLVING VISUAL AND AESTHETIC SPECIALISTS IN EIA PROCESSES

(Preface, Summary and Contents for full document go to the Provincial Government of the Western Cape, Department of Environmental Affairs and Development Planning web site, http://eadp.westerncape.gov.za/your-resource-library/policies-guidelines)


GUIDELINE FOR INVOLVING VISUAL AND AESTHETIC SPECIALISTS IN EIA PROCESSES
PROVINCIAL GOVERNMENT OF THE WESTERN CAPE:
DEPARTMENT OF ENVIRONMENTAL AFFAIRS
AND DEVELOPMENT PLANNING
bola
CSIR
Edition 1
June 2005

GUIDELINE FOR INVOLVING VISUAL AND AESTHETIC SPECIALISTS IN EIA PROCESSES

Edition 1

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Oberholzer, B. 2005. *Guideline for involving visual & aesthetic specialists in EIA processes: Edition 1.* CSIR Report No ENV-S-C 2005 053 F. Republic of South Africa, Provincial Government of the Western Cape, Department of Environmental Affairs & Development Planning, Cape Town.

ACKNOWLEDGEMENTS

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Stakeholders engaged in the guideline development process:

These guidelines were developed through a consultative process and have benefited from the inputs and comments provided by a wide range of individuals and organizations actively working to improve EIA practice. Thanks are due to all who took the time to engage in the guideline development process.

In particular, thanks are due to Jan Glazewski (University of Cape Town), Keith Wiseman (City of Cape Town), Paul Britton (SANPARKS), Graham Young (University of Pretoria), Lisa Parkes (Ninham Shand) and Paul Claassen (Environomics) for providing useful information and in-depth comments.

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PREFACE

The purpose of an Environmental Impact Assessment (EIA) is to provide decision-makers (be they government authorities, the project proponent or financial institutions) with adequate and appropriate information about the potential positive and negative impacts of a proposed development and associated management actions in order to make an informed decision whether or not to approve, proceed with or finance the development.

For EIA processes to retain their role and usefulness in supporting decision-making, the involvement of specialists in EIA needs to be improved in order to:

- Add greater value to project planning and design;
- Adequately evaluate reasonable alternatives;
- Accurately predict and assess potential project benefits and negative impacts;
- Provide practical recommendations for avoiding or adequately managing negative impacts and enhancing benefits;
- Supply enough relevant information at the most appropriate stage of the EIA process to address adequately the key issues and concerns, and effectively inform decision-making in support of sustainable development.

It is important to note that not all EIA processes require specialist input; broadly speaking, specialist involvement is needed when the environment could be significantly affected by the proposed activity, where that environment is valued by or important to society, and/or where there is insufficient information to determine whether or not unavoidable impacts would be significant.

The purpose of this series of guidelines is to improve the efficiency, effectiveness and quality of specialist involvement in EIA processes. The guidelines aim to improve the capacity of roleplayers to anticipate, request, plan, review and discuss specialist involvement in EIA processes. Specifically, they aim to improve the capacity of EIA practitioners to draft appropriate terms of reference for specialist input and assist all roleplayers in evaluating whether or not specialist input to the EIA process is appropriate for the type of development and environmental context. Furthermore, they aim to ensure that specialist inputs support the development of effective, practical Environmental Management Plans where projects are authorised to proceed (refer to *Guideline for Environmental Management Plans*).

The guidelines draw on best practice in EIA in general, and within specialist fields of expertise in particular, to address the following issues related to the timing, scope and quality of specialist input. The terms "specialist involvement" and "input" have been used in preference to "specialist assessment" and "studies" to indicate that the scope of specialists' contribution (if required) depends on the nature of the project, the environmental context and the amount of available information and does not always entail detailed studies or assessment of impacts.

The guidelines draw on best practice in EIA in general, and within specialist fields of expertise in particular, to address the following issues related to the timing, scope and quality of specialist input. The terms "specialist involvement" and "input" have been used in preference to "specialist

assessment" and "studies" to indicate that the scope of specialists' contribution depends on the nature of the project, the environmental context and the amount of available information.

	ISSUES
TIMING	▪ When should specialists be involved in the EIA process; i.e. at what stage in the EIA process should specialists be involved (if at all) and what triggers the need for their input?
SCOPE	▪ Which aspects must be addressed through specialist involvement; i.e. what is the purpose and scope of specialist involvement? ▪ What are appropriate approaches that specialists can employ? ▪ What qualifications, skills and experience are required?
QUALITY	▪ What triggers the review of specialist studies by different roleplayers? ▪ What are the review criteria against which specialist inputs can be evaluated to ensure that they meet minimum requirements, are reasonable, objective and professionally sound?

The following guidelines form part of this first series of guidelines for involving specialists in EIA processes:

- Guideline for determining the scope of specialist involvement in EIA processes
- Guideline for the review of specialist input in EIA processes
- Guideline for involving biodiversity specialists in EIA processes
- Guideline for involving hydrogeologists in EIA processes
- Guideline for involving visual and aesthetic specialists in EIA processes
- Guideline for involving heritage specialists in EIA processes
- Guideline for involving economists in EIA processes

The *Guideline for determining the scope of specialist involvement in EIA processes* and the *Guideline for the review of specialist input in EIA processes* provide generic guidance applicable to any specialist input to the EIA process and clarify the roles and responsibilities of the different roleplayers involved in the scoping and review of specialist input. It is recommended that these two guidelines are read first to introduce the generic concepts underpinning the guidelines which are focused on specific specialist disciplines.

Who is the target audience for these guidelines?

The guidelines are directed at authorities, EIA practitioners, specialists, proponents, financial institutions and other interested and affected parties involved in EIA processes. Although the guidelines have been developed with specific reference to the Western Cape province of South Africa, their core elements are more widely applicable.

What type of environmental assessment processes and developments are these guidelines applicable to?

The guidelines have been developed to support project-level EIA processes regardless of whether they are used during the early project planning phase to inform planning and design decisions (i.e. during pre-application planning) or as part of a legally defined EIA process to obtain statutory approval for a proposed project (i.e. during screening, scoping and/or impact assessment). Where specialist input may be required the guidelines promote early, focused and appropriate involvement of specialists in EIA processes in order to encourage proactive consideration of potentially significant impacts, so that negative impacts may be avoided or

effectively managed and benefits enhanced through due consideration of alternatives and changes to the project.

The guidelines aim to be applicable to a range of types and scales of development, as well as different biophysical, social, economic and governance contexts.

What will these guidelines not do?

In order to retain their relevance in the context of changing legislation, the guidelines promote the principles of EIA best practice without being tied to specific legislated national or provincial EIA terms and requirements. They therefore do not clarify the specific administrative, procedural or reporting requirements and timeframes for applications to obtain statutory approval. They should, therefore, be read in conjunction with the applicable legislation, regulations and procedural guidelines to ensure that mandatory requirements are met.

It is widely recognized that no amount of theoretical information on how best to plan and coordinate specialist inputs, or to provide or review specialist input, can replace the value of practical experience of coordinating, being responsible for and/or reviewing specialist inputs. Only such experience can develop sound judgment on such issues as the level of detail needed or expected from specialists to inform decision-makers adequately. For this reason, the guidelines should not be viewed as prescriptive and inflexible documents. Their intention is to provide best practice guidance to improve the quality of specialist input.

Furthermore, the guidelines do not intend to create experts out of non-specialists. Although the guidelines outline broad approaches that are available to the specialist discipline (e.g. field survey, desktop review, consultation, modeling), specific methods (e.g. the type of model or sampling technique to be used) cannot be prescribed. The guidelines should therefore not be used indiscriminately without due consideration of the particular context and circumstances within which an EIA is undertaken, as this influences both the approach and the methods available and used by specialists.

How are these guidelines structured?

The specialist guidelines have been structured to make them user-friendly. They are divided into six parts, as follows:

- **Part A**: Background;
- **Part B**: Triggers and key issues potentially requiring specialist input;
- **Part C**: Planning and coordination of specialist inputs (drawing up terms of reference);
- **Part D**: Providing specialist input;
- **Part E**: Review of specialist input; and
- **Part F**: References.

Part A provides grounding in the specialist subject matter for all users. It is expected that authorities and peer reviewers will make most use of Parts B and E; EIA practitioners and project proponents Parts B, C and E; specialists Part C and D; and other stakeholders Parts B, D and E. Part F gives useful sources of information for those who wish to explore the specialist topic.

SUMMARY

This guideline document, which deals with specialist visual input into the EIA process, is organised into a sequence of interleading sections. These follow a logical order covering the following:

- the background and context for specialist visual input;
- the triggers and issues that determine the need for visual input;
- the type of skills and scope of visual inputs required in the EIA process;
- the methodology, along with information and steps required for visual input;
- finally, the review or evaluation of the visual assessment process.

Part A is concerned with defining the visual and aesthetic component of the environment, and with principles and concepts relating to the visual assessment process. The importance of the process being logical, holistic, transparent and consistent is stressed in order for the input to be useful and credible.

The legal and planning context within which visual assessments take place indicate that there are already a number of laws and bylaws that protect visual and scenic resources. These resources within the Western Cape context have importance for the economy of the region, along with the proclaimed World Heritage Sites in the Province.

The role and timing of specialist visual inputs into the EIA process are outlined, with the emphasis being on timely, and on appropriate level of input, from the early planning stage of a project, through to detailed mitigation measures and management controls at the implementation stage.

Part B deals with typical factors that trigger the need for specialist visual input to a particular project. These factors typically relate to:

(a) the nature of the receiving environment, in particular its visual sensitivity or protection status;
(b) the nature of the project, in particular the scale or intensity of the project, which would result in change to the landscape or townscape.

The correlation between these two aspects are shown in a table, in order to determine the varying levels of visual impact that can be expected, i.e. from little or no impact, to very high visual impact potential.

Part C deals with the choice of an appropriate visual specialist, and the preparation of the terms of reference (TOR) for the visual input. Three types of visual assessment are put forward, each requiring different expertise, namely:
Type A: assessments involving large areas of natural or rural landscape;
Type B: assessments involving local areas of mainly built environment;
Type C: assessments involving smaller scale sites with buildings, or groups of buildings.

The scope of the visual input would in summary relate to the following:

- the issues raised during the scoping process;
- the time and space boundaries, i.e. the extent or zone of visual influence;

- the types of development alternatives that are to be considered;
- the variables and scenarios that could affect the visual assessment;
- the inclusion of direct, indirect and cumulative effects.

Approaches to the visual input relate to the level of potential impact and range from minimal specialist input, to a full visual impact assessment (VIA). A list of the typical components of a visual assessment is given, and the integration with other studies forming part of the EIA process is discussed.

Part D provides guidance for specialist visual input, and on the information required by specialists. Notes on predicting potential visual impacts are given, along with suggested criteria for describing and rating visual impacts. The assessment of the overall significance of impacts, as well as thresholds of significance are discussed.

Further aspects that need to be considered by visual specialists in EIA processes include:

- affected parties who stand to benefit or lose,
- risks and uncertainties related to the project,
- assumptions that have been made, and their justification,
- levels of confidence in providing the visual input or assessment,
- management actions that can be employed to avoid or mitigate adverse effects and enhance benefits, and
- the best practicable environental option from the perspective of the visual issues and impacts.

Finally, pointers for the effective communication of the findings are given.

Part E lists specific evaluation criteria for reviewing visual input by a specialist, where this becomes necessary. Further guidance on this is given in the document on *Guideline for the review of specialist input in EIA processes*.

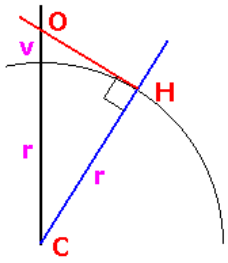
CONTENTS

APPENDIX III

FORMULA FOR DERIVING THE APPROXIMATE VISUAL HORIZON

The Mathematics behind this Calculation

This calculation should be taken as a guide only as it assumes the earth is a perfect ball 6378137 metres radius. It also assumes the horizon you are looking at is at sea level. A triangle is formed with the centre of the earth (C) as one point, the horizon point (H) is a right angle and the observer (O) the third corner. Using Pythagoras's theorem we can calculate the distance from the observer to the horizon (OH) knowing CH is the earth's radius (r) and CO is the earth's radius (r) plus observer's height (v) above sea level.



Sitting in a hotel room 10m above sea level a boat on the horizon will be 11.3km away. The reverse is also true, whilst rowing across the Atlantic, the very top of a mountain range 400m high could be seen on your horizon at a distance of 71.4 km assuming the air was clear enough.

APPENDIX IV

ZONES OF THEORETICAL VISIBILITY

TO BE ADDED

APPENDIX V

CUMULATIVE IMPACT ASSESSMENT

1 GENERAL LANDSCAPE CHANGE AND DEGRADATION OF NATURAL / RURAL CHARACTERISTICS

Nature of impact:

The affected landscape is not a highly natural area. It is also not a particularly cohesive rural landscape.

Current landscape character is affected by major industrial operations as well as strategic electrical infrastructure. It might be best characterised as urban fringe, where the main land uses are rural but there is also a major urban influence provided by infrastructure that is generated by the urban area.

The proposed development alternatives will be seen in different ways relative to existing infrastructure.

	Without mitigation	With mitigation
Extent	**Power line Alternative 3 with TX Substation Site A** Site and immediate surroundings **(2)** **Power line Alternative 4 with TX Substation Site D** Site and immediate surroundings **(2)** **Power line Alternative 6 with TX Substation Site F** Site and immediate surroundings **(2)** **DX Substation Site A** Local **(1)** **DX Substation Site B** Local **(1)** **DX Substation Site C** Site and immediate surroundings **(2)**	All as without mitigation.
Duration	Permanent **(5)**	All as without mitigation.
Magnitude	**Power line Alternative 3 with TX Substation Site A** Minor **(2)** **Power line Alternative 4 with TX Substation Site D** Low to Moderate **(5)** **Power line Alternative 6 with TX Substation Site F** Moderate **(6)**	**Power line Alternative 3 with TX Substation Site A** Minor **(2)** **Power line Alternative 4 with TX Substation Site D** Low to Moderate **(5)** **Power line Alternative 6 with TX Substation Site F** Moderate **(5)**

	DX Substation Site A Small **(0)** **DX Substation Site B** Small to minor **(1)** **DX Substation Site C** Minor **(2)**	
Probability	**Power line Alternative 3 with TX Substation Site A** Improbable **(2)** **Power line Alternative 4 with TX Substation Site D** Probable **(3)** **Power line Alternative 6 with TX Substation Site F** Highly probable **(4)** **DX Substation Site A** Very improbable **(1)** **DX Substation Site B** Improbable **(2)** **DX Substation Site C** Probable **(3)**	**Power line Alternative 3 with TX Substation Site A** Improbable **(2)** **Power line Alternative 4 with TX Substation Site D** Probable **(3)** **Power line Alternative 6 with TX Substation Site F** Probable **(3)**
Significance	**Power line Alternative 3 with TX Substation Site A** Low **(18)** **Power line Alternative 4 with TX Substation Site D** Medium **(36)** **Power line Alternative 6 with TX Substation Site F** High **(52)** **DX Substation Site A** Very Low **(6)** **DX Substation Site B** Low **(14)** **DX Substation Site C**	**Power line Alternative 3 with TX Substation Site A** Low **(18)** **Power line Alternative 4 with TX Substation Site D** Medium **(36)** **Power line Alternative 6 with TX Substation Site F** Medium **(36)**

	Low **(27)**	
Status	The further loss of rural character is likely to be seen in a **negative** light by tourists and visitors.	
Reversibility	Low	Low
Loss of Resources?	Yes	Yes
Confidence in findings	High	
Can impacts be mitigated?	Impacts associated with TX substation alternatives particularly can be part mitigated through screen planting. It is not appropriate to mitigate the impact of the DX substation alternatives on the minor rod to the north as vegetation in this area is relatively natural.	

Mitigation / Management:

Planning:

- Plan screen planting.

Construction:

- Minimise disturbance;
- Undertake screen planting.

Operations:

- Maintain screen planting.

2 THE VISIBILITY OF THE FACILITY TO, AND POTENTIAL VISUAL IMPACT ON FARMSTEADS THAT HAVE BEEN IDENTIFIED AS POTENTIALLY BEING IMPACTED.

Nature:

The impact relates to industrialisation of the outlook from homesteads. There are already extensive sections of electrical infrastructure in the area that impact on homesteads.

TX Powerline alternative 3 with TX Substation alternative A will only impact homesteads that are currently impacted by electrical infrastructure. This alternative will intensify existing impacts on one homestead (Kleinberg). This homestead is currently located close to existing HV power lines to the west. The proposed TX substation alternative A will be located approximately 450m to the east of the homestead.

TX Power line alternative 4 with TX Substation alternative D and TX Power line alternative 6 with TX Substation alternative F will each impact an additional 3 homesteads, all of which will be within 400m of the proposed power line (including Anyskop and Klenberg).

Extent	**All Alternatives** Site and immediate surroundings **(2)**
Duration	**All Alternatives** Long term **(4)**
Magnitude	**Power line Alternative 3 with TX Substation Site A** Low to moderate **(5)**

	Power line Alternative 4 with TX Substation Site D Moderate **(6)** **Power line Alternative 6 with TX Substation Site F** Moderate **(6)**
Probability	**All Alternatives** Probable (**3**).
Significance	**Power line Alternative 3 with Substation Site A** Medium **(33)** **Power line Alternative 4 with TX Substation Site D** Medium **(36)** **Power line Alternative 6 with TX Substation Site F** Medium **(36)**
Status (positive or negative)	The further loss of rural character is likely to be seen in a **negative** light by residents particularly those in closest proximity to the development.
Reversibility	Low
Loss of Resources?	Yes
Can impacts be mitigated?	No
Confidence in findings:	High
Mitigation: Due to the proximity, scale and nature of the proposed development no practical mitigation is possible.	

3 THE VISIBILITY OF THE FACILITY TO, AND POTENTIAL VISUAL IMPACT ON SECTIONS OF THE R27, R45, R399 AND LOCAL ROADS THAT HAVE BEEN IDENTIFIED AS POTENTIALLY BEING IMPACTED.

Nature:

The impact relates to industrialisation of the outlook from roads. There are already extensive sections of electrical infrastructure in the area that impact on roads. The introduction of new electrical infrastructure including a major substation and HV overhead power lines in close proximity to the R27 as well as MV overhead power lines in close proximity to a minor road are likely to increase the extent of industrial elements that are seen from the road.

These roads are important for local and regional tourism.

TX Power line alternative 3 with TX Substation alternative A will impact on a small additional area of the R27 at the crossing point. The proposed substation will be viewed at a distance of approximately 900m from the road.

TX Powerline alternative 4 with TX Substation alternative D will result in the power line impacting on approximately an additional 7km of the R27. The proposed substation will be set back in the order of 500m from the R27 but will be located close to a minor road. This alternative will also require a new 132kV power line running close to and parallel with a minor road for approximately 2km.

TX Powerline alternative 6 with TX Substation alternative F will result in the power line impacting on approximately an additional 7km of the R27. The proposed substation will be located close to the edge of the R27. This alternative will also require a new 132kV power line running close to and parallel with a minor road for approximately 3km.		
	Without mitigation	**With mitigation**
Extent	**Power line Alternative 3 with TX Substation Site A** Site and immediate surroundings **(2)** **Power line Alternative 4 with TX Substation Site D** Site and immediate surroundings **(2)** **Power line Alternative 6 with TX Substation Site F** Site and immediate surroundings **(2)** **DX Substation Site A** Local **(1)** **DX Substation Site B** Local **(1)** **DX Substation Site C** Site and immediate surroundings **(2)**	All as without mitigation.
Duration	**All Alternatives** Long term **(4)**	All as without mitigation.
Magnitude	**Power line Alternative 3 with TX Substation Site A** Small to minor **(1)** **Power line Alternative 4 with TX Substation Site D** Low to Moderate **(5)** **Power line Alternative 6 with TX Substation Site F** Moderate **(6)** **DX Substation Site A** Small **(0)** **DX Substation Site B** Small to minor **(1)** **DX Substation Site C** Minor **(2)**	**Power line Alternative 3 with TX Substation Site A** Small to minor **(1)** **Power line Alternative 4 with TX Substation Site D** Low to Moderate **(5)** **Power line Alternative 6 with TX Substation Site F** Moderate **(5)**
Probability	**Power line Alternative 3 with TX Substation Site A**	**Power line Alternative 3 with TX Substation Site A**

	Improbable **(2)** **Power line Alternative 4 with TX Substation Site D** Probable **(3)** **Power line Alternative 6 with TX Substation Site F** Highly probable **(4)** **DX Substation Site A** Very improbable **(1)** **DX Substation Site B** Improbable **(2)** **DX Substation Site C** Probable **(3)**	Improbable **(2)** **Power line Alternative 4 with TX Substation Site D** Probable **(3)** **Power line Alternative 6 with TX Substation Site F** Probable **(3)**
Significance	**Power line Alternative 3 with TX Substation Site A** Low **(14)** **Power line Alternative 4 with TX Substation Site D** Medium **(33)** **Power line Alternative 6 with TX Substation Site F** High **(48)** **DX Substation Site A** Very Low **(5)** **DX Substation Site B** Low **(12)** **DX Substation Site C** Low **(24)**	**Power line Alternative 3 with TX Substation Site A** Low **(14)** **Power line Alternative 4 with TX Substation Site D** Medium **(33)** **Power line Alternative 6 with TX Substation Site F** Medium **(33)**
Status (positive or negative)	The further loss of rural character is likely to be seen in a **negative** light by residents, visitors and tourists using roads particularly those in closest proximity to the development.	
Reversibility	Low	
Loss of Resources?	Yes	
Can impacts be mitigated?	Impacts associated with TX substation alternatives particularly on the R27can be partly mitigated through screen planting. It is not appropriate to mitigate the impact of the DX substation alternatives on the minor rod to the north as vegetation in this area is relatively natural.	
Confidence in findings:	High	
Mitigation / Management: <u>Planning</u>:		

- Plan screen planting.

Construction:

- Minimise disturbance;
- Undertake screen planting.

Operations:

- Maintain screen planting.

4 THE VISIBILITY OF THE FACILITY TO, AND POTENTIAL VISUAL IMPACT THE TOWNS OF LANGEBAAN, SALDANHA AND VREDENBURG THAT HAVE BEEN IDENTIFIED AS POTENTIALLY BEING IMPACTED

As the proposed development is highly unlikely to be obvious from these areas, cumulative impact is also highly unlikely.

5 THE VISIBILITY OF THE FACILITY TO, AND POTENTIAL VISUAL IMPACT ON THE WEST COAST NATIONAL PARK, THE ELANDSFONTEIN PRIVATE NATURE RESERVE AND AREAS OF HIGH NATURAL SCENIC QUALITY

As the proposed development is highly unlikely to be obvious from these areas, cumulative impact is also highly unlikely.

6 THE VISIBILITY OF THE FACILITY TO, AND POTENTIAL VISUAL IMPACT ON THE COASTAL STRIP AND PARTICULARLY AREAS THAT ARE IMPORTANT FOR TOURISM AND RECREATIONAL USE.

As the proposed development is highly unlikely to be obvious from this areas, cumulative impact is also highly unlikely.

7 THE POSSIBLE IMPACT OF LIGHTING ASSOCIATED WITH THE PROJECT

Nature:

The area in question is already affected by lighting associated with infrastructure and industry. It is therefore not a pristine night time landscape.

The majority of uses are unlikely to be sensitive.

Whilst during daylight hours the various elements are highly unlikely to be obvious from the West Coast National Park and the Elandsfontein Private Nature Reserve, lighting could make the development obvious from the north facing slopes of these areas.

The TX substation is likely to be the most obvious element at a minimum distance of approximately 13km. These elements are generally located away from major existing light sources and pose a risk of floodlighting lighting up large areas of the facilities.

The DX substations are also possible sources of light particularly if floodlighting is used, however, these are closer to existing industry and will be seen in the context of other industrial lighting.

The same issue applies to the northern edge of Langebaan although this area is unlikely to be as sensitive as the protected areas indicated above.

	Without mitigation	**With mitigation**
Extent	**All TX Substation alternatives** Region **(3)**	**All TX Substation alternatives** Region **(3)**
Duration	**All TX Substation**	**All TX Substation**

	alternatives Permanent **(5)**	**alternatives** Permanent **(5)**
Magnitude	**All TX Substation alternatives** Minor **(2)**	**All TX Substation alternatives** Small **(0)**
Probability	**All TX Substation alternatives** Probable **(3)**	**All TX Substation alternatives** Improbable **(2)**
Significance	**All TX Substation alternatives** Low to medium **(30)**	**All TX Substation alternatives** Low **(16)**
Status (positive or negative)	Night time visitors to the protected areas are likely to view additional light pollution as a negative issue.	
Reversibility	High	
Loss of Resources?	No	
Can impacts be mitigated?	Impacts associated with TX substation alternatives particularly on the R27can be part mitigated through screen planting. It is not appropriate to mitigate the impact of the DX substation alternatives on the minor rod to the north as vegetation in this area is relatively natural.	
Confidence in findings:	High	

Mitigation / Management

Planning:
Plan lighting to;

d. Minimise the use of lighting to absolute necessities.
e. Investigate the use of an infra-red security lighting and camera system with normal security lighting coming on only when there is a security breach.
f. Break the HV Yard lighting up into different circuits so only the area to be accesses or worked in is lit.

Ensure that lighting specification and design is undertaken to minimise light pollution on surrounding areas. This should include;

c. Ensuring that there is no light spill outside the HV yard / fence line.
d. Ensuring that all fittings are hooded to prevent glare.

Construction:
Ensure that planned measures are implemented.
Operations:
Maintain lighting and ensure that the planned scheme is not amended or extended.

APPENDIX VI

ENVIRONMENTAL MANAGEMENT PLAN

Project component/s	Saldanha Bay Network Strengthening including; • A new 400kV overhead transmission line; • A new 132kV overhead transmission line; • A new 400/132kV TX substation; and • A new 132/66kV DX substation.		
	Identified impacts include; • Change in Landscape Character; • Visual impact on homesteads; • Visual impact on local roads; • Visual impact on edges of urban areas; • Visual impacts on protected areas; • Visual impact on the coastal strip • Impact of night lighting.		
Activity/risk source	Due to scale and location the majority of impacts cannot be mitigated. The following issues can be addressed; 1. Visibility of the TX substation to local roads; 2. lighting impacts particularly within the substations 3. decommissioning		
Mitigation: Target/Objective	**1. TX SUBSTATION SCREENING** Screen the TX substation where ever possible from adjacent roads. This is particularly important for alternatives D and F. **2. LIGHTING** Ensure that lighting design and implementation is undertaken to minimise light pollution on surrounding areas. **3. DECOMISSIONING** Remove structures and rehabilitate site on decommissioning.		
Mitigation: Action/control		**Responsibility** Contractor (C) Environmental Control Officer (ECO) Environmental Liaison Officer (ELO)	**Timeframe** Construction Phase (C) Operational Phase (O) Decommissioning Phase (D)

. TX SUBSTATION SCREENING		
• Design necessary screen planting	C, ECO, ELO	C
• Implement the necessary screen planting.	C, ECO, ELO	C
• Maintain the necessary screen planting.	C, ECO, ELO	O
. LIGHTING		
• Ensure that lighting specification and design is undertaken to minimise light pollution on surrounding areas. This should include; i. Ensuring that there is no light spill outside the HV yard / fence line. ii. Ensuring that all fittings are hooded to prevent glare.	ECO, ELO	C
• Ensure that lighting system is maintained and functioning as intended to minimise light pollution.	ECO, ELO	O
. DECOMISSIONING		
Ensure that all structures are cleared from site and necessary rehabilitation undertaken.	ECO, ELO, C	D

Performance Indicators	1. Screening of structures from local roads 2. Viewing of night lighting to ensure lighting is concentrated on site. 3. Condition of site following decommissioning
Monitoring	Evaluate screening effect of planted vegetation and augment / maintain as necessary. Evaluate effectiveness of lighting and light pollution measures. Make adjustments as necessary. Take regular time-line photographic evidence. Responsibility: ECO and ELO. Prepare regular reports.