ESKOM TRANSMISSION

Thyspunt Transmission Lines Integration Project

Visual Impact Assessment Study – EIA Phase – Northern Corridor

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1 INTRODUCTION

SiVEST have been appointed by Eskom Transmission to undertake an EIA study for the proposed development of a number of powerlines and associated electricity infrastructure to provide a link between the proposed Thyspunt Nuclear Power Station and the Port Elizabeth area in the Eastern Cape (The Thyspunt Transmission Lines Integration Project - TTLIP). As part of the EIA studies being conducted for the proposed development, the need to undertake a visual impact assessment study has been identified. Accordingly a scoping-level visual impact assessment study was initially conducted to identify all potential visual impacts and issues related to the proposed development. This study has now been followed up with a more detailed visual impact assessment in the EIR phase.

The EIR-phase study aims to identify how the visual environment and in particular the sensitive receptors within the study area may be affected by visual impacts associated with the proposed powerlines. A detailed methodology has been developed to assess the visual impacts associated with the proposed power lines at the level of each receptor.

Three different applications have been submitted to the DEA for different components of the proposed powerlines (the Northern Corridor, the Southern Corridor and a new proposed Port Elizabeth Substation Site). A separate report for each corridor has been compiled. This report assesses the potential visual impacts associated with the Northern Corridor of the proposed powerline. A separate report has been generated for the other components of the proposed development, i.e. the proposed Southern Corridor and the proposed Port Elizabeth Substation. The potential impacts associated with the upgrading of the Grassridge and Dedisa Substations have been included in this report as these substations would fall within an extension of both the Northern and the Southern Corridors.

1.1 Project Description

It is important to note that the two proposed corridors (Northern and Southern) are not alternatives to each other, as both are anticipated to be utilized by Eskom to carry a total of 5 X 400kV lines from the proposed nuclear power station – 2 lines in the Southern Corridor and 3 lines in the Northern Corridor. Rather, the respective corridors will provide adequate space for a number of potential alternative alignments to be located within them.

- The corridors are approximately 2km in width. In certain areas, the corridors are wider or narrower to take into account environmental sensitivities.
- In terms of Eskom standards, a 400kV line will require a servitude of 55m in width
- Assuming the Northern Corridor has 3 lines running parallel within it – the proclaimed servitude will be a total of 165m wide (assuming lines run in parallel)

1.1.1 Tower type

- Currently it is proposed that the Cross Rope Suspension tower will be used. This tower is approximately 40m in height. The total footprint area required for each tower is 70m x 30m (including the support ropes). A diagram of the proposed tower is indicated in section the impact assessment section below.
- Strain towers will also be used.
- The final tower design has not been finalised at this stage.

1.2 Assumptions and Limitations

The identification of visual receptors has been based on feedback from the public, including potentially-affected landowners and other stakeholders. In addition, analysis of the study area tourism and other recreational facilities has been undertaken to identify sensitive receptor locations. A desktop search for households / farmsteads within the corridor using Google Earth has been undertaken. Lastly notes and observations in the field have been used to add to the list of receptors. It should be noted that not all receptor locations may perceive the proposed powerlines in a negative way. Where no receptor or property-specific feedback has been received, a number of broad assumptions have been made in terms of the identification of sensitive receptors; e.g. homesteads / farmsteads in a largely natural setting have been assumed to be likely to be sensitive from a visual perspective.

A matrix has been developed to assist in the assessment of the potential visual impact at each receptor location. The limitations of quantitatively assessing a largely subjective or qualitative type of impact should be noted. The matrix is relatively simplistic in considering four main parameters relating to visual impact, but provides a reasonably accurate indicative assessment of the degree of visual impact likely to be exerted on each receptor location by the EIA Team-preferred route. The results of the matrix should be viewed in conjunction with the visualisation modelling to gain a full understanding of the likely visual impacts associated with the EIA Team-preferred alignment.

Viewsheds have not been generated for the proposed lines due to the complexity associated with generating viewsheds off multiple points on each of the lines. Rather distance banding from the EIA Team-preferred lines has been used to gain an understanding of the level of visual exposure associated with the power line alignments.

The assessment of receptor-based impacts has been based on the EIA Team-preferred alignment for the Northern Corridor. A challenge is posed by the potential ability of the powerlines to be placed anywhere across a ~2km-wide corridor. The numerous permutations for aligning the 3 parallel-running powerlines within the corridor make it impractical to model or rate all of these permutations in this report, hence the use of the EIA Team-preferred alignment for the assessment. This proposed alignment has been carefully selected to avoid impacting receptors in a number of areas along the corridor and has been based upon detailed stakeholder and landowner feedback. It should be noted that this does not represent a 'worst case scenario' for receptor locations in many instances, as the lines have specifically been aligned to avoid sensitive visual receptors as far as possible. However this alignment will be proposed by the EIR as the preferred alignment for the development of the power lines, should they be authorised.

Visualisation modelling has been undertaken for the proposed powerlines. It should be noted that due to budget limitations, the visualisation modelling of the proposed powerlines from all potential receptor locations has not been able to be undertaken. A reflective range of receptor locations for visually sensitive areas has been selected for modelling to provide an indication of the possible likely impact along different parts of the corridor. It should be noted that this modelling is specific to the individual receptor location, and that even receptors in close proximity to one another may be affected in different ways by the proposed powerlines.

The cumulative impact assessment has been undertaken for a number of *proposed* developments within and close to the study area. Many of these proposed developments are in an advanced stage, and a realistic chance exists that at least some of them may be developed. For the purposes of the cumulative impact assessment, a 'worst case' scenario has been examined, with the assumption made that all of the proposed developments would be developed. The information on the visual impacts associated with each proposed development has been taken from each development's EIA and visual impact studies (where available). It should be

noted that it is not part of the scope of this project to undertake an individual receptor-level assessment of the cumulative impacts of all the proposed large-scale developments in the study area.

The proposed Thyspunt HV Yard does not form part of the scope of this investigation, but is being assessed as part of the Nuclear 1 EIA. The HV Yard has however been considered in the cumulative impacts section.

Full technical specifications for the tower types were not made available to SiVEST for modelling purposes and as such the towers depicted in the simulations should not be seen as 100% accurate but rather a realistic representation of what the towers would look like It should also be noted that the final route alignment for the TTLIP and in particular the individual tower positions have not yet been determined and as such the tower positions used in the visual modelling exercise are approximate.

2 STUDY APPROACH AND METHODOLOGY

2.1 Approach related to the Revision of Corridors from the Scoping Phase and through the EIA Phase

At the start of the EIA phase of the project, the corridors were revised from those that were presented in the final scoping report. Figure 1 below indicates the corridors at the end of the scoping phase of the project.

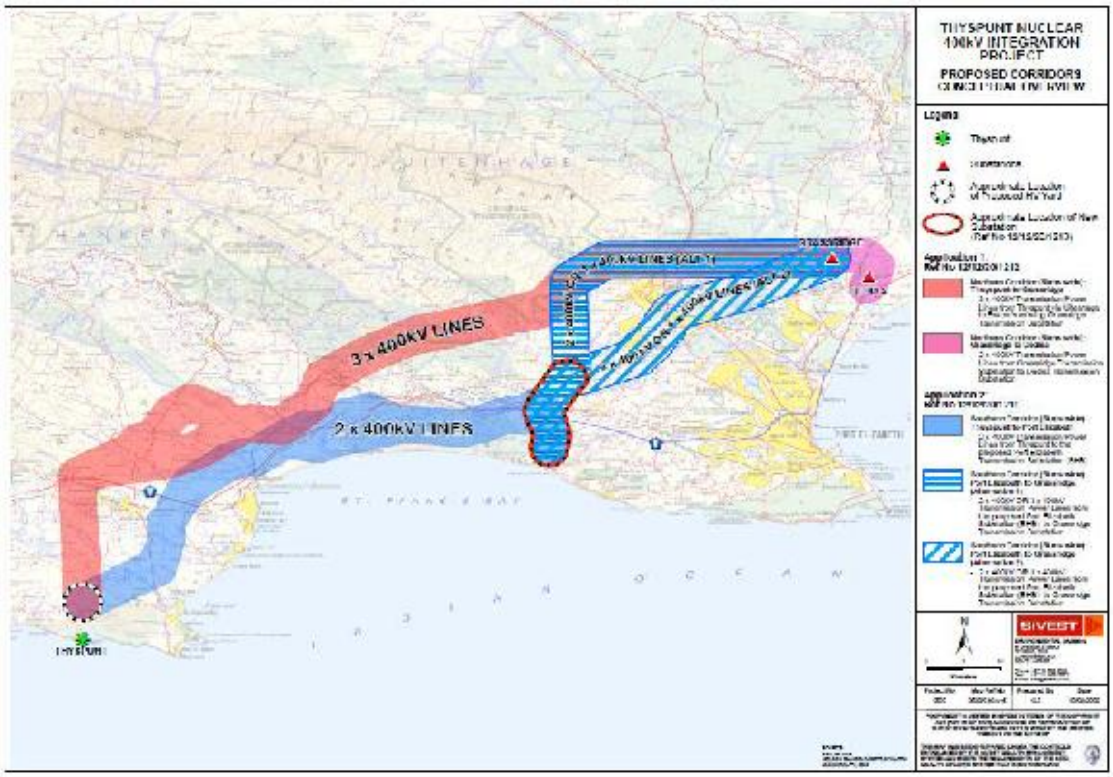

Figure 1 – TTLIP Corridors at the end of the Scoping Phase

At the start of the EIA phase the corridors were revised to take account of a number of environmental issues that emerged as part of the environmental scoping process, and were generally 'narrowed' from a 5km width to a 2km width to allow for more detailed study, and to be in line with a 2km-wide corridor for which Eskom Transmission as the proponent would seek authorisation. The figure below presents the proposed corridors in the early phases of the EIA phase of the project. It should be noted that a detailed account of the corridor routing changes through the history of the project is presented in the draft EIR.

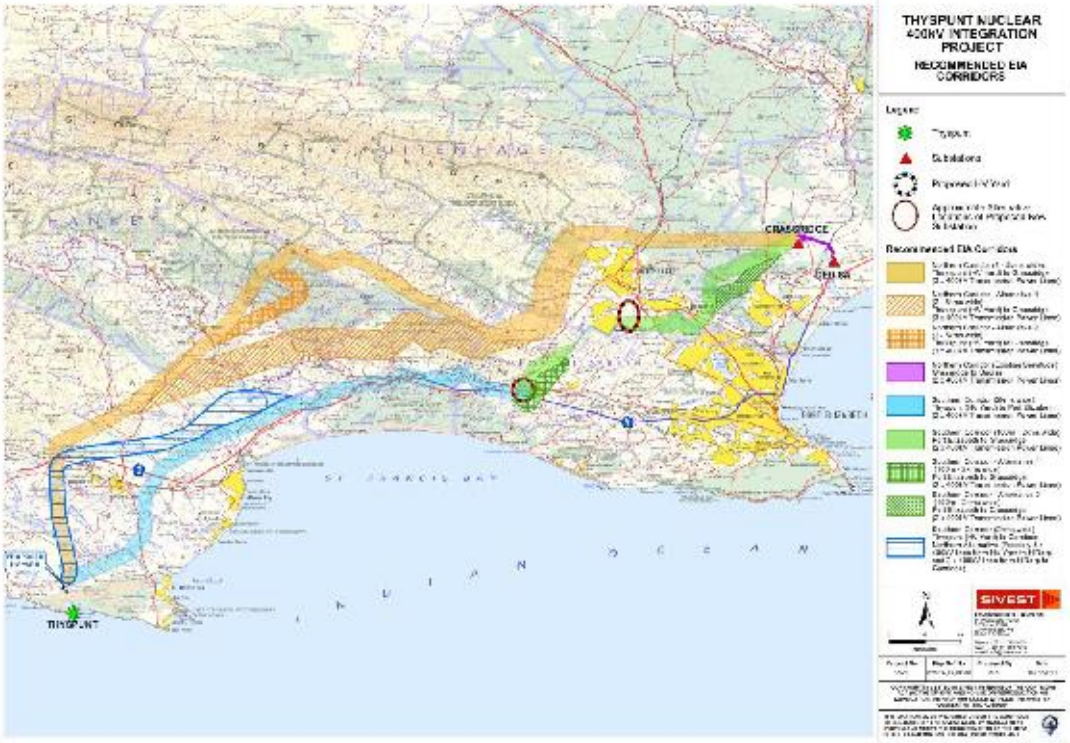

Figure 2 – TTLIP corridors in the early part of the EIA phase of the project

During the EIA phase there were a number of alternatives presented for assessment along sections of both corridors, as shown by the map above. Following a specialist workshop held in early 2011, preferred alternatives (where alternatives along the corridors existed) were selected (please refer to section 5 below for the comparative assessment of alternative sections in the Northern Corridor) and in addition changes to the alignment of the corridors were proposed due to a number of environmental fatal flaws being identified by certain specialist studies, in particular the social and economic studies. Parts of the Southern Corridor were proposed to be discarded, with the Southern Corridor shifting into the southern alternative (Alternative 1) of the Northern Corridor through the Longmore Area, and with the Northern Corridor being routed through the northern Longmore Alternative in this area. These changes are presented in Figure 3 below.

Another outcome of the specialist workshop was the creation of an EIA team preferred alignment; i.e. a proposed alignment of the 2 and 3 lines in the Southern and Northern Corridors respectively. This was undertaken to fulfil the requests of a number of I&APs who requested that a proposed alignment (and not just a wide corridor) be proposed to allow for an understanding of how the proposed powerlines may affect individual properties.

The creation of an EIA Team-preferred alignment has facilitated the undertaking of visual modelling and impact assessment in terms of the visual impact assessment study. It is very difficult to model and accurately assess the visual impacts associated with a proposed powerline based on a wide corridor, in which multiple permutations in terms of alignment of the proposed lines are possible. As such the impact assessment and modelling have been based upon the EIA Team proposed alignment as described below.

In spite of the use of the proposed alignment that is associated with revised corridors being used for impact assessment and modelling, all corridor alternatives that have historically been considered / assessed through the EIA phase of the project are considered in this report as these areas were at one stage potentially subject to visual impacts associated with the proposed power lines. Accordingly, potential sensitive receptor locations within all Southern Corridor versions have been included in this assessment (even those receptor locations which fall within alternatives that have been discarded towards the end of the EIA phase). Due to the shifting of parts of the Southern Corridor into a previous alternative of the Southern Corridor, the following approach has been taken; the former Longmore southern firebreak Alternative of the Northern Corridor (Alternative 1) is being included as part of the Southern Corridor, and receptor locations in this area are assessed in the Southern Corridor Report.

Figure 3 – EIA Team-preferred alignments and associated revised corridors (April 2011)

2.2 Assessment Methodology

2.2.1 Summary of Study Area Visual Character

A summary of the findings of the Scoping Phase visual study assessment of the Study Area's visual environment has been included in this report to contextualise the assessment of potential visual impacts and associated sensitivity. The summary includes a description of the physical characteristics of the Study Area that affect the visual environment, as well as an assessment of visual sensitivity.

2.2.2 Identification of Sensitive Receptor Locations

The visual study has included a refinement of the identification of sensitive receptors within all alternatives of the Northern Corridor considered during the EIA phase of the study from those identified in the Scoping Phase. New / additional receptors have been identified based on the EIA public participation process undertaken to date, and from field-based observation within the new additions to the corridors.

All potential receptor locations have been listed in tabular format, with the receptor name, nature of the receptor (e.g. farmstead, accommodation facility etc.) and the current location of the receptor (within the corridor or within a 2km buffer) presented. A similar table listing roads or railways that could be considered to be visually sensitive has been compiled.

2.2.3 Visual Impact Rating Matrix

In order to assess the impact of the proposed powerlines on the sensitive receptor locations in the study area a matrix that takes into account a number of factors that have a bearing on visual impact is applied to each receptor location within a certain radius of the Northern Corridor. The matrix has been based on a number of factors relevant to the experiencing of visual impacts, and thus provides a combined assessment of the likely visual impact that would be experienced at each receptor location.

2.2.4 Assessment of Visual Impacts associated with the Substations

The visual impacts associated with the upgrading of the existing substations have been undertaken. An examination of the components of the substation upgrades has been undertaken to identify potential visual impacts in both a night-time and day-time context.

2.2.5 Visualisation Modelling

An important aspect of any Visual Impact Assessment is the ability to visualise the proposed development within the context of the local landscape. This requires a clear understanding of the likely shape, size, alignment and location of the proposed development.

In order to visualise the proposed power lines and towers comprising the TTLIP, it was necessary to provide some form of graphic representation or simulation of the proposed development in the relevant landscape. This involved the compilation of three dimensional, scale models of the towers and power lines using 3D modeling software. Using GIS software and Google Earth, the models were then positioned geographically within selected sections of the proposed TTLIP which then allowed for the models to be superimposed on photographs taken from identified sensitive receptor points.

Although this process is not 100% accurate, it provides a useful means of visualising the project for professional teams and for interested and affected local communities.

2.2.6 Cumulative Visual Impact Assessment

An assessment of the likely cumulative visual impacts associated with a number of proposed large-scale power generation (primarily wind farm) developments planned for parts of the study area has been undertaken. These developments could exert a significant visual impact on the landscapes and visual environment within the area and in combination with the proposed powerlines, as assessment of the cumulative impact on the study area has been undertaken.

3 SUMMARY OF SCOPING PHASE VISUAL STUDY

3.1 Physical Landscape Characteristics and Visual Implications

Due to the large area covered by the by the proposed electricity infrastructure, the physical landscape characteristics, such as topography, vegetation cover and prevailing landuse, have been described by dividing the corridor into smaller sections.

3.1.1 Thyspunt High Voltage Yard to Humansdorp

The relatively flat topography becomes gently undulating as the land rises to the north away from the coast, with the Krom, Geelhoutboom and Seekoei river valleys being slightly more incised. Natural dune fynbos and dune thicket prevail on the shifting and stable sand dunes at the coast near Thyspunt, with much of the natural grassy fynbos vegetation to the north up to Humansdorp being transformed by agricultural landuses, in the form of crop cultivation. Thicket-type vegetation and relict patches of indigenous forest still occur in the river valleys.

<u>Visual Implications:</u>
The relatively flat terrain and natural vegetation will result in wide ranging vistas from higher points in the area

3.1.2 Humansdorp to the Gamtoos River Valley

The terrain in this part of the study area is gently undulating. A steep escarpment forms the boundary between the higher-lying plateau and the broad Gamtoos valley floodplain; however the (scoping-phase) corridor descends into the valley along more gently sloping ground. The vegetation comprises of fynbos and grassland, with thicket-type vegetation in river valleys and sloping ground.

<u>Visual Implications:</u>
Wide ranging vistas exist over the plateau, with restricted views in more enclosed river valleys.

3.1.3 Gamtoos River Valley to Loerie

Steeply sloping ground extends from the broad river valley to the town of Loerie. Most of the Gamtoos floodplain has been transformed by agricultural activities, mostly in the form of planted pastures for livestock, except to the east of the floodplain where agricultural areas are mixed with natural thicket.

Visual Implications:
Steeply sloping ground encloses the valley on both sides and restricts views to up and down the valley.

3.1.4 Loerie to Groendal Wilderness Area

To the east of Loerie Dam until the southern part of the Groendal Wilderness Area the terrain is much more hilly and incised with steeply-sloping river valleys in places. Although natural vegetation prevails in the Groendal Wilderness Area, commercial forestry which has completely transformed the natural fynbos and grassland predominates in this part of the study area (the Longmore Forest).

Visual Implications:
Plantations of mature trees will effectively restrict viewsheds and vista over the mountainous terrain. In areas where trees have been cleared or where patches of natural vegetation remain wide ranging vistas will be present from localized areas of higher elevation and will be restricted in steeply incised valleys.

3.1.5 Groendal Wilderness Area to Grassridge Substation

The terrain rises up from the Swartkops valley to the higher ground which is gently undulating. The vegetation comprises of valley bushveld that has been transformed in areas by agricultural activities and urbanisation.

Visual Implications:
The undulating terrain and low natural vegetation results in wide ranging vistas being present from localised higher elevation or areas where the natural vegetation has been cleared.

3.1.6 Grassridge to Dedisa Substation

The study area between the two substations is sparsely populated and the valley bushveld vegetation is relatively undisturbed, however mining activities are being initiated and may transform the area.

Visual Implications:
There is a relatively high density of electrical infrastructure in the area which is visually dominant due to the undulating terrain and low vegetation.

3.2 Visual Character

The above physical landscape characteristics as well as the presence of built infrastructure influence the visual character of the study area. Visual character is defined based on the level of transformation from a completely natural setting, with varying degrees of transformation engendering different visual characteristics.

Most of the study area is considered to have a natural visual character with some areas having a rural or pastoral visual character. Although agricultural landuses have transformed parts of the study area, the area is largely rural and has a 'natural' appearance due to the low density of human habitation and associated human infrastructural footprint. In small areas urbanisation has altered the visual character of the study area; however these areas often occur along more natural portions of the landscape. Although access to the study area will be limited in many parts, the introduction of a powerline is likely to be a degrading factor in the context of the natural visual character.

3.2.1 Potential Visual Absorption Capacity

The visual absorption capacity (VAC) of an area / landscape refers to the ability of the area / landscape to absorb the development without any noticeable intrusion or change to the visual character of the area. It is measured on a scale from high (an area which has a high capacity to absorb the development) to low (an area in which a development would be highly visible and importantly incongruent with its surroundings). It is a function of topography, landuse and land cover, with urban areas having a high VAC and natural areas having a low VAC. Where existing powerlines exist within a landscape, these are likely to substantially increase the VAC of the landscape.

The majority of the study area could be assigned a low VAC due to the largely natural visual character of the study area as well as the limited human settlement and lack existing electrical infrastructure. Only in limited urban areas to the north of Uitenhage and in the Grassridge Area (which is characterised by a density of existing powerline infrastructure) would the VAC be higher.

3.3 Visual Sensitivity

Visual sensitivity is expressed as the sensitivity to new developments which could be perceived as visual impacts. A classification system was used in order to divide the study area into zones of differing visual sensitivity, in order to assist in indentifying areas in which visual impacts are most likely to be experienced and where sensitive receptors are most likely to be located. The study area was divided into areas of high, medium and low sensitivity based on a synthesis of the landuse and land cover of different components of the study area. The table below outlines the landuse / land cover classes assigned for each sensitivity class.

Class of Visual Sensitivity	High	Medium	Low
Land use classes falling into each visual sensitivity zone	-Conservation	-Residential -Subsistence Farming	-Commercial / Industrial -Cultivated land -Forestry -Mining
Landcover classes falling into each visual sensitivity zone*	-Non-degraded shrubland and low fynbos	-Barren Rock -Degraded – shrubland and low fynbos -Thicket and bushland -Waterbodies -Wetlands	-Indigenous Forest -Improved Grassland

Table 1: Landcover / landuse as per visual sensitivity class.

The scoping-phase Northern Corridor passed through areas which were classified primarily as having a high visual sensitivity.

3.4 Presence of Sensitive Visual Receptors

A sensitive receptor is defined as a receptor which would potentially be adversely impacted by a proposed set of powerlines. This takes into account a subjective factor on behalf of the viewer – i.e. whether the viewer would consider the impact as a negative impact. As described above, the adverse impact is often associated with the alteration of the visual character of the area in terms of the intrusion of powerlines into a 'view', which may affect the 'sense of place'. The identification of sensitive receptors has been undertaken based on a number of factors which include:

- the visual character of the area, especially taking into account visually scenic areas and areas of visual sensitivity
- the presence of conserved areas or conservancies, and other 'visually sensitive' landuses
- the presence of leisure-based (esp. nature-based) tourism infrastructure in an area
- feedback from interested and affected parties, as raised during the public participation process conducted as part of the wider EIA study

The map below indicates the location of potential sensitive receptors as identified along the *scoping-phase* Northern Corridor. Sensitive receptor locations are present, but mostly distributed sparsely across the Corridor. This sparse distribution of receptor locations reflects the predominantly rural landuse, very low density of human settlement and habitation, as well as poor public access into most parts of the Northern Corridor. It should be noted that with the alteration of the corridor into the EIA-phase of the project, certain of these receptor locations may no longer be affected by the proposed development.

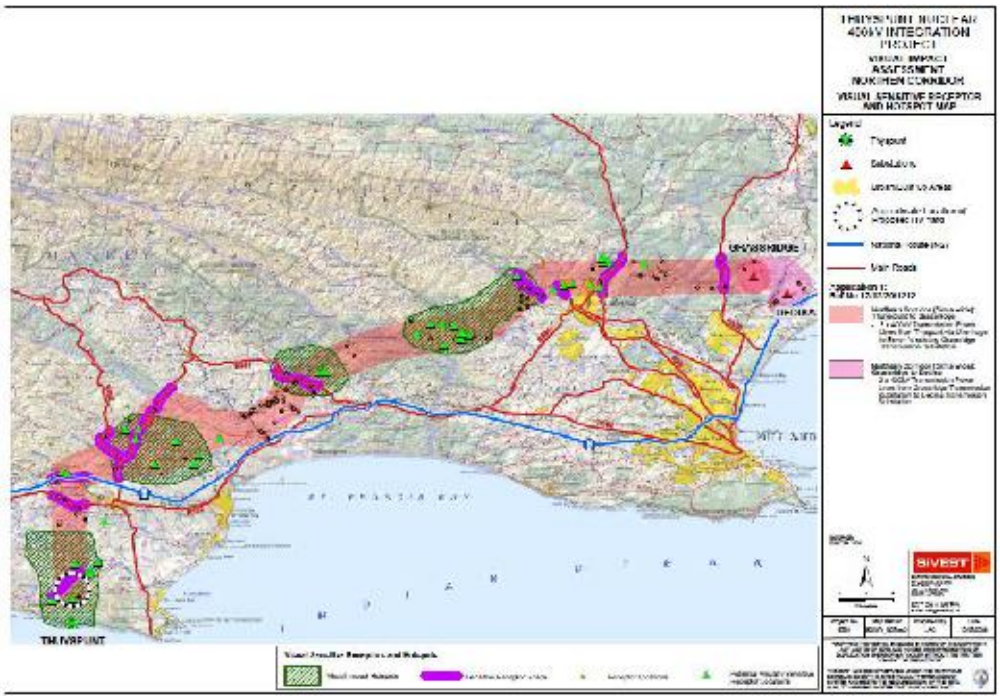

Figure 4 – Receptor locations and Visual 'Hot-spot' areas identified in the Scoping Phase

3.5 Generic Impacts associated with powerlines and substations

Transmission powerline towers are by their nature very large objects and thus highly visible. The standard tower height of the proposed 400kV powerlines is 40m (equivalent in height to a 13-storey building). The height of a tower / pylon thus means that the pylon is typically visible from a large radius around the tower. A powerline consists of a series of towers spaced approximately 400m apart in a linear alignment. The powerline consisting of a number of these tall towers spaced linearly is thus typically highly visible.

The degree of visibility of an object informs the level and intensity of the visual impact, but there are other factors that influence the nature of visual impact. The landscape and aesthetic context of the environment in which the object is placed, as well as the perception of the viewer are also important factors. In the context of powerlines, the type of tower used as well as the degree to which the towers would impinge upon or obscure a view is also a factor in the experiencing of visual impacts associated with the powerline.

As described above, powerlines are not a feature of the natural environment, but are rather representative of human (anthropogenic) alteration of the natural environment. Thus when placed

in a largely natural landscape, powerlines can be perceived to be highly incongruous in the context of the setting. The height and linear nature of powerlines exacerbate this incongruity with the natural landscape, as the towers tend to impinge on views within the landscape. In addition, the practice of clearing a strip of vegetation under the powerline servitude in certain vegetation types can exacerbate the visibility and incongruity of the powerline in a largely natural setting, by causing fragmentation of natural vegetation, thus making the powerline more visible. The cleared strip of land is often highly visible and draws the viewer's attention to the powerline servitude, especially when it occurs within a context of natural thicket / bushveld vegetation where bushes or trees commonly occur.

Powerlines are often perceived to be a source of visual impact if they affect or change the visual quality of a landscape. It is in this context of incongruity with a natural setting that powerlines are often perceived to be a source of visual impact. The perception of the viewer /receptor of impact is also very important, as certain receptors may not consider the development of a powerline to be a visual impact. The perception of visual impacts is thus highly subjective and thus involves 'value judgements' on behalf of the receptor. The context of the landscape character, the scenic / aesthetic value of an area, and the types of landuse practiced tend to affect the perception of whether powerlines are an unwelcome intrusion, and thus the sensitivity of receptors to the erection of powerlines in an area. Powerlines are often perceived as visual impacts where value is placed on the scenic or aesthetic character of an area, and where activities such as tourism are practised which are based upon the enjoyment of, or exposure to, the scenic or aesthetic features of the area. Sensitivity to visual impacts is typically most pronounced in areas set aside for the conservation of the natural environment (such as protected natural areas or conservancies), or in areas in which the natural character or scenic beauty of the area acts as a drawcard for visitors (tourists) to visit the area. Residents and visitors to these areas may perceive powerlines to be an unwelcome intrusion that would degrade the natural character and scenic beauty of the area, and which would potentially even compromise the practising of tourism activities in the area.

Conversely, the presence / existence of other anthropogenic objects associated with the built environment may influence the perception of whether a powerline is a visual impact. Where buildings and other linear structures such as roads, railways and especially other powerlines exist, the visual environment could be considered to be 'degraded' and thus the introduction of a new powerline into this setting may be considered to be less of a visual impact than if there was no existing built infrastructure visible.

Visual impacts can be experienced by different types of receptors, such as people driving along roads, or people living / working in the area in which the powerlines are visible. The receptor type in turn affects the nature of the typical 'view' of a potential source of visual impact, with views being permanent in the case of a residence or other place of human habitation, or transient in the case of vehicles moving along a road. The nature of the view experienced affects the intensity of the visual impact experienced. Viewing distance is a critical factor in the experiencing of visual

impacts, as beyond a certain distance, even large objects such as powerline towers tend to blend in with the landscape. The visibility of an object tends to decrease exponentially with increasing distance away from the object. Other factors, as listed below can impact the nature and intensity of a potential visual impact associated with a powerline:

- the location of a powerline in the landform setting – i.e. in a valley bottom or on a ridge top. In the latter example the powerline would be much more visible and would 'break' the horizon.
- the presence of macro- or micro-topographical features such as buildings or vegetation that would screen views from a receptor position to the powerline.
- The number of powerlines proposed to run in parallel to each other
- temporary factors such as weather conditions (presence of haze, or heavy mist) which would affect visibility

It is important to note that visual impacts are only experienced when there are receptors present to experience this impact; thus in a context where there are no human receptors or viewers present there are not likely to be any visual impacts experienced.

4 EIA PHASE SENSITIVE RECEPTOR LOCATIONS AND HOTSPOTS

4.1 Sensitive Receptor Locations

4.1.1 Sensitive Receptor Locations

The table below lists all of the sensitive receptors that have been identified throughout the EIA phase, that were potentially visually affected by the proposed powerlines. In order to ensure that all sensitive receptor locations along all of the corridor 'versions' have been captured, the Northern Corridors were assimilated into one combined shapefile, and receptor locations within this combined corridor area were identified. As potential visual impacts would be potentially experienced in the immediate area outside of the corridors, receptors within a 2km buffer outside of the boundary of the corridors have also been included. 2km has been chosen as beyond this distance it has been assumed that the visual impact associated with the powerlines would greatly diminish (even if the powerlines were located on the boundary of the corridor). As parts of the Northern Corridor have fallen away since the start of the EIA, certain receptor locations are no longer likely to be affected at all. In order to allow the distinction to be made between receptor locations that are still likely to be affected and those that are not, the table lists the position of the receptor in relation to both the corridor at the start of the EIA phase. The table has been colour coded for ease of reference:

Position within the Corridor:
Within Corridor
Within 2km buffer
Outside 2km buffer

It should be noted that one of the Northern Corridor alternatives (at the start of the EIA phase), Alternative 1 (the southern Longmore alternative) now forms part of the Southern Corridor. In order to lessen confusion, *it should be noted that the receptor locations potentially affected by this part of the corridor are not included in this report, but in the southern corridor report*.

Figure 5 – A homestead on the Rondebosch Farm to the north of Humansdorp – a typical receptor location

Receptor Location	Type of Receptor	Within / out of corridor? (Start of EIA phase)	Within / out of corridor? (as at April 2011)
Penny Sands	Farmstead	Outside of corridor at start of EIA phase	Within Revised EIA Corridor
Lappie-aarde	Farmstead	Outside of corridor at start of EIA phase	Within 2km buffer
Geelhoutboom Farmstead West	Farmstead and Game Farm	Within corridor at start of EIA phase	Within Revised EIA Corridor
Geelhoutboom Farmstead East	Farmstead and Game Farm	Within corridor at start of EIA phase	Within Revised EIA Corridor
Die Berg	Community	Just outside corridor at start of EIA phase	Within Revised EIA Corridor
Zwartenbosch Golf Estate	Golf Course and proposed housing estate	Outside of corridor at start of EIA phase	Within 2km buffer
Rondebosch Farmstead	Farmstead	Outside of corridor at start of EIA phase	Within 2km buffer
Rondebosch Restaurant and Tenant's House	Restaurant and Homestead	Outside of corridor at start of EIA phase	Within 2km buffer
Honeyville	Homestead	Just outside corridor at start of EIA phase	Outside of 2km buffer
Honeyville Private Nature Reserve and proposed re-burial (Heritage) site	Protected Area and Heritage Site	Part of Nature Reserve = within corridor at start of EIA phase Heritage site = within corridor at start of EIA phase	Nature Reserve = partly within 2km buffer and partly outside 2km buffer; Heritage site = within 2km buffer
Honeyville Proposed	Proposed cultural centre	Within corridor at start of EIA	Within 2km buffer

Receptor Location	Type of Receptor	Within / out of corridor? (Start of EIA phase)	Within / out of corridor? (as at April 2011)
Cultural Centre		phase	
Honeyville Proposed Eco-village	Housing	Just outside corridor at start of EIA phase	Outside of 2km buffer
Weltevrede	Farmstead	Just outside corridor at start of EIA phase	Outside 2km buffer
Chan Te Mar Hunting Game Farm	Owner (guest accommodation) Residence	Within corridor at start of EIA phase	Outside 2km buffer
Chan Te Mar Hunting Game Farm	Guest Accommodation near biltong making building	Within corridor at start of EIA phase	Outside 2km buffer
Chan Te Mar Hunting Game Farm	Manager's Residence	Within corridor at start of EIA phase	Outside 2km buffer
Antonieskraal	Farmstead	Outside of corridor at start of EIA phase	Within Revised EIA Corridor
Sarah Baartman Monument and Sundial	Monument (Heritage Site) and Proposed Cultural Centre	Just outside corridor at start of EIA phase	Outside of 2km buffer
Putters Inn B&B	Accommodation Facility	Just outside corridor at start of EIA phase	Outside of 2km buffer
Heuningkloof Farmstead	Farmstead	Outside of corridor at start of EIA phase	Outside of 2km buffer
Loerie Ruskamp – Main Building	Pub and camping	Within corridor at start of EIA phase	Within 2km buffer
Loerie Ruskamp – Accommodation – Old Saal	Accommodation Facilities	Within corridor at start of EIA phase	Within 2km buffer
Loerie Ruskamp –	Accommodation Facilities	Within corridor at start of EIA	Within 2km buffer

Receptor Location	Type of Receptor	Within / out of corridor? (Start of EIA phase)	Within / out of corridor? (as at April 2011)
Accommodation – Rondawels		phase	
Loerie Ruskamp – Accommodation – Klein Skool	Accommodation Facilities	Outside of corridor at start of EIA phase	Within 2km buffer
Loerie Ruskamp – Accommodation – Moreson Farmhouse	Accommodation Facilities	Outside of corridor at start of EIA phase	Within 2km buffer
R331 Road stall / Farm stall	Road stall / Farm stall (Currently closed)	Outside corridor at start of EIA phase	Within 2km buffer
Sand River Lodge	Accommodation Facility	Outside corridor at start of EIA phase	Within 2km buffer
Owners House (Sand River Lodge)	Homestead	Just outside corridor at start of EIA phase	Within 2km buffer
Tanglewood	Homestead	Just outside corridor at start of EIA phase	Within 2km buffer
Burrows Hiking and Bush Camp	Accommodation Facility and Leisure Facilities	Within corridor at start of EIA phase	Within 2km buffer
Vrede	Homestead / Farmstead	Outside corridor at start of EIA phase	Within 2km buffer
Gumdale	Homestead / Farmstead	Outside corridor at start of EIA phase	Within 2km buffer
La Rochelle	Homestead / Farmstead	Outside corridor at start of EIA phase	Within 2km buffer
Old House – Bulk River		Just within corridor at start of	Within 2km buffer

Receptor Location	Type of Receptor	Within / out of corridor? (Start of EIA phase)	Within / out of corridor? (as at April 2011)
Dam		EIA phase	
Peerboom	Homestead / Farmstead	Outside corridor at start of EIA phase	Within 2km buffer
Hillingdon	Homestead / Farmstead	Outside corridor at start of EIA phase	Within 2km buffer
Solitude (Owner's Residence and Guest house)	Homestead (owners) & Accommodation Facility	Just outside corridor at start of EIA phase	Within 2km buffer
Offcamber Bush Camp	Accommodation Facility	Outside corridor at start of EIA phase	Within 2km buffer
Waverley Hills	Homestead and Accommodation Facility	Outside corridor at start of EIA phase	Within 2km buffer
Uitkyk and Brakkefontein Farmsteads	Homestead / Farmstead	Within corridor at start of EIA phase	Within 2km buffer
Ranger Hills	Homestead / Farmstead	Within corridor at start of EIA phase	Within 2km buffer
The Chalet Farmstead – North	Homestead / Farmstead	Within corridor at start of EIA phase	Within 2km buffer
The Chalet Farmstead – South	Homestead / Farmstead	Within corridor at start of EIA phase	Within 2km buffer
High Ridge Farmstead	Homestead / Farmstead	Outside corridor at start of EIA phase	Within 2km buffer
Holrivier Farmstead West	Homestead / Farmstead	Outside corridor at start of EIA phase	Within 2km buffer
Holrivier Farmstead East	Homestead / Farmstead	Outside corridor at start of EIA phase	Within 2km buffer

Receptor Location	Type of Receptor	Within / out of corridor? (Start of EIA phase)	Within / out of corridor? (as at April 2011)
Ampé ni Farmstead North	Homestead / Farmstead	Outside corridor at start of EIA phase	Within 2km buffer
Ampé ni Farmstead South	Homestead / Farmstead	Outside corridor at start of EIA phase	Within 2km buffer
Various Homesteads / Farmsteads along the Elands River Road west of Rocklands	Homesteads / Farmsteads	Outside corridor at start of EIA phase	Outside 2km buffer
Paardehoek Farmstead West	Homestead / Farmstead	Within corridor at start of EIA phase	Within Revised EIA Corridor
Paardehoek Farmstead East	Homestead / Farmstead	Outside corridor at start of EIA phase	Within 2km Buffer
Mimosadale West / Ruigte Vlei Game Farm (incl. Echodale)	Game Farm (Hunting), owner's Homestead and Proposed Hunting Accommodation (Echodale old farmstead)	Within corridor at start of EIA phase	Within 2km buffer
Echodale - owner's house	Farmstead	Within corridor at start of EIA phase	Within 2km buffer
Echodale - old farmhouse (proposed accommodation)	Proposed Hunting Accommodation	Within corridor at start of EIA phase	Within 2km buffer
Wincanton Old Farmstead (proposed accommodation	Proposed Hunting Accommodation	Within corridor at start of EIA phase	Within Revised EIA Corridor
Wincanton Old House	Proposed Hunting Accommodation	Within corridor at start of EIA	Within Revised EIA Corridor

Receptor Location	Type of Receptor	Within / out of corridor? (Start of EIA phase)	Within / out of corridor? (as at April 2011)
(proposed accommodation)		phase	
Blouberg Farmstead	Homestead / Farmstead	Outside corridor at start of EIA phase	Within 2km buffer
Sonneheuwels	Homestead	Just outside corridor at start of EIA phase	Within 2km buffer
Plumbago Hills	Conference Venue and Homestead	Within corridor at start of EIA phase	Within Revised EIA Corridor
Buffelsfontein Farmstead	Farmstead	Within corridor at start of EIA phase	Within Revised EIA Corridor
Rooiland Farmstead	Farmstead	Within corridor at start of EIA phase	Within Revised EIA Corridor
Groendal – Offices and start of trails	Nature Conservation Facility	Outside corridor at start of EIA phase	Within 2km buffer
Groendal – Hiking trails	Wilderness area / hiking trails	Outside corridor at start of EIA phase	Within 2km buffer
Northern parts of Uitenhage (Vanes Estate & Levydale)	High income suburban area	Outside corridor at start of EIA phase	Within 2km buffer
Uitenhage Concentration Camp Monument and facility	Historical Monument and Cultural Facility	Within corridor at start of EIA phase	Within Revised EIA Corridor
Springs Municipal Resort	Pleasure Resort	Outside corridor at start of EIA phase	Within 2km buffer
Springs Nature Reserve	Hiking trails in Municipal Nature	Outside corridor at start of	Outside 2km buffer

Receptor Location	Type of Receptor	Within / out of corridor? (Start of EIA phase)	Within / out of corridor? (as at April 2011)
	Reserve	EIA phase	
Doornkom Safaris	Hunting Farm and owner's residence	Outside corridor at start of EIA phase	Outside 2km buffer
Hexagon	Wedding Venue and B&B	Within corridor at start of EIA phase	Within 2km buffer
Amanzi Estate (proposed golf estate development)	Proposed Golf Estate and Residential Development	Within corridor at start of EIA phase	Within 2km buffer
Coega Ridge (Proposed Eco Estate)	Proposed Lodge	Within corridor at start of EIA phase	Within 2km buffer
Coega Ridge (Proposed Eco Estate)	Proposed Eco (residential) Estate – middle income housing and golf estate	Outside corridor at start of EIA phase	Within and outside of 2km buffer

Table 2 – Sensitive Receptor Locations within the Northern Corridor

Maps of all of these Receptor locations have been generated and are presented in Appendix A. The maps show the location of the receptor locations in relation to:

- the proposed EIA Team-preferred alignment for the Northern Corridor
- the Northern Corridor
- the distance banding associated with the proposed Northern Corridor alignment

It should be noted that the EIA Team-preferred alignment for the Southern Corridor has also been presented on the maps to allow an understanding to be gained of the proximity of the two sets of alignments, where relevant. A separate set of maps has been collated for the Southern Corridor, and these maps should be consulted to see how receptor locations fall within the Southern Corridor and the associated distance banding.

4.1.2 Sensitive Receptor Roads

A number of sensitive receptor roads and one railway) are present within the study area. Visually-sensitive receptor roads were identified in the scoping phase of the project, and these have been refined based on the revised EIA Southern Corridor. These roads are typically located within areas of high scenic beauty, or along tourist routes which would be accessed in many cases as a way to appreciate the natural beauty of the area, or to access tourist facilities. Experiencing views of power lines may be associated with a visual impact, as the powerlines may be perceived to be incongruous in this setting.

Figure 6 - a roadside view from the R332 in the Honeyville area.

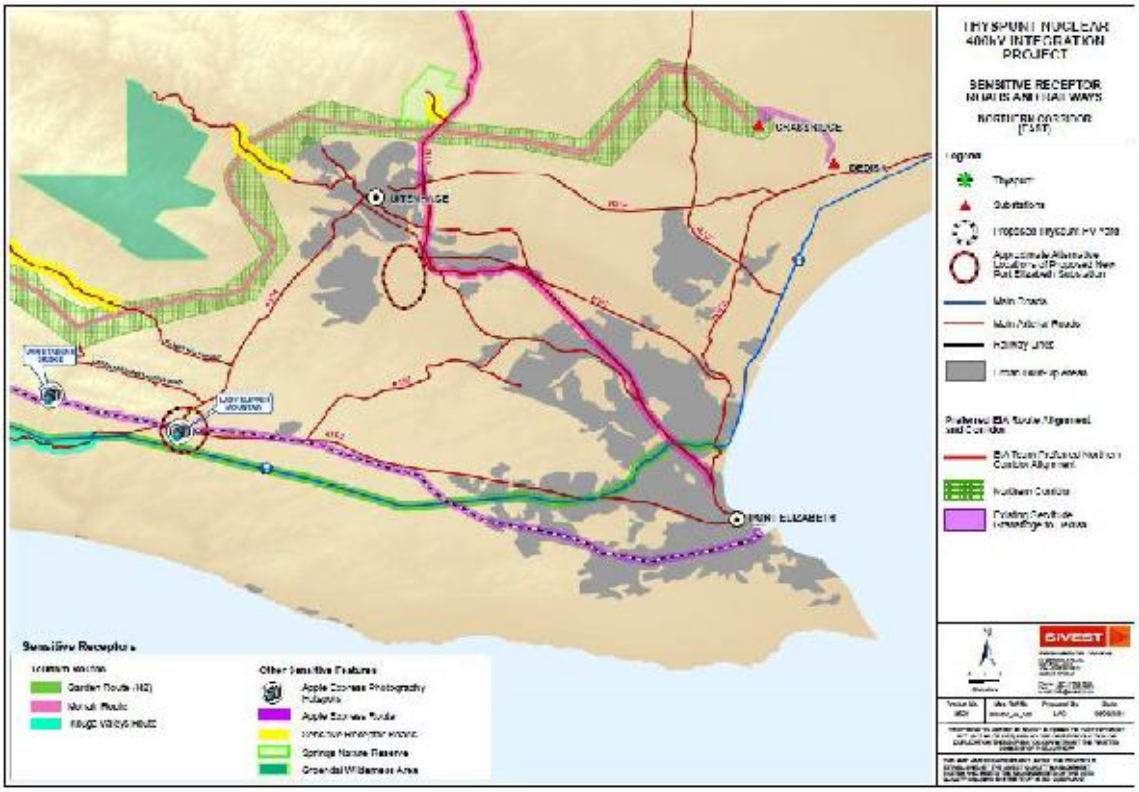

Figure 7 - Eastern section of the study area showing sensitive receptor roads in relation to the Northern Corridor

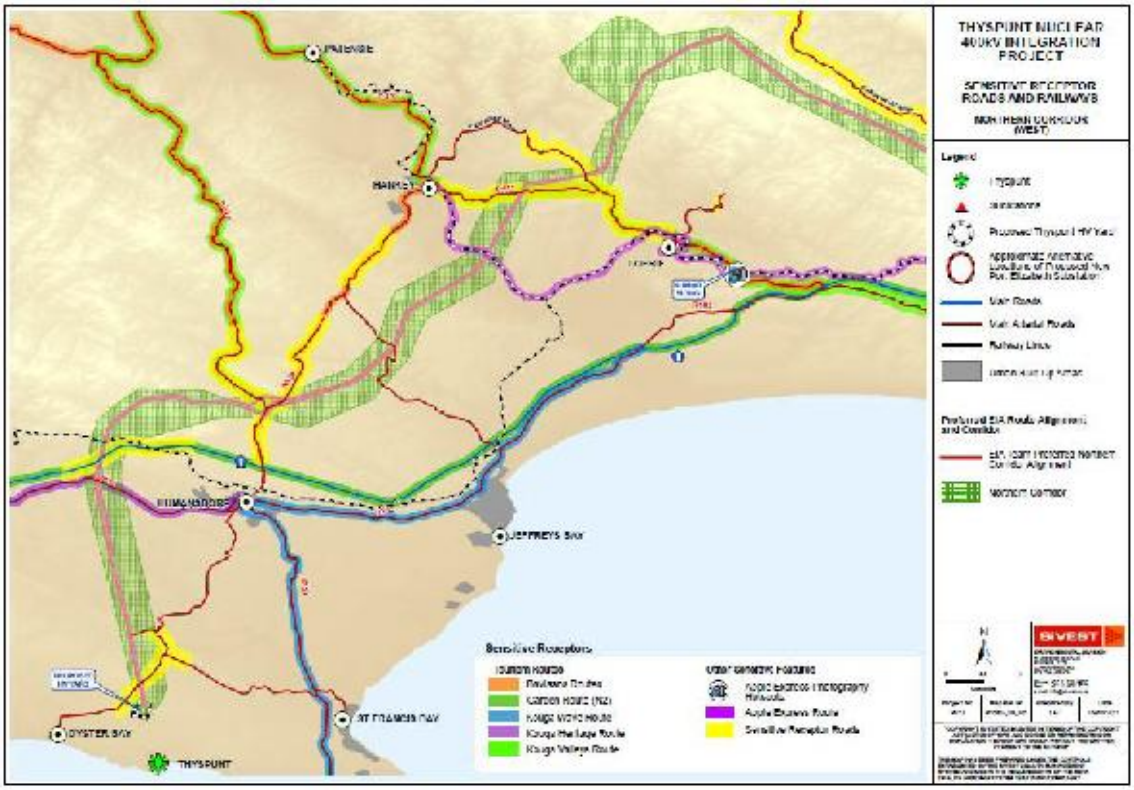

Figure 8 - Western section of the study area showing sensitive receptor roads in relation to the Northern Corridor

The following roads have been identified as carrying receptors that may potentially be sensitive to visual impacts:

Road Stretch	Visual Sensitivity
The St. Francis Bay-Oyster Bay un-surfaced road	-Main access to the town of Oyster Bay (tourism location); passes through a largely unspoilt natural area close to the dune fields
N2 highway north and north-west of Humansdorp	-Arterial road carrying much tourist local access traffic and traffic to and from the Garden Route -Passes close to the scenic range of hills to the north and north-west of Humansdorp
R330 north of Humansdorp	-Forms part of a local tourist route -To the north of Humansdorp passes through a highly scenic, natural area consisting of natural grassy fynbos and hills
R332 (un-surfaced road) north of Humansdorp	-Forms part of a local tourist route -Passes through a highly scenic, natural area consisting of hilly terrain -Access route to planned tourism and heritage sites in the Honeyville area
R330 Hankey Pass	-Forms part of a local tourist route -To the north of Humansdorp passes through a highly scenic, natural area
R331 between Hankey and Loerie	-Local tourist route – part of the access to the Baviaanskloof and to the Sara Baartman Monument -Highly scenic road that follows high ground in hilly, natural terrain with highly scenic vistas of the surrounding areas
Loerie Ruskamp and Klein Rivier access road	-access road to the Loerie Ruskamp (tourism attraction) -highly scenic road with vistas to the natural hilly terrain and the distant coast to the south
Elands Valley Road (un-surfaced)	-Local access to a number of tourism facilities within the Elands River Valley -Parts of the road (especially further west) are highly scenic with clear vistas to the natural ridge to the south and over the valley and the distant Groendal Wilderness Area to the north
Local access road to the Groendal Wilderness Area Offices	-access road to the Groendal Wilderness area (tourism attraction) -the road runs into a highly scenic area of natural hilly terrain
Local access road to the Springs Nature Reserve	- access road to a tourist attraction
The Apple Express	-The Apple Express is a tourist attraction, part of which is based

Road Stretch	Visual Sensitivity
Railway	on the scenery it passes through -Passes through a number of very scenic areas including the Red Cliffs of the Gamtoos valley

Table 3 – Visually sensitive roads in the Northern Corridor

The maps above indicate these receptor roads and the route of the Apple Express. The potential impact of the proposed Northern Corridor powerlines on these roads and railways is assessed in the impact assessment section below.

5 COMPARATIVE ASSESSMENT OF ALTERNATIVE SECTIONS WITHIN THE NORTHERN CORRIDOR

Three alternative sections were presented for comparative assessment in the Northern Corridor during the early part of the EIR phase. A comparative assessment of the Alternatives from a visual perspective has thus been undertaken. The table below undertakes the comparative assessment of the Longmore Alternatives 1, 2 and 3 though a comparative assessment of the relative number of sensitive receptors that could be affected, as well as the examination of visual hotspots potentially affected. Although this approach is simplistic, it does provide a means by which to comparatively assess the alternatives. It should be noted that Alternatives 2 and 3 have been grouped in one of the scenarios as Alternative 2 is a deviation off Alternative 3. In the context of the assessment a fatal flaw can be considered to be an impact or series of negative impacts that would be unable to be mitigated to an acceptable level.

Alternative Section	Number of Sensitive Receptors potentially affected	Areas of Visual Sensitivity Traversed / Affected	Fatal Flaws
Alternative 1 (Southern Firebreak Alternative)	17	-The Bergrivier Accommodation Facilities and Hiking Trails -The Loerie Dam area	No
Alternative 2 (Northern Firebreak Alternative)	18	--The Elands River Valley Conservancy	Yes
Alternative 2/3 (Northern Firebreak Alternative)	23	-The Loerie Ruskamp Accommodation Facilities -The Elands River Valley Conservancy	Yes

Table 4 – Comparative Assessment of Alternatives within the Northern Corridor

The relative number of sensitive receptors affected by the alternatives is similar, with Alternative 2/3 potentially affecting the greatest number. All of the alternative sections traverse visually sensitive areas, however an examination of the spatial extent of the areas in relation to the corridors (refer to figures 4 and 14) indicates that the Bergrivier and Loerie Dam visual 'hotspots' could be avoided by the power lines through a northerly alignment within Alternative 1. On the other hand the Loerie Ruskamp visual 'hotspot' stretches across the entire width of Alternative 2, and the very importantly the Elands River Conservancy hotspot traverses a very large area of Alternative 3. In this context the entire valley along the length of Alternative 3 within it could be considered to be visually sensitive, as it contains a number of visually sensitive homesteads / farmsteads as well as tourism facilities. It is for this reason that this part of Alternative 2 and Alternative 2/3 can be considered to be a fatal flaw. This is particularly relevant in the context of the 3 sets of power lines potentially being located on the southern ridge that forms the boundary and edge of the visual envelope of the Elands River Valley. On the southern side of the valley the ground rises up from the valley to form low hills that run parallel to the valley. The Longmore Forest Northern Firebreak is located along this southern-most edge of the valley, and as such these hills are natural in character, not being planted with forestry. This natural character of the prominent ridge / hills is an important component of the natural character of the entire valley as this area is visually prominent. The northern part of Alternative 3 traverses the ridge down to the Elands River Valley road which runs at the base of the hills. Placing the power lines on the hills (if the lines were to be aligned along the Longmore Northern Firebreak) would mean that the power lines would be highly visually intrusive, and would entail that the visual character of this part of the valley and the 'sense of place' would be likely to be degraded.

It is in the context of the visual fatal flaw associated with the Elands River that Alternative 1 was deemed to be the preferred alternative section.

The recommendation made by the social and economic specialists that the parts of the Southern Corridor between the Gamtoos Valley and Rocklands move northwards into Alternative 1 of the Northern Corridor (please refer to section 2 of this report, above) has potential implications for the above recommendations, as the Northern Corridor would then have to be located through Alternative 3. This recommendation that was accepted by the project EIA and specialist team at a workshop in January 2011 was problematic from a visual perspective as the Northern Corridor would then run through an area identified as a visual fatal flaw. This was discussed at the specialist workshop, and it was agreed that the Alternative 3 could be used subject to an important proviso; the fatal flaw as discussed above relates to the potential visibility and intrusiveness of the lines to receptors within the valley. Alternative 3 could be used if the lines were placed out of the viewshed of the Elands River Valley. This would necessitate the shifting of the corridor further to the south into the Longmore Forest. This is discussed in further detail in Section 6 below.

6 IMPACT ASSESSMENT

6.1 Visual Impact Assessment Matrix

In order to assess the impact of the proposed powerlines on the sensitive receptor locations listed above that are potentially affected by the northern corridor proposed lines, a matrix that takes into account a number of factors has been developed, and is applied to each receptor location. Additionally visualisation modelling of the proposed powerlines from a number of key sensitive receptor locations has been undertaken to provide a realistic picture of how the visual environment of different parts of the study area may be affected.

The matrix has been based on a number of factors as listed below:

- Distance of receptor away from the lines (distance banding)
- Primary focus / orientation of the receptor
- Presence of screening factors (topography, vegetation etc.)
- Visual context

These factors are considered to be the most important factors when assessing the visual impact of a proposed development on a sensitive receptor. It must be remembered that the experiencing of visual impacts is a complex and qualitative phenomenon, and thus difficult to accurately quantify; thus the matrix should be seen as a representation of the likely visual impact at a receptor location. The matrix should be viewed in combination with the powerline visualisation images below to gain an understanding of the likely visual impact associated with the powerlines in a certain area.

An explanation of the matrix follows.

Factor	Classes and Scores			
Distance of Receptor away from proposed alignment (distance banding)	0-499m Score: 4	500-999m Score:3	1-2km Score:2	>2km Score:1
Primary Focus / orientation of receptor	'Arc of view' directly towards proposed lines Score:4		'Arc of view' partially towards proposed lines Score:2	'Arc of view' in opposite direction towards proposed lines Score:1
Presence of Screening Factors	No screening factors – lines highly visible Score:4		Screening factors partially obscure powerlines Score:2	Screening factors completely block any views towards powerlines Score:1
Visual Context	Visual context highly natural; no visually 'degrading' factors Score:4	Visual environment rural / pastoral with typical rural infrastructure Score:3	Partially transformed visual context (e.g. outlying residential areas) with partial presence of industrial-type infrastructure Score:2	Transformed visual context (e.g. industrial) and / or high degree of industrial-type anthropogenic objects present Score:1

Table 5 – Explanation of the Visual Impact Matrix

Categories of impact:
High Visual Impact = >3-4
Medium Visual Impact = >2-3
Low Visual Impact = 1-2

The distance of the viewer / receptor location away from the powerline is the most important factor in the context of the experiencing of visual impacts. Beyond a certain distance, even large structures such as power lines tend to be much less visible, and are difficult to differentiate from the surrounding landscape. The visibility of an object is likely to decrease exponentially with increasing distance away from the object, with maximum impact being exerted on receptors at a distance of 500m or less. The impact decreases exponentially as one moves away from the source of impact, with the impact at 1000m being a quarter of the impact at 500m away (see the figure below). At 5000m away or more, the impact would be negligible.

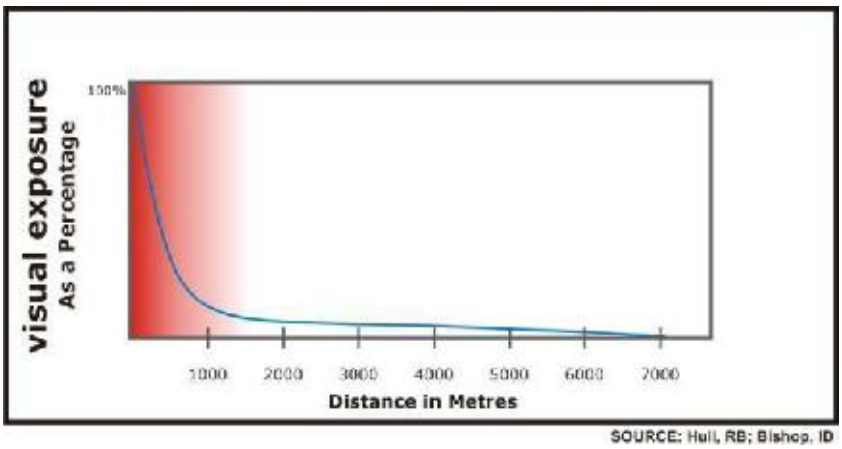

Figure 9 Diagram illustrating diminishing visual exposure over distance

The highest rating has thus been assigned to receptor locations that are located within 0-500m of the proposed alignment. Beyond 2km, the visual impact associated with a powerline is likely to be insignificant, and any receptor location beyond 2km from the proposed alignment has been allocated into the lowest class.

The orientation of a receptor becomes important in many cases, as the receptor location is typically oriented in a certain direction, e.g. with views towards a certain area / part of the landscape from a highly frequented area like a porch or garden. The visual impact of a set of powerlines could be potentially much greater if powerlines intruded into such a view, and thus the highest rating has been given to a situation where the powerlines would cross directly across an 'arc of view / orientation' – i.e. the 180° panorama in a certain direction.

The presence of screening factors is equally as important in this context in many circumstances as the distance away from the powerlines. Screening factors can be vegetation, buildings, as well as topography. For example a grove of trees located between a receptor location and a set of powerlines could effectively completely shield the lines from the receptor. Topography (relative elevation and aspect) plays a similar role as a receptor location in a deep or incised valley will have a very limited viewshed and may not be able to view an object that is close by, but not in its

viewshed. The opposite applies, and tall objects such as powerlines that cross a ridge would be highly visible.

Figure 10 – Part of the view from the porch of a receptor location, note the screening played by the hills in the background – powerlines aligned behind these hills would not be visible

Visual context is the last factor considered in the matrix. This factor attempts to bring in the visual environmental context, which is important, as much of the study area is largely natural in character, with the aesthetic quality of the area and sense of place being an important drawcard to the area. Placing 3 sets of parallel-running powerlines in this context has the potential to adversely affect or degrade the natural visual environment of these areas. Receptors in these areas are typically most sensitive to visual changes that would be brought about by powerlines being placed in such a landscape. Many parts of the study area are somewhat visually altered from a completely natural state due to agricultural activities such as crop cultivation, planting of pastures etc. Although there is a relative density of anthropogenic (human) infrastructure (e.g. fences, centre pivots, buildings such as barns and farmhouses) and influence on the landscape (for example the presence of groves of tall exotic trees), this type of 'pastoral' or rural landscape is often perceived as sensitive to visual impacts associated with more industrial or large-scale infrastructure such as powerlines. The second most sensitive class is thus assigned to this landscape. The relative degree of intrusion of large-scale or industrial-type infrastructure into a landscape as well as the degree of change of visual environment is reflected in the last two classes of visual context.

Figure 11 – A highly natural vista in the Burghley Hills area

Urban settings are typically highly visually transformed, and the presence of powerlines in this environment would typically not be seen as intrusive. Residential areas may be associated with more visual sensitivity, especially those areas present in parts of the study area that have views onto surrounding natural areas. This context is captured in the 3rd class of sensitivity. Less built up areas may have a profusion of existing large-scale or industrial infrastructure within them, for example the area around the Grassridge and Dedisa Substations to the north-east of Port Elizabeth that are characterised by an existing high density of powerline and other electricity infrastructure. In these cases, these areas would be assigned to the one of the lower 2 classes due to the existing visual degradation associated with the existing electricity infrastructure.

Figure 12 – An example of an urban area with a view onto a more natural part of the landscape

Through the matrix a visual a 'Visual Impact Score average' for each receptor location is calculated. This average score is derived by tallying the scores for each of the four classes and averaging these. The visual impact rating for each receptor location is determined by the range of numbers within which this average score falls as listed above. It should be again noted that this rating matrix is a relatively simplified way to assign a likely representative visual impact which allows a number of factors to be considered. Part of its limitation lies in the quantitative assessment of what is largely a qualitative or subjective impact. The simplified matrix also has certain limitations in that in certain cases the complete screening of the source of the impact from the receptor may not be taken into account. An example of this would be where the nature of the topography completely hides the proposed powerlines from view at a receptor location. In some parts of the route the northern and southern corridors are located very close together, and the effective impact of the proposed powerlines may be greater than what is being calculated in the matrix which examines just one alignment. For certain receptor locations in the northern corridor, the southern corridor lines are either closer or more visible to the receptor location, and thus the visual impact associated with these lines would be greater than that associated with the northern corridor alignment. In order to take this factor and the instances of complete screening of the lines from the receptor into account, an 'override' function has been introduced to the matrix. The override allows the visual rating assigned to a receptor location to be either increased or lowered based on the one of the following factors:

- The receptor location is likely to be more greatly affected by the powerlines in the other corridor
- The receptor location is completely screened from the proposed powerlines by micro-topographical features such as vegetation or buildings
- The powerlines are outside of the viewshed of the receptor location, and thus are not visible

The table below presents the results of the visual impact matrix. It should be noted that receptor locations that fall within earlier versions of the EIA corridors that are no longer close to the corridor (the situation is mainly relevant to parts of the old southern corridor) have not been rated in the matrix. Receptor locations in those areas beyond the 2km buffer outside of the corridor are too far away from the proposed corridors and EIA Team-preferred alignment to be likely to be impacted by the proposed powerlines. Thus the visual impact on these receptor locations is considered to be negligible or non-existent.

A challenge is posed by the potential ability of the powerlines to be placed anywhere across a ~2km-wide corridor. The numerous permutations for aligning the 3 parallel-running powerlines within the corridor make it impractical to model or rate all of these permutations in this report. Thus for the purposes of the impact rating matrix and the visual modelling, the EIA Team-preferred alignment has been used as the basis on which to undertake the assessment. This proposed alignment has been carefully selected to avoid impacting receptors in a number of contexts and has been based upon detailed stakeholder and landowner feedback (see the introductory section above). It should be noted that this does not represent a 'worst case scenario' in many instances, as the lines have specifically been aligned to avoid sensitive visual receptors as far as possible. However this alignment will be proposed by the EIR as the preferred alignment for the development of the power lines, should they be authorised.

The matrix is presented in the table below.

Receptor Location	Distance	Orientation	Screening	Visual Context	Total Score	Visual Impact Score Average	Visual Impact Rating	Overriding Factors?	Corrected Visual Rating
Penny Sands	3	2	2	3	10	**2.50**	**MODERATE**	**Southern Corridor**	**MODERATE**
Lappie-aarde	2	1	1	3	7	**1.75**	**LOW**	**Southern Corridor**	**LOW**
Geelhoutboom Farmstead West	4	2	2	3	11	**2.75**	**MODERATE**		
Geelhoutboom Farmstead East	3	2	2	3	10	**2.50**	**MODERATE**		
Die Berg Community	2	2	2	4	10	**2.50**	**MODERATE**		
Zwartenbosch Golf Estate	1	1	1	2	5	**1.25**	**LOW**	**Out of viewshed**	**NO IMPACT**
Rondebosch Farmstead	3	1	1	4	9	**2.25**	**MODERATE**	**Southern Corridor**	**HIGH**
Rondebosch Restaurant and households	3	4	2	4	13	**3.25**	**HIGH**		
Honeyville Farmstead									**NO IMPACT**
Honeyville proposed re-burial (Heritage) site	2	2	2	4	10	**2.50**	**MODERATE**		
Honeyville Proposed Cultural Centre	2	1	1	4	8	**2.00**	**LOW**	**Out of viewshed**	**NO IMPACT**
Honeyville Proposed Eco-village									**NO IMPACT**

Receptor Location	Distance	Orientation	Screening	Visual Context	Total Score	Visual Impact Score Average	Visual Impact Rating	Overriding Factors?	Corrected Visual Rating
Weltevrede									**NO IMPACT**
Chan Te Mar Hunting Game Farm - Main Lodge									**NO IMPACT**
Chan Te Mar Hunting Game Farm - Accommodation at Biltong Processing Building									**NO IMPACT**
Chan Te Mar Hunting Gamer Farm - Foreman's House									**NO IMPACT**
Antonieskraal	2	2	2	4	10	**2.50**	**MODERATE**	**Southern Corridor**	**MODERATE**
Sarah Baartman Monument and Sundial									**NO IMPACT**
Putters Inn B&B									**NO IMPACT**
Heuningkloof Farmstead									**NO IMPACT**
Loerie Ruskamp – Main Building	3	1	1	4	9	**2.25**	**MODERATE**		
Loerie Ruskamp – Accommodation - Old	3	1	1	4	9	**2.25**	**MODERATE**	**Not in viewshed**	**NO IMPACT**

Receptor Location	Distance	Orientation	Screening	Visual Context	Total Score	Visual Impact Score Average	Visual Impact Rating	Overriding Factors?	Corrected Visual Rating
Saal									
Loerie Ruskamp - Accommodation - Rondawels	2	1	1	4	8	**2.00**	**LOW**	**Not in viewshed**	**NO IMPACT**
Loerie Ruskamp - Accommodation - Klein Skool	1	1	1	4	7	**1.75**	**LOW**	**Not in viewshed**	**NO IMPACT**
Loerie Ruskamp - Accommodation - Moreson Old Farmhouse	1	2	1	4	8	**2.00**	**LOW**		
R331 Road stall / Farm stall	2	1	4	3	10	**2.50**	**MODERATE**		
Sand River Lodge (Owners House)	1	1	1	4	7	**1.75**	**LOW**		
Sand River Lodge	1	1	1	4	7	**1.75**	**LOW**		
Tanglewood	1	2	1	2	6	**1.50**	**LOW**		
Burrows Hiking and Bush Camp	2	2	1	4	9	**2.25**	**MODERATE**	**Unlikely to be in viewshed**	**LOW**
Vrede	1	2	1	2	6	**1.50**	**LOW**		
Gumdale	2	1	1	2	6	**1.50**	**LOW**		
La Rochelle	1	1	1	3	6	**1.50**	**LOW**		

Receptor Location	Distance	Orientation	Screening	Visual Context	Total Score	Visual Impact Score Average	Visual Impact Rating	Overriding Factors?	Corrected Visual Rating
Old House – Bulk River Dam	2	2	1	4	9	**2.25**	**MODERATE**	**Unlikely to be in viewshed**	**LOW**
Peerboom	2	1	1	2	6	**1.50**	**LOW**		
Hillingdon	2	1	1	3	7	**1.75**	**LOW**		
Solitude (Offcamber Guest house and owners house)	2	1	1	3	7	**1.75**	**LOW**		
Offcamber Bush Camp	1	1	1	2	5	**1.25**	**LOW**		
Waverley Hills	2	2	2	3	9	**2.25**	**MODERATE**		
Uitkyk & Brakkefontein Farmsteads	1	2	2	3	8	**2.00**	**LOW**	**Southern Corridor**	**MODERATE**
Ranger Hills	2	2	1	4	9	**2.25**	**MODERATE**	**Southern Corridor**	**HIGH**
The Chalet Farmstead - North	2	4	2	4	12	**3.00**	**MODERATE**	**Southern Corridor**	**HIGH**
The Chalet Farmstead - South	2	4	2	4	12	**3.00**	**MODERATE**	**Southern Corridor**	**HIGH**
High Ridge Farmstead	1	2	1	4	8	**2.00**	**LOW**	**Southern Corridor**	**MODERATE**
Holrivier Farmstead West	1	1	1	4	7	**1.75**	**LOW**	**Screening blocks views**	**NO IMPACT**

Receptor Location	Distance	Orientation	Screening	Visual Context	Total Score	Visual Impact Score Average	Visual Impact Rating	Overriding Factors?	Corrected Visual Rating
								totally	
Holrivier Farmstead East	1	1	2	3	7	**1.75**	**LOW**	**Southern Corridor**	**LOW**
Ampé ni Farmstead North	1	2	2	2	7	**1.75**	**LOW**	**Southern Corridor**	**LOW**
Ampé ni Farmstead South	1	2	1	2	6	**1.50**	**LOW**	**Southern Corridor**	**LOW**
Various Homesteads / Farmsteads along the Elands River Road west of Rocklands									**NO IMPACT**
Paardehoek Farmstead West	4	2	2	4	12	**3.00**	**MODERATE**		
Paardehoek Farmstead East	2	2	2	4	10	**2.50**	**MODERATE**	**Southern Corridor**	**HIGH**
Echodale - owner's house	2	2	1	3	8	**2.00**	**LOW**	**Screening would effectively block views**	**NO IMPACT**
Echodale - old farmhouse (proposed accommodation)	2	2	1	3	8	**2.00**	**LOW**	**Screening would effectively**	**NO IMPACT**

Receptor Location	Distance	Orientation	Screening	Visual Context	Total Score	Visual Impact Score Average	Visual Impact Rating	Overriding Factors?	Corrected Visual Rating
								block views	
Wincanton Old Farmstead (proposed accommodation	3	4	1	2	10	**2.50**	**MODERATE**	**Screening would effectively block views**	**LOW**
Wincanton Old House (proposed accommodation)	3	4	4	3	14	**3.50**	**HIGH**		
Blouberg Farmstead	2	2	2	2	8	**2.00**	**LOW**	**Southern Corridor**	**MODERATE**
Sonneheuwels	2	2	1	3	8	**2.00**	**LOW**	**Southern Corridor**	**HIGH**
Plumbago Hills	3	2	1	3	9	**2.25**	**MODERATE**	**Raised & proximity to lines**	**HIGH**
Buffelsfontein farmstead	4	4	2	3	13	**3.25**	**HIGH**		
Rooiland Farmstead	3	1	2	3	9	**2.25**	**MODERATE**		
Groendal – Offices and start of trails	1	1	1	4	7	**1.75**	**LOW**	**Lines prominent in valley**	**MODERATE**

Receptor Location	Distance	Orientation	Screening	Visual Context	Total Score	Visual Impact Score Average	Visual Impact Rating	Overriding Factors?	Corrected Visual Rating
Groendal – Hiking trails	1	1	1	4	7	**1.75**	**LOW**		
Northern parts of Uitenhage (Vanes Estate & Levydale)	2	4	2	2	10	**2.50**	**MODERATE**		
Uitenhage Concentration Camp Monument and facility	4	2	2	2	10	**2.50**	**MODERATE**		
Springs Municipal Resort	1	1	1	4	7	**1.75**	**LOW**		
Springs Nature Reserve									**NO IMPACT**
Doornkom Safaris									**NO IMPACT**
Hexagon	2	1	1	3	7	**1.75**	**LOW**	**Not in viewshed**	**NO IMPACT**
Amanzi Estate (proposed golf estate development)	2	1	1	3	7	**1.75**	**LOW**	**Unlikely to be in viewshed**	
Coega Ridge (Proposed Eco Estate) - Middle Income Development	1	2	1	4	8	**2.00**	**LOW**	**Southern Corridor**	**LOW**
Coega Ridge (Proposed Eco Estate) - Proposed Lodge	1	2	2	4	9	**2.25**	**MODERATE**	**Southern Corridor**	**MODERATE**

Table 6 – Visual Impact Assessment on Sensitive Receptor Locations

6.2 Implications of the Proposed Powerlines for Receptors

6.2.1 Implications of three parallel-running lines

The planned three parallel running lines in the Northern Corridor have important implications for visual impacts. Due to access and maintenance requirements, the three proposed lines in the corridor are proposed to run in parallel. The viewer / receptor will thus be exposed to three sets of powerlines running alongside one another. The presence of three lines together would make the powerlines highly intrusive. It is assumed that the towers would be placed alongside one another, and thus there would be three towers visible together. This would pose a significant visual intrusion especially if the viewer was looking down the line as opposed to across it. The presence of three lines is likely to increase the potential for the lines in the Northern Corridor to result in an alteration of the visual character of the area in which the lines are placed, especially where there is no existing infrastructure in a natural setting. In this context it is critical that the recommendations made in the mitigation measures section below in terms of routing and alignment of the lines is adhered to in the final routing of the powerlines. As a general principle, the lines should be kept away from sensitive receptor locations as far as possible, as it would be impossible to avoid routing the lines through natural areas as these are prominent within the corridor. The 3D modelling in section 6.3 below provides a good example of this aspect of the potential impact of the lines.

Figure 13 – An example of 2 parallel lines with cross rope suspension towers in the Sun City Area of the North west Province

6.2.2 Relative Number of Receptor Locations subject to high impacts

As can be seen from the table above, of the 70 listed sensitive receptor locations, a very small number (10) have been assessed to be likely to experience a high degree of visual impact associated with the proposed EIA Team-preferred alignments. 16 locations have been assigned a moderate visual impact rating, which entails that the majority of the receptor locations are either likely to experience a low impact or no impact at all (64% of all locations). If the EIA Team-preferred alignment were to be developed, a relatively small number of receptor locations would be subject to a significant visual impact, and the majority would be subject to very little or no degree of visual impact. This situation is reflective of the consideration in the planning of the EIA Team-preferred alignment for the Northern Corridor for the powerlines to avoid sensitive receptors as far as possible. It should be noted that proposed developments have been taken into account in the table above. In some cases, no detailed layouts of the proposed developments are yet available. Should layouts become available, the assessment would be able to be refined and the EIA Team-preferred alignment may be able to be refined to take consideration of these locations.

It should be noted that more sensitive receptors could potentially be subject to greater visual impacts should the lines be located in other parts of the corridor. Due to the fact that there are

many permutations for alignment within the corridor, some of which could be beneficial for one receptor while being disadvantageous for another, it is impossible to quantitatively assess how a change may affect each individual receptor. It should be remembered that the EIA Team-preferred route has been provided to landowners for comment, and in many parts of the Study Area has been aligned based on landowner and stakeholder feedback.

While the Northern Corridor has undergone significant changes to part of its routing, it is worthwhile to consider the visual impact 'hotspots' identified in the Scoping Phase Visual Report for the Northern Corridor, and to examine how the revised Northern Corridor, and the proposed EIA Team alignment in particular affect these areas. The map below indicates these visual hotspot areas identified in the Scoping Phase study, as well as new areas of visual sensitivity identified in the current phase, as discussed below.

The table and map below lists the scoping-phase visual hotspots and presents how these are potentially affected by the EIA Team-preferred alignment.

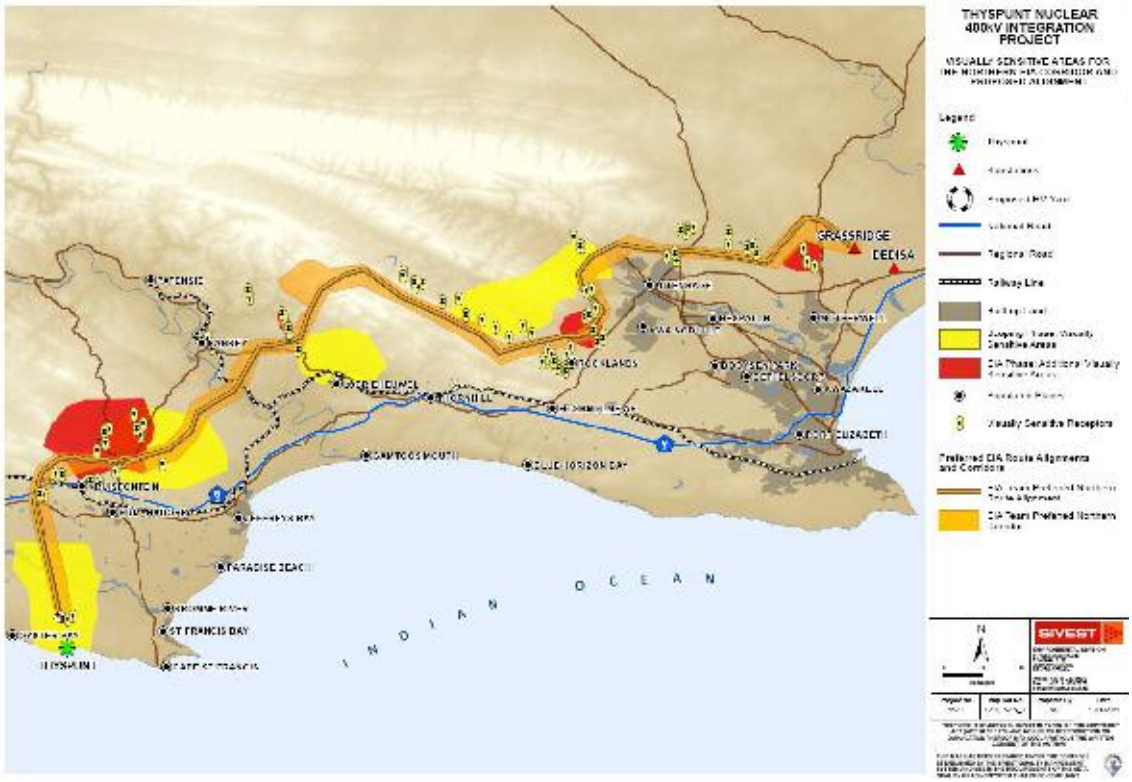

Figure 14 – Map showing visual 'hotspots' along the Northern Corridor

Visual hotspot	How the EIA Team-preferred alignment for the NC affects these areas
Area to the north of the shifting sand dunes west of St Francis (in the vicinity of the proposed HV Yard) and natural farmland to the north	The NC (and SC) alignment(s) runs to the north of the proposed HV Yard. The lines do not affect the shifting sand dunes to the south of the HV Yard. The (5) lines however run over the natural area to the north of the HV Yard and would be very visible as they cross the low ridges in this area. **Note: this area is potentially subject to significant cumulative impacts related to a proposed wind farm development that would significantly alter the visual environment of this area.**
Area to the north of Jeffreys Bay and north-east of Humansdorp	The NC alignment bisects this area, but avoids the sensitive receptor locations located around Honeyville and Chan Te Mar (see below). Thus most sensitive receptor locations are avoided. **Note: this area is potentially subject to significant cumulative impacts related to 2 proposed wind farm developments. Please consult the cumulative impacts section below.**
The area around the Loerie Dam and surrounds	The Northern Corridor avoids this area. However it should be noted that the Southern Corridor alignment has been shifted up to run in a previous alternative of the Northern Corridor in this area. **Please refer to the Southern Corridor report.**
The area around Loerie Ruskamp	The proposed NC runs to the south of this area, and does not physically affect this area. There may be some visual impacts related to the power lines from the southern part of the Loerie Ruskamp
The Elands River Valley and the Groendal Wilderness Area to the north-east	The proposed NC alignment does not traverse or cross the Elands River Valley except at the eastern end of the valley. The alignment has been routed to run behind the highest point of the ridge on the southern side of the valley to be less visible. The alignment traverses the hotspot area to the north-east in the Kruisrivier area, but has been routed to run at the foot of the hills, and not into the Groendal Wilderness Area.
The Game Farming Areas to the north of Rocklands and to the west of the R334	The proposed NC lines bisect this area and a number of sensitive receptor locations could be affected. A slight mitigating factor is that the lines run to the south-east of the Wincanton Road (less visually sensitive) as indicated by receptors
The Northern parts of the proposed Coega Ridge development	The Southern Corridor runs to the north-west to this area, but avoids traversing it. The northern-most proposed developments could be visually affected by the proposed power lines, but are more likely to be affected by the proposed Southern Corridor lines.

Table 7 – How the EIA Team-preferred alignment affects the visual hotspots in the Northern Corridor

Although the alignments do traverse some of these hotspot areas, the receptor-based assessments are more useful in determining the level of likely visual impact on receptors in these areas. It should also be noted that the Northern Corridor that has been revised since the scoping phase and within the EIA phase has specifically been modified to avoid visually-sensitive areas including the following parts of the study area that have also been identified to be visually sensitive:

- the south-facing slopes of the hills to the north of Humansdorp as far as possible, especially the area around the proposed Zwartenbosch Estate
- the parts of the Gamtoos River Valley close to Hankey and the Sara Baartman Monument and look-out
- the area around the Honeyville Private Nature Reserve, (in particular the ridges in this area) and the nearby Chan Te Mar Game Farm
- the cluster of accommodation facilities within the Loerie Ruskamp property
- the southern ridge (northern-facing slopes) of the Elands River valley, and as much of the valley itself as possible
- as much of the game farming properties in the area to the west of KwaNobuhle and the R334 as possible, with the corridor not extending to the north of the Wincanton road as far as possible
- the (natural) foothills on the boundary of the Groendal Wilderness Area
- the Springs (Uitenhage) Nature Reserve
- the proposed Amanzi Estate development
- the proposed Coega Ridge Development (middle and high-income components)

As such these visually-sensitive areas are unlikely to be affected, or likely to be subject to a relatively low visual impact as a result. A number of visually-sensitive receptors that previously could have been impacted by the proposed development are likely to be subject to a negligible or no visual impact from the proposed power lines:

- the proposed Zwartenbosch Golf Estate
- the Honeyville development complex including most parts of the nature reserve and the proposed cultural centre
- the Chan Te Mar Hunting Farm and lodges
- the Sara Baartman Monument (lookout) and proposed cultural centre
- most of the Loerie Ruskamp accommodation facilities
- the hunting farms to the west of the Wincanton Road, and proposed accommodation facilities therein
- the Springs Nature Reserve
- Doornkom Safaris

Other important receptor locations, in particular the Groendal Wilderness Area Trails close the reserve entrance, most receptor locations within the Elands River Valley Conservancy Area, the proposed Amanzi Estate Development and the middle-income portion of the proposed Coega Ridge development are likely to be subject to a low visual impact from the EIA Team-preferred alignment.

Most of the sensitive receptor locations which have been assessed to be subject to a high impact rating are located in an area between the start of the Elands River Valley and the Elands River Road north of Rocklands, and the R334 west of KwaNobuhle. The following receptor locations have been assessed to be likely to be subject to a high visual impact associated with the proposed powerlines in this area:

- Chalet Farmsteads (North and South)
- Ranger Hills Farmstead
- Paardehoek Farmstead East
- Wincanton Old House (proposed hunting accommodation)
- Sonneheuwels Farmstead
- Blouberg Farmstead
- Buffelsfontein Farmstead

The two corridors run very close to each other in this area, being constrained by the presence of the Elands River Valley to the west, Groendal Wilderness Area and the game farms of Ruigte Vlei and Burghley Hills to the north, the smallholdings of Rocklands to the south, and the Hopewell Conservancy to the east. The difficulty of routing five (5) powerlines through this area entails that the proposed EIA Team-preferred alignment runs in close proximity to a number of sensitive receptors in this area. It should be noted that for some of these receptor locations, the Southern Corridor lines are closer to the receptors, thus vaulting these locations up into the high impact category. These receptor locations are located within a visual environment that can be described as being somewhat natural in character, with developed components. Most of these receptor locations are located within a natural setting, especially those set back from the R334 (Uitenhage-Rocklands) road within hilly, incised terrain. However the large urban area of KwaNobuhle and Uitenhage and Despatch further afield are a prominent feature of the visual environment, arguably degrading the otherwise natural character of the area. Consideration has been given to finding a less intrusive alignment for these receptors in the recommendations section below.

A similar situation exists where the proposed Northern and Southern Corridor alignments run close to the Rondebosch farm and restaurant receptors located to the north of Humansdorp. The proximity of the lines in a largely natural setting has been assessed to be associated with a potentially high visual impact. Although the farmstead would be highly screened from the Northern Corridor alignment by tall trees, the Southern Corridor lines to the south would be highly visible.

A couple of receptor locations in the Kruisrivier area are similarly subject to high visual impact; the Buffelsfontein Farmstead and the Plumbago Hills Conference Venue. In the case of the Buffelsfontein Farmstead the alignment is located immediately adjacent to the farmstead. The Plumbago Hills Conference Venue is situated slightly further away, however it occupies an elevated position in relation to the valley to west in which the alignment runs, thus making it likely to be able to clearly see the proposed power lines. Both receptor locations have been assessed to have an unacceptably high level of visual impact. It is thus recommended that the EIA Team-preferred alignment is altered to reduce the visual impact at these two locations.

Of the receptor locations associated to experience a moderate visual impact, micro-topographical features would screen the proposed power lines in many cases, making the proposed lines much less visible. Distance away from the lines is a factor in many of these cases, although typically the alignment is not sufficiently distanced to away to render the lines sufficiently visually obtrusive. The perceptions of each individual receptor will largely determine whether a moderate level of visual impact associated with the proposed lines would be acceptable or not. Based on stakeholder consultation and feedback to date, the most likely of the receptors that have been assessed to be subject to a moderate visual impact that would be likely to be sensitive to visual impacts are:

- the Geelhoutboom Farmsteads (property on which game breeding takes place)
- the Honeyville proposed Khoi-San reburial site
- the Waverley Hills Camp
- the Coega Ridge Development proposed lodge

Two of these are accommodation facilities thus likely to be sensitive in this context. The proposed Coega Ridge Lodge would be located in an area of natural valley bushveld thicket vegetation, although the areas to the south (Motherwell and the proposed low income Coega Ridge development) and the east (the brickworks and the Dedisa electricity complex) are visually 'degraded'. The lodge would nonetheless be likely to be visually sensitive.

In the case of the Honeyville re-burial site, the position of the site on the top of a ridge with a near 180° vista would make it particularly 'vulnerable' to visual impacts such as those associated with new developments like the proposed lines. The site has been chosen by the community to allow views to a number of important cultural parts of the landscape, including St Francis Bay (the current location of the remains), the mountains of the Baviaanskloof to the north and north-west, and 'Moon Mountain' (Posfontein se berg) to the north-west (John Barrett, personal communication). The proposed wind farm developments in this area are particularly important in this context, as discussed below. While the lines would be visible from this location, the proposed lines have been routed as far south as possible to avoid affecting this sensitive receptor location.

6.2.3 Implications of having the two proposed corridors located close together

In certain parts of the study area the corridors run very close to one another or even overlap. This has implications of potentially increasing the visual impact of the proposed power lines in totality by placing five power lines within the landscape or within a viewshed in relatively close proximity. There are a number of parts of the study area where this possibility exists. It should be borne in mind that Eskom require a technical specification that the respective lines within each corridor be placed at a certain distance apart (preferably 2km apart). However due to limitations related to the presence of existing infrastructure, the presence of human settlements and other factors such as environmental 'no-go' areas, there are certain parts of the study area where the EIA Team-preferred alignments (and thus likely the final alignments of the powerlines) are located in closer proximity. These areas are:

- the area between the proposed Thyspunt HV Yard and an area to the south-west of Kruisfontein (Humansdorp) where the lines both run northwards (effectively forming a single corridor)
- the area around the Rondebosch farmstead (to the west of the R330 north of Humansdorp)
- the entrance to the Elands River valley north and north-west of Rocklands and the R334
- the area to the east of Amanzi Estate (the proposed Amanzi development) and to the west of the proposed Coega Ridge development (to the north of Humansdorp)

In these areas, a viewer / receptor could be confronted with 5 lines within his / her arc of view, especially if the viewer was looking down the lines. This would constitute a cumulative visual impact associated with the lines; the presence of 5 high voltage power lines located closely together would be a significant visual impact for any viewer exposed to this. The distance separation requirement between the 2 sets of lines would be an ameliorating factor, as these lines would not form a contiguous set of 5 power lines. However as detailed below, there are certain areas in which a full set of five powerlines may be visible from a receptor location:

- Oyster Bay Road to the north of the HV Yard (especially on the low ridge to the north of the HV Yard) – view to the south and to the north*
- Rondebosch Farmstead – view to the west onto the rising ground
- Range Hills Farmstead – view to the west and the east

This impact would be particularly intense in the area to the north of the HV Yard where the 2 sets of Northern Corridor and Southern Corridor lines are proposed to run parallel to one another. Please refer to the 3D visual modelling in section 6.3 below for a realistic impression of this impact

It should be noted that there are other receptor locations that may be able to view more than 2 or 3 sets of power lines, but not down one 'line of sight'. The potential visual impact at these receptor locations could be considered to be of a very high intensity, especially as all of these locations are set in an area with a natural visual character.

6.2.4 Visual implications of the proposed tower design

As mentioned in the introductory section above, the cross rope suspension tower type has been proposed as the tower type for this project. The tower type has potential implications for the visual impacts associated with the proposed power lines as different tower types have different designs and thus differing degrees of solid metal that are visible. The other tower type that would be used along the line is the self supporting (strain) tower; this would be used in areas where the lines bend, and in areas (such as on steep ground) where a more stable tower type is required. The self supporting tower is the classical 'kite-shaped' pylon which is familiar to many people as older lines typically consisted of these pylons. The other tower type that may have been considered is the guyed suspension tower. The tower types are illustrated below.

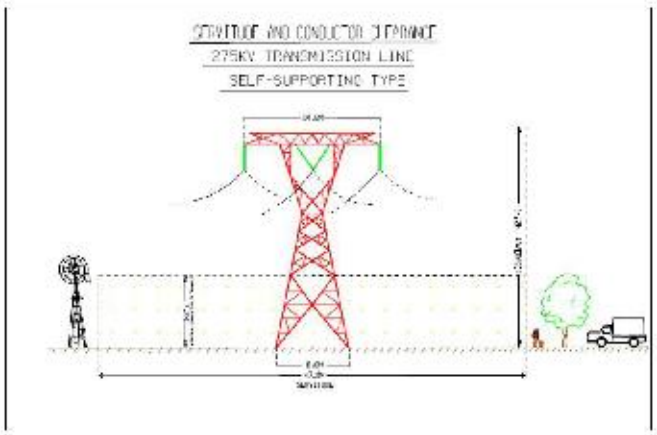

Figure 15 – The Self-Supporting (Strain) Tower type

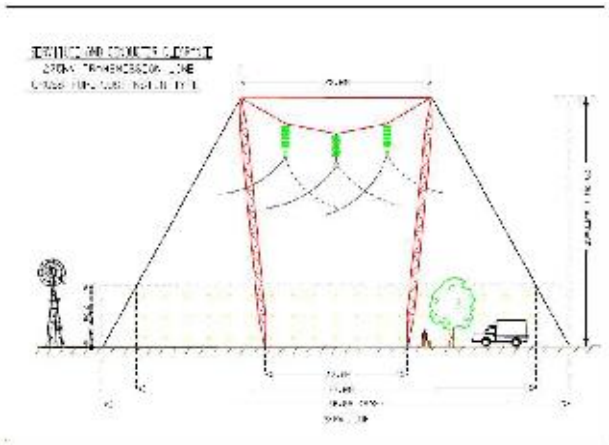

Figure 16 – The Cross Rope Suspension Tower Type

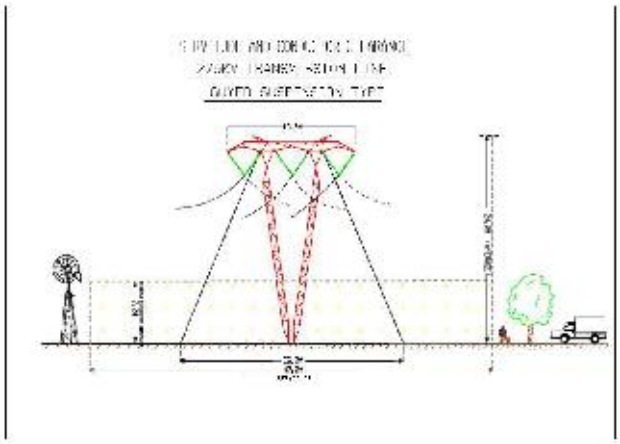

Figure 17 – the Guyed Suspension Tower

The different tower types above have different structures and thus different levels of visibility. The self support tower has the highest degree of steel lattice in terms of the tower structure. The guyed suspension tower type has less steel lattice within its design with the cross rope suspension tower having the least amount of steel with no horizontal lattice and no cross arms as in the other two tower types. The presence of only two vertical lattice structures in the cross rope suspension type makes this tower type much less visually intrusive than the other two types. The suspension of conductors from a transverse spanning wire rope instead of from rigid cross arms lessens the visibility of the powerline as the cross rope and conductors would be much less visible than a steel lattice, especially when viewed from a distance. The lesser visual impact associated with the cross rope suspension has been reported in literature (Behncke and White, 2002). The predominance of the cross rope suspension tower would be likely to reduce the visual impact associated with the proposed power lines, and it is strongly recommended that the cross rope suspension tower type be used as far as possible. Where they are used, the self supporting tower type would be more visible, especially if a number of towers along each line were to be self supporting tower types. In spite of the lesser visual intrusion factor associated with the cross rope suspension tower, the size and number of proposed parallel-running power lines is nonetheless likely to be associated with a potential visual impact as assessed above. Please refer to the 3D visual modelling for visualisations of the 2 different tower types in the context of the study area.

Figure 18 - Difference between cross rope suspension towers (left photo) and self support towers (left in right photo) and a guyed suspension tower (right in right photo)

6.2.5 Visual Impacts on Sensitive Receptor Roads

As described above a number of sensitive receptor roads exist in the area. The table below assesses how these sections of road and railway are likely to be affected by the proposed power lines.

Receptor Road Section	How will the power lines affect travelling receptors?	Subject to cumulative impacts?
The St. Francis Bay-Oyster Bay un-surfaced road	All 5 proposed lines cross this road in relatively close proximity. The current natural, scenic views to the dune field to the south, especially from the high points along the road would be significantly degraded by the presence of 5 sets of lines in close proximity. This would constitute a significant visual impact / intrusion.	✓
N2 highway north and north-west of Humansdorp	Travellers will be confronted with 2 sets of power lines crossing the road perpendicularly and running up the hills to the right of the road. The lines will be highly visible as they cross the road and as they rise up the ridge. The impact will be transient due to the speed of vehicles travelling along the highway.	✓
R330 north of Humansdorp	All 5 proposed lines cross this road in relatively close proximity. The current natural, scenic views to east and north would be significantly degraded by the presence of 5 sets of lines in close proximity. As a mitigating factor the lines do not climb any of the ridges in the area and would be partly shielded from view by the ridges to the east of the road. This would constitute a significant visual impact / intrusion.	✓
R332 (un-surfaced road) north of Humansdorp	This road is only directly traversed by the proposed power lines at its southern extent; in this area the visual environment is slightly degraded by the presence of a quarry. The local hills in the area would shield the lines to a certain degree, especially as the lines run through the Rondebos River valley and not over high ground.	✓
R330 Hankey Pass	The road is located relatively far to the north of the corridor, and runs through a steeply incised valley, therefore the power lines will not affect this section of the road.	X
R331 between Hankey and Loerie	The road follows a ridge with views off to the south; the power lines cross the road more or less perpendicularly to the north-west of Loerie; the lines would be (briefly) highly visible as the traveller drives east or west on the road. The power line then turns to run parallel to the road approximately 550m to the north of the road. In this section the road follows a high ridge top while	X

Receptor Road Section	How will the power lines affect travelling receptors?	Subject to cumulative impacts?
	the lines run slightly lower into the valley. The lower elevation of the powerlines along with the screening effect of the roadside vegetation entails that people travelling along the road will be exposed to intermittent views of parts of the powerlines. The visual impact in this section is thus not expected to be significant.	
Loerie Ruskamp and Klein Rivier access road	The powerlines cross the road perpendicularly over a valley into which the road descends. It is quite possible that the road would be spanned by towers on the ridge tops on either side of the road. Thus the lines may be less visible to the vehicle travelling directly underneath them, but will be briefly prominent at the edge of the restricted viewshed for vehicles travelling down into the valley. In the section of the road that links the Loerie Ruskmap and the Klein Rivier valley, there are extensive but intermittent (due to roadside vegetation) into the lower-elevation ground to the south-west. The power lines would be visible from these viewpoints, but the potential impacts would be highly intermittent unless someone stopped to admire the view.	✓
Elands Valley Road (un-surfaced)	The power lines would cross this road perpendicularly at the entrance point to the valley. The lines would be highly visible as they cross the road and to the south-west of the road as they drop down a ridge. Further west up the valley, the lines would be largely screened from view by running behind and to the south of the ridge top of the southern side of the valley. The impact related to the lines along the road will thus be confined to the area at the eastern end of the valley where the lines cross the road.	X
Local access road to the Groendal Wilderness Area Offices	The power lines would cross this road perpendicularly just before a person travelling westwards would start to climb up into the hilly ground out of the Swartkops River valley. The traveller would be exposed to the visually intrusive and highly visible 3 sets of lines overhead and this would constitute a transient but high intensity visual impact in the context of the natural areas to the west. To the south-west the lines would be visible, but as they run at the foot of the hills would be less visually intrusive than if they were placed on or on top of the hills to the south-west. Travellers	X

Receptor Road Section	How will the power lines affect travelling receptors?	Subject to cumulative impacts?
	headed eastwards (away from the reserve) will be less affected as the vistas are onto the more developed urban areas to the east.	
Local access road to the Springs Nature Reserve	This road is not crossed by the proposed power lines therefore there is not likely to be an impact.	X
The Apple Express **Railway** – Loerie to Hankey	The railway follows the northern edge of the Gamtoos River valley and the high ground to the north would screen the (distant) lines from view. The power lines would be highly visible as the line turns north-west around the Bodker Siding, especially as they descend the steep-sided western escarpment of the Gamtoos River Valley – the scenic area (red cliffs) to which views are prominent and which is the focus of this part of the route. The lines would be only visible from this part of this section of the route due to the constriction of the viewshed within the valley.	✓

Table 8 – Visual Impacts on Sensitive Receptor Roads

As can be seen from the table above a few roads would be subject to significant visual impacts, the most intensive of which would be the section of the Oyster Bay – St Francis road to the north of the HV Yard and the section of the R330 near the R332 intersection where all 5 lines would cross the roads in very close proximity to one another and would be highly intrusive in a natural context (please refer to the 3D visualisations of the power lines in this area in section 6.3 below). It needs to be noted that both of these locations are potentially subject to even more significant cumulative visual impacts due to the potential presence of wind farm developments. The Oyster Bay road in the vicinity of the HV Yard will be enveloped by numerous wind turbines of the proposed Central Kouga Wind Farm development which would significantly alter the visual environment of the area. Similarly, the turbines of the proposed Jeffreys Bay wind farm development to the east of road would be prominent for vehicles travelling to the north of Humansdorp.

Most other roads are crossed perpendicularly by the proposed Southern Corridor lines and due to this factor and the mobility of passengers along these routes, the impact, though of an intensive nature would be transient.

Lastly the Apple Express route through the study area is unlikely to be affected in a significant manner by the proposed power lines. The two critical view points along the route of the train are nowhere near the proposed lines with the only view of the lines being in part of the Gamtoos valley where the lines cross the valley.

6.3 Modelling of Powerline-related Impacts

It should be noted that due to budget limitations, not all sensitive receptor locations could be modelled. A set of receptor locations, as detailed in the table below was chosen as representative areas of potential visual impacts associated with the proposed power lines. The limitations associated with the 3D modelling as discussed in the assumptions and limitations section above should be noted.

Sensitive Receptor Location	Direction of View	Comments
Northern edge of Uitenhage High Income Residential	North	
Uitenhage Concentration Camp Memorial	North	
Springs Nature Reserve	West	Power lines not visible from modelling point
Groendal Wilderness - Offices	East-south-east	
Groendal – Hiking Trail	South-east	Power lines not visible from modelling point
Waverley Hills		Power lines not visible from modelling point
Burrows Hiking Trail - Elands River Valley	South	
Elands River Road west of the Sand River Dam	South	
Elands River Road near the Bulk River Dam	SSE - SW	Power lines not visible from modelling point
Offcamber Bush Camp	South-east	Power lines not visible from modelling point
Koekepan (R331) Farm stall	North	
Oyster Bay Road - High Point	N-NNE Panorama	
Oyster Bay Road - High Point	South	

The visual modelling is presented below. A photograph without the modelled power lines is followed by the same image with the power lines superimposed upon it.

6.3.1 Northern edge of Uitenhage High Income Residential

Figure 19 – Existing View north from the Uitenhage Suburbs

Figure 20 – View north from Uitenhage Suburbs with Northern Corridor power lines

Nature of Impact as assessed by visual impact matrix - MODERATE

6.3.2 Uitenhage Concentration Camp Memorial

Figure 21 – Existing view to the north from the Uitenhage Concentration Camp Memorial

Figure 22 View north from the Uitenhage Concentration Camp Memorial with lines behind the pine trees

6.3.3 Springs Nature Reserve

Figure 23 - A view to the west from a hiking path in the Springs Nature Reserve in which the Northern Corridor lines *would not be visible*

6.3.4 Groendal Hiking Trail

Figure 24 – A view to the south-east from a hiking trail in the Groendal Wilderness Area in which the lines *would not be visible*

6.3.5 Groendal Wilderness – Offices

Figure 25 – Existing View ESE from Groendal Wilderness Offices

Figure 26 – View ESE from Groendal Offices with Northern Corridor power lines

Nature of Impact as assessed by visual impact matrix - LOW

6.3.6 Burrows Hiking Trail – Elands River Valley

Figure 27 – Existing view south from a point along the Burrows Hiking Trail

Figure 28 – View south from Burrows Hiking Trail with Northern Corridor Power lines

Nature of Impact as assessed by visual impact matrix - LOW

6.3.7 Elands River Road west of the Sand River Dam

Figure 29 - Existing view south from the Elands River Road east of the Sand River Dam

Figure 30 –View south from the Elands River road with the Northern Corridor lines within it

Figure 31 – View SSE from a point on the Elands River Road near the Bulk River Dam in which the lines *would not be visible*

Figure 32 - View south-west from a point on the Elands River Road near the Bulk River Dam in which the lines *would not be visible*

Figure 33 - Existing view to the south-east from the Offcamber Bush Camp in which the lines *would not be visible*

6.3.8 Koekepan Farm Stall – R331

Figure 34 – Existing view to the north from the Koekepan Farm Stall along the R331

Figure 35 – View from the Koekepan Farm Stall along the R331 with Northern Corridor lines

Nature of Impact as assessed by visual impact matrix - MODERATE

6.3.9 Oyster Bay Road north of the HV Yard

Figure 36 – Existing view north to NNE from a high point on the Oyster Bay Road

Figure 37 - View north to NNE from the Oyster Bay Road with both NC (left) and SC (right) lines

Figure 38 – Existing view south from a high point on the Oyster Bay Road

Figure 39 Existing View from the Oyster Bay Road showing the SC lines (foremost) and NC lines (behind)

6.3.10 Implications for Development

The sensitive receptor locations selected to be 3D-modelled above indicate differing degrees of visual intrusion associated with the proposed EIA Team-preferred alignment. As assessed by the visual impact assessment matrix, the intrusion factor associated with the proposed power lines is highly dependent on the distance of the viewer to the lines, and the position of the lines in relation to the viewer. There were a number of receptor locations selected for modelling where the modelling indicated that the lines would not be visible, due largely to the lines being shielded from view by topography. The shielding effect of vegetation is well illustrated by the modelling undertaken at the Uitenhage Concentration Camp memorial site where a row of pine trees would shield the lines to a degree.

Due to the modelling there are a few locations where the initial result of the visual impact rating as assessed through the visual impact matrix has been elevated. The first example is the Groendal Wilderness Area Offices where one of the key views (towards the proposed power lines) is eastwards down the Swartkops River Valley. The visual impact rating assessed the visual impact at this site to be low; however the modelling indicates that the lines would be prominent as they cross the valley. The rating has thus been raised to a moderate level. On the other hand the limited views down into the Swartkops River Valley from the raised ground and eastward-facing aspect of the area traversed by the hiking trails in the reserve (that should by virtue of its position be at least able to view the power lines) will not be affected by the power lines as a combination of tall thicket vegetation and topography will shield the lines from view in these locations.

The second location where a higher impact rating than originally envisaged (although roads were not rated due to their linear nature) has emerged from the modelling is the upper (western) parts of the Elands River Road as discussed below. The visual impact of the power lines in the area to the north of the HV Yard on the Humansdorp – Oyster Bay road has been confirmed to be high, as originally indicated in the assessment above. Views from local high points along the road in this area indicate that the lines would be highly intrusive, especially as a full set of 5 lines would be visible. As discussed below, however, the views modelled at these 2 locations could potentially be subject to even greater visual impacts due to a number of proposed wind farm developments due to which a dense field of very large wind turbines could significantly alter the visual context.

Importantly at a number of receptor locations in the lower parts of the Elands River Valley in which a number of highly visually sensitive receptor locations are present the lines would not be

visible at all This includes the Elands Valley road near the Bulk River Dam as well as the area further east where Offcamber Adventures are located. Modelling has been undertaken for certain parts of the Burrows Hiking Trail into the Longmore Forest Area; although the hiking and mountain bike trails further into the Longmore Forest would have much more significant exposure of the lines, the areas closer to the Elands Valley Road would only have limited distant views of the lines.

Conversely however, the modelling has indicated that the lines would be highly visible higher up the valley to the west (near the Sand River Dam) as the lines exit the Longmore Forest Area. The 3D visualisation indicates that in this part of the valley the lines would be highly visible as they run over the Longmore Northern firebreak on the southern ridge of the valley edge. Significantly the towers would break the horizon in this area being much more visible. In this area the high visibility of the lines has contradicted the stipulation made in routing the EIA Team-preferred alignment that the lines should not be at all visible from the Elands River Valley. Although there are no directly-affected receptor homesteads identified in this area it is strongly recommended that the a realignment of the EIA Team-preferred alignment be undertaken in this area to ensure that the lines in this area are not visible over the high ground on the southern side of the valley.

6.4 Visual Impacts associated with proposed existing Substation upgrades

As the proposed Port Elizabeth Substation is associated with the Southern Corridor, its potential visual impacts are not discussed in this report, but rather in the Southern Corridor Visual Report. However the upgrades to the existing Transmission Substations – Grassridge and Dedisa – are covered within this report.

6.4.1 Components of Proposed Substation Upgrades

Both substations are proposed to be upgraded to accommodate the proposed five lines. At the Dedisa Substation the 400kV busbar system at needs to be extended and the feeder 3 needs to be fully equipped to deal with the new lines. Thus a fully equipped 400 kV feeder bay with double busbar selection and bypass capability needs to be constructed. Essentially this upgrading will entail the construction of new metal structures within the substation. The fence surrounding the substation will need to be extended and new operational lighting will need to be erected; lighting masts 24m high will need to be erected (as discussed below).

At Grassridge, similar new provisions for the lines need to be made. The set up is slightly different to Dedisa, and at Grassridge bringing in the fourth feeder will require that the busbar be sectionalised further to create a fourth zone. The busbar system will further have to be extended by two bays. No new fencing, extra roads or additional lighting will be required to be installed at the substation.

The changes to the busbar systems at both substations are unlikely to be associated with any visual impacts, as this will not add any significantly visible changes to the substation structures as viewed from the outside. The lighting masts at Dedisa however will be highly visible due to their height, being a height equivalent to an 8-storey building.

6.4.2 Visual Impacts associated with the proposed lighting masts

In order to assess the impacts associated with the proposed communication towers, the visual characteristics of the surrounding areas need to be examined. The Dedisa Substation is located to the north of the N2 highway and the R334 road in the Coega area. It is located on high ground on the crest of a low ridge to the west of a valley draining south into the Coega River valley as it opens up into its estuary at the coast. The position of the substation thus makes it relatively visible when viewed from the surrounding areas.

Figure 40 – The Dedisa Substation viewed from the valley to the west of the substation

The substation is relatively close to the Coega Industrial Development Zone Complex which is currently under development. A new road layout has been set out in the area to the north of the N2 highway and it is expected that this currently vacant land will be developed at some point in the future. The Dedisa Substation will thus be very close to a large industrial complex, although this is not currently developed. Currently the area immediately adjacent to the substation site is vacant, but could become highly industrialised in the future. There are no sensitive receptor locations within a 2km radius of the proposed substation. Due to their height and the position of the substation on an area of localised higher elevation the lighting masts would be likely to be visible from a wide radius. However the absence of any sensitive receptor locations within a 2km radius of the substation and the proximity of the substation to the Coega IDZ are likely to entail that during the day time the masts would be unlikely to exert any significant visual impact on the surrounding area.

The Grassridge Substation is a large substation that is located on high ground to the east of the Coega River Valley, and to the west and north of two smaller valleys which feed into the Coega Valley. The Substation is thus relatively visible by virtue of its position. The area immediately adjacent to the substation is relatively natural in character; a nature reserve has been declared as part of the Coega Ridge IDZ development to protect the endangered Coega Copper Butterfly. This area is thus largely natural in character and will provide a 'natural' buffer between the Grassridge Substation and the Coega development complex located to the south. In spite of the absence of development around the substation, the area is visually degraded by a number of

existing high voltage power lines which link the Grassridge Substation into the national grid. A farmstead is located approximately 1.5km to the north of the substation, but the visual environment around this farmstead has been similarly degraded by the high voltage power lines running to the north of the substation. As no new lighting is proposed at the Grassridge Substation, there will not be any new visual impact associated with lighting masts.

6.4.3 Night-time Visual Impacts

In order to assess any night-time visual impacts, the baseline night-time environment around the two transmission substations needs to be examined. Both the Dedisa and Grassridge Substations are located outside of an urban / industrial area, although the Grassridge Substation is located relatively close to the Motherwell Urban area, and the Dedisa Substation is located even closer to the Coega Industrial Complex. Night-time visits to both substation sites revealed that there is minimal lighting from within, and in the immediate vicinity of the substations. The Dedisa Substation was observed to be completely unlit, and the area in the general vicinity is completely dark. The only lighting impact appears from the Port Elizabeth conurbation to the south-west, and appears as a glow on the western horizon. A very similar situation exists at the Grassridge Substation; the substation is located in a dark, unlit area, away from any developed areas (as it is located adjacent to the nature reserve declared as part of the Coega development). The only lighting at the proposed substation was a security light at the entrance gate to the substation; otherwise the substation was unlit (as indicated by the photograph below – note the orange glow from the PE metropole on the horizon behind the substation; the 'light' at the top of the picture is the moon). As described above for the proposed PE substation above, these types of substations contain high-powered lighting that can be switched on in the event of the need for emergency work within the substation; however this lighting is not lit on a permanent basis, but would only be switched on intermittently when the need arises. Due to the current status quo the areas surrounding the two substations have a very low visual absorption capacity in the context of any new proposed lighting.

Figure 41 - The night-time environment at the Grassridge Substation

The potential for any night-time impact associated with the substation upgrades is dependent on whether any new lighting is introduced to the proposed substations. At the Grassridge Substation no new lighting will be introduced so the status quo will remain the same.

As only a portion of the substation was originally constructed, additional lighting will need to be erected at the Dedisa Substation. The proposed lighting masts at the substation will be 24m in height, and in a similar manner to the proposed PE Substation, these 'floodlights' would present a prominent source of lighting at night due to the height of the lights at the top of the mast. As there are no sensitive receptors located within a 2km radius of the proposed substation, the impact of the lighting would be minimal within this area. The closest (potential) sensitive receptors of lighting are the proposed middle income Coega Ridge development; these locations are located approximately 8km distant from the substation, and thus the presence of a this lighting source which would only be switched on occasionally would not present a significant source of night-time visual impact.

6.5 Cumulative Impacts

Although it is important to assess the visual impacts of the proposed power lines and substation upgrades on their own, it is equally important to assess the cumulative visual impacts that could materialise in the area should a number of proposed large scale developments be granted authorisation to proceed. Cumulative impacts are the impacts which combine from different developments / facilities and result in significant impact that is larger than sum of all the impacts. A number of energy facilities are proposed within relatively close proximity of the proposed Thyspunt Transmission Line Corridors. EIAs are being undertaken for these proposed projects and a number of them are at an advanced stage.

The visual character of parts of the study area could change dramatically if the mainly energy-generation projects were developed within the area. These pending developments and their potential for large scale visual impacts could significantly affect the way in which the powerlines may affect the study area, by greatly changing the visual absorption capacity of the area. Accordingly an investigation of the impact each proposed development is expected to have on the visual environment in the area was undertaken in order to ascertain the cumulative visual impacts and the overall impression on receptors in the region at large. The visual impacts of each proposed project as detailed in their respective visual impact assessments are summarised below. The map below indicates the location of the proposed developments in this area.

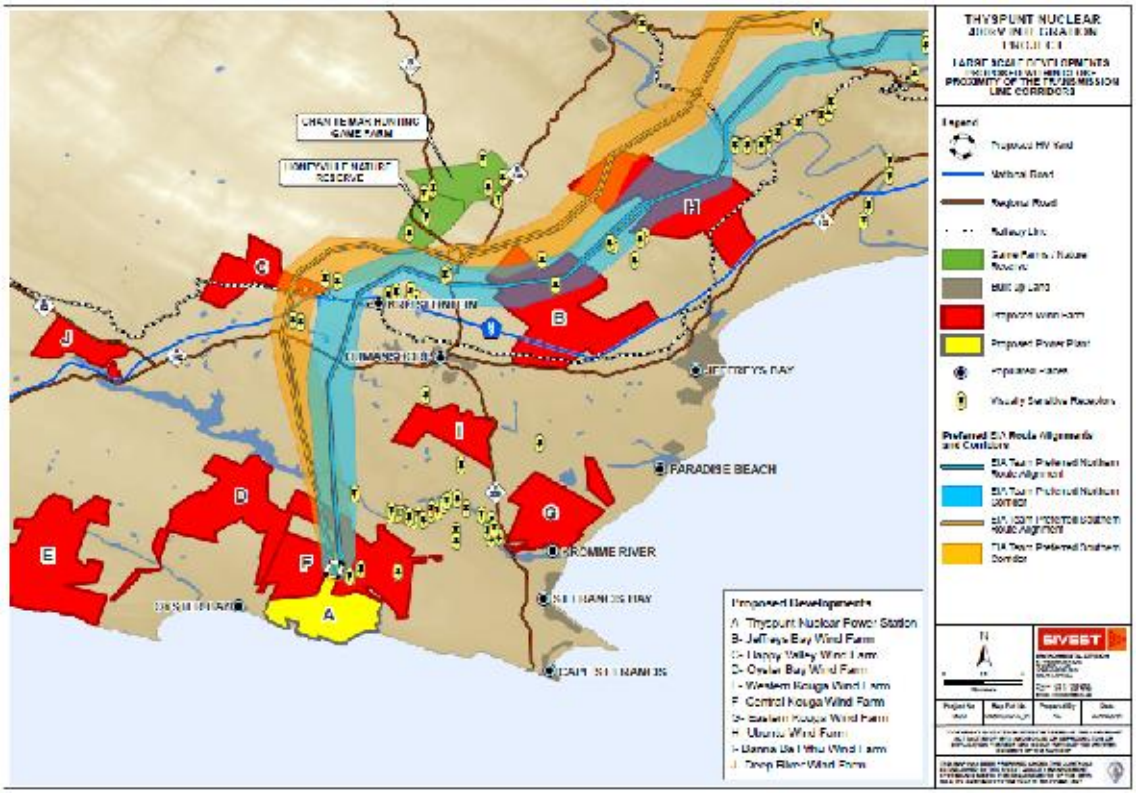

Figure 42 – The location of the proposed power generation developments in the south-western part of the study area

6.5.1 Proposed Thyspunt Nuclear Power Station

The proposed Thyspunt Nuclear Power Station has been predicted to severely alter the landscape character and sense of place in the area surrounding the proposed development due to the remoteness and the scenic quality of the natural landscape of the area in which it is proposed. According to the assessment the proposed power station would have the largest visual impact on the coastal towns of Oyster Bay and Cape St Francis. However coastal-oriented inland areas will only be partially affected by the plant as the shifting dune field to the north of the proposed power station (and to the south of the proposed HV Yard from where the proposed powerlines originate) will limit most of the visual impact associated with the power station to areas along the coastline. The dunes will also visually screen the plant from motorists travelling along coastal roads in this area. The assessment has concluded that the proposed power plant will have a localised impact which will last for the operational life of the plant and will permanently alter the unspoiled unique coastline setting.

It should be noted that the Thyspunt High Voltage Yard is not being assessed as part of this EIA, but as part of the EIA for the proposed nuclear power station. The HV Yard would in essence be similar to the transmission substations as described above. It should also be noted that there would be 2 400kV transmission power lines and 1 132kV power line linking the proposed power station to the HV Yard; these would need to cross over the dune field. The transmission power line towers on top of the dunes would be highly visible as the top of the dunes are a local high point that forms part of the horizon for south-facing vistas.

Implications for the proposed TTLIP power lines

The proposed nuclear power station will be unlikely to have a significant cumulative visual impact alongside the proposed powerlines, due to the shielding effect of the shifting dune field inland of the power station site. The Central Kouga wind farm to the north of the dune field is much more likely to exert a cumulative impact alongside the proposed powerlines as discussed below. The proposed Thyspunt HV Yard would be located to the north of the dunes, and the transmission power lines would need to cross the dunes. The presence of the tall steel structures would add to the proposed cluster of large electricity and power generation infrastructure in the immediate vicinity of the start of the proposed power lines. The presence of three extra power lines, including 2 which would cross over the dunes would also add to the profusion of electricity infrastructure in a natural context.

6.5.2 Central Kouga (Red Cap) Wind Farm

The proposed wind farm forms one of three wind farms for which the proponent is Red Cap Investments. The 'central' wind farm portion is proposed to be located immediately to the north of the proposed Thyspunt HV Yard, and all of the five TTLIP lines would run through this wind farm. The VIA for this development has assessed that the proposed (central) Kouga Wind Energy Facility will have the highest visual impact on people residing on surrounding farms. Large portions of the wind farm will also be visible from Kruisfontein and Humansdorp despite the distance of the proposed development away from the town. The wind farm will be visible to motorists travelling on the gravel road between St Francis Bay and Oyster Bay. The proposed wind farm has been assessed to be likely to impact on protected areas and alter the current pastoral character of the landscape, reflecting its largely undeveloped status. It should be noted that it is likely that distribution powerlines are likely to need to be constructed as part of the wind farm development in order to link the wind farm with Eskom's electricity grid.

A new 132kV overhead power lines to the wind farm is required to connect to the Melkhout substation located 3km to the north of Humansdorp.

Implications for the proposed TTLIP lines

The proposed number of wind turbines in close proximity to both corridors in a currently industrially-undeveloped area would greatly alter the visual environment of the immediate area around the wind farm, and the wider coastal area between Oyster Bay and the St Francis area. In combination with the other proposed wind farms in the wider area (assuming these are all approved and developed), the cumulative impact on the visual environment would be even greater. The cluster of wind farms that would be visible across the area would be particularly important in this context, as the impact would be spread across the visual envelope of this landscape rather than being confined to one part of it. Due to the height and density (number) of proposed wind turbines through which the powerlines would run, the powerlines would be 'masked' to a large degree by the wind turbines, especially to those receptors from farther afield and to the north. The presence of the wind turbines would greatly increase the visual absorption capacity of the immediate and wider area, and would make the much smaller powerlines much less visually intrusive than they would otherwise be in a natural setting. The presence of this and the other two wind farms would thus be likely to decrease the visual impact associated with the proposed TTLIP powerlines.

The proposed distribution lines would likely traverse a similar area to that of the proposed TTLIP power lines, and would add to the cumulative visual impact of the lines and other proposed distribution lines from other wind farm developments.

6.5.3 Western and Eastern Kouga (Red Cap) Wind Farms

Two further wind farms are proposed by Red Cap in this area. The Western wind farm development is proposed to be located to the west of the hamlet of Oyster Bay, close to the coastline. The Eastern wind farm is proposed to be located to the north of St. Francis Bay, immediately to the north of the Krom River. The Western wind farm development has been assessed to have the greatest impact on the local farms, with less of an impact on the Oyster Bay Area. In the case of the Eastern wind farm, it would be highly visible from several resort towns in the area including Paradise Beach, Krom River Mouth and St Francis Bay. Motorists travelling along the R330 between St Francis Bay and Humansdorp will have views of the proposed wind farm and it would be highly visible from this road. As with the proposed Central wind farm development, residents in Kruisfontein and Humansdorp will have views of large portions of the wind farm, despite the fact that the towns are located relatively far away from the proposed site. Although numerous man-made features are present in the region, the visual impact of the wind farm has been assessed to be high due to the height of the turbines. The proposed wind farm will also impact on several protected areas and alter the pastoral character of the coastal plains.

New 132kV overhead power lines to both wind farms are required to connect to the Melkhout substation located 3km to the north of Humansdorp.

Implications for the proposed TTLIP lines

Neither of these proposed wind farms is located close to either of the current TTLIP corridors. The wind farms will greatly add to the potential cumulative change to the visual environment of the area, as described above. However the proposed distribution lines would likely traverse a similar area to that of the proposed TTLIP power lines, and would add to the cumulative visual impact of the lines and other proposed distribution lines from other wind farm developments.

Figure 43 – The view towards the coast and dunes from the Oyster Bay road. This largely natural view could be highly transformed by a cluster of wind farm developments as well as the proposed powerlines and the Thyspunt HV Yard

6.5.4 Oyster Bay (Renewable Energy Systems) Wind Farm

This proposed wind farm is located to the west of both corridors, in the area to the north of the hamlet of Oyster Bay and to the south of Mpofu Dam. The proposed facility is located relatively close to both the TTLIP corridors and the proposed Central Kouga Wind Farm. The scoping phase-visual assessment has concluded that the proposed development is expected to have the largest visual impact on residences in Oyster Bay and other receptor locations within a 5km radius of the proposed site. The report has noted that tourism routes, resort towns and conservation areas are present in the area and as a result the area has a high tourism value. The proposed wind farm will be visible to motorists travelling along the N2, R102 and R330 roads. The scenic quality of the rural landscape in the area around the wind farm is likely to be altered by the proposed wind farm.

A new 66/132kV overhead power line is proposed to connect the wind energy facility substation to Eskom's grid via the existing Melkhout substation, which is located approximately 20km north of the site. Alternative routes/corridors are still to be assessed in the EIA phase.

Implications for the proposed TTLIP lines

The proposed wind farm facility is located in relatively close proximity to the Northern Corridor of the TTLIP in particular, as well as to the proposed Central Kouga wind farm. As described above for the proposed Central Kouga Wind Farm, the size and possible density of the wind turbines will result in the alteration of the visual environment of the immediate area, and in particular the wider area inland of Oyster Bay. Should this wind farm be developed, it will assist in the masking of the proposed powerlines due to the larger size of the turbines as compared to the electricity pylons, and would effectively reduce the potential visual impact of the proposed powerlines by greatly increasing the VAC of the area. This effect will be even greater should the other proposed wind farm developments, in particular the Central Kouga wind farm be developed. The proposed distribution lines would likely traverse a similar area to that of the proposed TTLIP power lines, and would add to the cumulative visual impact.

6.5.5 Banna ba Pifhu (WKN Windcurrent) Wind Farm

This wind farm development is located to the south of Humansdorp. The EIA for the proposed wind farm is in its early stages, and as such no visual impact assessment has yet been undertaken. The wind farm is located to the east of the current TTLIP corridors, and as such is unlikely to directly interface with the proposed power lines. If approved, however, the wind farm will add to the cumulative visual impact of the wind farm developments encircling Humansdorp, and will increase the change in the visual character of the area

6.5.6 Happy Valley (Renewable Energy Investments) Wind Farm

The Happy Valley proposed Wind Farm development is located on the ridges and hilly incised terrain immediately to the north-west of Humansdorp and Kruisfontein. In relation to the proposed development, the northern corridor of the TTLIP bisects the eastern part of the proposed wind farm as it climbs up the ridge to the north-west of Humansdorp. According to the scoping-phase visual assessment for the development it is expected to have a negative visual impact on motorists, residences in Kruisfontein and other observers within a 5-10km radius of the proposed site. A large area to the south of the development will be exposed to visual impact as a result of the proposed placement of the turbines on a ridge, while areas to the north will have interrupted exposure as a result of the screening effect of mountains and hills. Sections of the N2 and R102 will have views of the proposed facility. The report has assessed that the proposed wind farm will alter the scenic character of the natural landscape.

A new overhead distribution power line is proposed to connect the wind energy facility substation to Eskom's grid via the existing Melkhout Substation. Alternative routes/corridors are still to be

assessed in the EIA phase, however it is likely that they will follow existing linear infrastructure such as roads or existing power lines, in order to consolidate the infrastructure and limit the need for additional access points.

6.5.7 Implications for the proposed TTLIP Lines

The Northern Corridor of the proposed TTLIP passes through the eastern part of the proposed wind farm. In this part of the proposed development, the preliminary turbine layout indicates that a series of turbines would be placed along the ridge, being highly visible due to their size and position in the landscape. The proximity of these proposed turbines to the three proposed powerlines of the Northern Corridor as they climb and cross the ridge would make the powerlines less visually intrusive on a prominent landscape feature of a ridge, which is currently natural, as the row of turbines on the ridge would visually dominate the landscape. As such the visual impact potential of the powerlines in this context would be reduced as compared to a scenario where the powerlines crossed the ridge alone. The placement of such large man-made features such as turbines (and powerlines) would alter the visual character of the ridge, in particular from receptor locations to the south, east and west. In a wider context, the proposed development would add to the cumulative visual impact on the visual character of the wider area, where wind farms could be positioned all across the landscape. The proposed 132kV power line will add to the density of electrical infrastructure in the area.

6.5.8 Deep River (VentuSA Energy) Wind Farm

This proposed wind farm is located to the west of Humansdorp, close to the N2 highway west of the town. The proposed wind farm is not located close to the proposed TTLIP corridors. The EIR-phase visual assessment has concluded that due the low lying area of the proposed site, the development will have the highest visual impact on settlements and homesteads within the river valley. Due to its position in the landscape, the development would be visually screened from significant areas. Motorist travelling along the N2, R102, R62 and the southern part of the R330 will be exposed to the visual impacts of the proposed wind farm. The visual report has concluded that the proposed wind farm will be visible from various protected areas and will impact on the picturesque sense of place and natural beauty of the area.

A new overhead 132kV distribution power line is proposed to connect the wind energy facility substation to Eskom's grid via the existing Melkhout substation, which is located 18km east of the proposed site.

Implications for the proposed TTLIP lines

The proposed TTLIP power lines are not located close to this proposed development, and thus there is unlikely to be any visual connection between the two developments. The potential presence of the wind farm in relation to a number of others in the area around Humansdorp will add to the cumulative impact in terms of the visual alteration of the landscape.

The proposed distribution lines could traverse a similar area to that of the proposed TTLIP power lines, and would add to the cumulative visual impact.

6.5.9 Jeffreys Bay (Mainstream) Wind Farm

This proposed wind farm development is located in an area inland (to the north-west) of Jeffreys Bay and to the east and north-east of Humansdorp. It straddles the N2 to the east of Humansdorp. In relation to the corridors of the proposed TTLIP, the southern corridor runs directly through the northern part of the proposed wind farm. The visual impact assessment for the proposed development has assessed that the proposed development will be highly visible, exerting the greatest visual impact on the residents in the coastal resort town of Jeffrey's Bay, the inland town of Humansdorp and surrounding farms in close proximity to the proposed site. The visual study has assessed Scenic viewpoints and protected areas in the region will be highly sensitive to the visual impacts associated with the wind farm; however the report concludes that the visual intrusion of the wind farm will be significantly reduced as a result of existing settlements and man-made features in the area. Motorists travelling along the N2 and R330 would be highly exposed to visual impacts of the proposed wind farm, although the impact will be short lived. The proposed project will be highly intrusive due to the height of the turbines and the sensitivity of the visual receptors. The visual impact report has concluded that the proposed development will have a regional impact which will last for the operational life of the wind farm. It should be noted that a new 132kV overhead power line is required to connect the wind energy facility substation to Eskom's grid.

Implications for the proposed TTLIP lines

The northern part of the proposed wind farm is located very close to the proposed southern corridor of the TTLIP, with parts of the corridor and the EIA Team-preferred alignment bisecting this part of the wind farm. It is important to note that as described above, the area in which the proposed wind farm is proposed was identified as a visually-sensitive area due by the TTLIP visual assessment due to its largely natural and highly scenic character. The development of a large number of wind turbines in this area would significantly alter the visual environment of this area. In this context the proposed powerlines would be dwarfed by the adjacent wind turbines,

and may even be partially masked by these if the powerlines were to pass in between turbines. As in the case of the Central Kouga wind farm development and other wind farm developments discussed above, the potential presence of the wind farm would potentially reduce the visual impact potential of the proposed powerlines by changing the visual character of this visually-sensitive area and thus by increasing the area's VAC. The proposed 132kV power line will add to the density of electrical infrastructure in the area.

6.5.10 Ubuntu Wind Farm

Although the scoping study for this wind farm has been undertaken, no visual information was included in the scoping study. Thus no information on the likely affected visual areas is available. Due to the position of the proposed wind farm, the local farms are likely to be affected. Other areas that would be likely to be subject to the visual impacts associated with the proposed wind turbines are the northern parts of Jeffreys Bay as well as the Gamtoos River Valley to the east. A new overhead power line is required to connect the wind energy facility substation to Eskom's grid.

Implications for the proposed TTLIP lines

Both corridors run through the area in which the proposed wind farm is proposed. The proposed number of wind turbines in close proximity to both corridors in a currently industrially-undeveloped area would greatly alter the visual environment of the immediate area around the wind farm, and the wider area, in particular that of the Gamtoos River valley, where wind turbines would be prominent and visually intrusive on the western valley side when viewed from within the valley, In combination with the other proposed wind farms in the wider area (assuming these are all approved and developed), the cumulative impact on the visual environment would be even greater. The cluster of wind farms that would be visible across the area would be particularly important in this context, as the impact would be spread across the visual envelope of this landscape rather than being confined to one part of it. Due to the height and density (number) of proposed wind turbines through which the powerlines would run, the powerlines would be 'masked' to a large degree by the wind turbines, especially to those receptors from farther afield and to the north. The presence of the wind turbines would greatly increase the visual absorption capacity of the immediate and wider area, and would make the much smaller powerlines much less visually intrusive than they would otherwise be in a natural setting. The presence of this and the other two wind farms would thus be likely to decrease the visual impact associated with the proposed TTLIP powerlines. The proposed 132kV power line will add to the density of electrical infrastructure in the area.

6.5.11 Implications of cumulative visual impacts for sensitive receptors

As the proposed developments are located within the area in which a number of sensitive receptors are located, these receptors are likely to be affected by the cumulative impacts that would be created if all of the proposed developments were to be approved and developed. It is not part of the scope of this study to assess these potential cumulative impacts at the level of each individual receptor location; however the following table presents a summary of which areas are likely to be affected by each proposed development in the area.

	Thys-punt Nuclear	Jeffreys Bay WF	Happy Valley WF	Oyster Bay WF	Western Kouga WF	Central Kouga WF	Ubuntu WF	Banna ba Pifhu	Eastern Kouga WF	Deep River WF	NC Power lines
RESIDENCES AND COMMUNITIES											
Oyster Bay	✓			✓	✓						
St Francis Bay									✓		
Jeffrey's Bay		✓					✓	✓			
Humansdorp		✓				✓		✓		✓	✓
Kruisfontein			✓	✓		✓				✓	✓
Paradise Beach		✓						✓	✓		
Krom River									✓		
Cape St Francis / St Francis Bay	✓										
Southern Gamtoos Valley							✓				
Honeyville / Chan Te Mar receptors		✓					✓				
		MAIN ROADS									
N2		✓	✓	✓			✓	✓		✓	
R330		✓							✓	✓	
R102		✓	✓	✓			✓	✓		✓	
R62		✓								✓	
R332		✓									

Table 9 – Cumulative Impacts on Communities and Roads in the Study Area

The following receptors would be likely to be affected by the potential cumulative impacts associated with the proposed developments in the area:

- Penny Sands Farmstead
- Lappie-aarde Farmstead
- Geelhoutboom Farmstead West Farmstead
- Geelhoutboom Farmstead East Farmstead
- Die Berg Community
- Zwartenbosch Golf Estate
- Rondebosch Farmstead
- Rondebosch Restaurant and households
- Honeyville proposed re-burial (Heritage) site
- Chan Te Mar Hunting Game Farm - Main Lodge
- Chan Te Mar Hunting Game Farm - Accommodation at Biltong Processing Building
- Chan Te Mar Hunting Gamer Farm - Foreman's House
- Antonieskraal Farmstead

Due to the nature of the visual impacts associated with wind farms, and due to the density of the wind farm developments in the St Francis Bay – Jeffreys Bay – Humansdorp area, the cumulative impacts are likely to exert greater visual impacts on these receptor locations that that associated with the proposed power lines on their own.

6.6 Mitigation Measures and Routing Recommendations

Although the EIA Team-preferred alignment for the Northern Corridor has been assessed to result in relatively few receptor locations having significant visual impacts, and although the corridor has been revised to avoid areas of visual sensitivity where possible, a number of key recommendations are relevant in order to ensure that the proposed power lines do not exert a significant potential impact on receptor locations. The table below outlines the routing recommendations per receptor / area:

Area / Receptor	Routing Recommendation
Geelhoutboom area west of Kruisfontein	Route powerlines as far west within the corridor as possible to avoid affecting the Geelhoutboom Game Breeding Farm
Hills North-west of Kruisfontein	Route powerlines in 'saddle / nek' of hills (i.e. on current EIA Team-preferred alignment to avoid visual exposure over these hills)
Die Berg / Endymion Communities	Route powerlines as far north-west as possible (away from Die Berg) to avoid affecting these communities
Farm Zwartebosch 347 near the R332 / R330 intersection	Align powerlines in the lower-lying area between the hills to the north and the south to avoid visual impacts associated with crossing the higher ground
Farm Weltevreden 305 east of the R330	Align the lines as far south in the corridor as possible to avoid the sensitive receptor locations at Chan te Mar Game Farm
Loerie Ruskamp Area	Align the powerlines as far south and east as possible within the corridor to avoid impacting the Loerie Ruskamp sensitive receptor locations
Stinkhoutberg Nature Reserve / Otterford State Forest	Avoid aligning the power lines adjacent to the boundaries of the Stinkhoutberg Nature Reserve
Upper Elands River Valley (near the Sandrivier Dam)	Avoid the northern parts of the corridor, **in particular the southern-most ridges that form the boundary of the Elands River Valley. The lines must not run along the ridge top**
Elands River Valley near Bulk River Dam	Avoid the northern parts of the corridor, **in particular the southern-most ridges that form the boundary of the Elands River Valley. The lines must not run along the ridge top**
Lower Elands River Valley and Elands River Road	Run lines in the northern part of the corridor to avoid the sensitive receptor locations at the Chalet
Ruigte Vlei / Burghley Hills	Run the lines in the northern part of the corridor to avoid impacting the Paardehoek West sensitive receptor location

Area / Receptor	Routing Recommendation
Wincanton / Rooihoogte Area	Avoid the hilly rising ground (natural vegetation) in the eastern part of the corridor
Elands River Road in the vicinity of the Sand River Dam	**Re-route the lines to the south and out of the viewshed of the Elands River Valley. Routing the lines in the firebreak, and thus the viewshed of the valley must not occur.**
Kruisrivier Area	Avoid the hilly ground (natural vegetation) in the western part of the corridor and run at the base of the hills as far as possible
Kruisrivier Area	Avoid the sensitive receptors at Buffelsfontein and Plumbago Hills. A re-alignment of the EIA Team-preferred alignment in this area is recommended to lessen the visual impact on these two receptor locations
Doornkom / Rezona Area (to the north of Uitenhage and Kamesh)	Avoid crossing ridges and high points to avoid potential visual exposure / intrusion
Alwynhoek Area	Avoid crossing the hill to the south of the proposed Amanzi Estate to minimise visual exposure / intrusion associated with crossing this high point

Table 10 – Routing Recommendations with respect to visually-sensitive areas

It is very important that these routing recommendations be followed in the final alignment of the proposed powerlines to avoid the potential visual exposure and intrusion associated with the proposed powerlines and to avoid impacting on sensitive receptors. Two general recommendations are particularly important in this context:

Firstly it is critical that the proposed powerlines are not routed on the ridge top of the southern side of the Elands River Valley. As discussed in the point below, the positioning of large structures such as the proposed high voltage powerlines on a ridge top or a hill makes them highly visible. The Elands River Valley and Conservancy is a particularly sensitive area from a visual perspective, and having three sets of powerlines running on the top of the ridge would make these powerlines highly intrusive, and totally incongruous in the setting of the conservancy. The 'visual envelope' of the valley is enclosed to the south by this ridge. The ridge is largely natural in character, and is not planted with exotic trees as it forms part of the Longmore Forest firebreak. Being able to view powerlines on the top of the ridge would alter the visual character of the valley greatly and would exert a significant visual impact on the receptor locations within the valley. The powerlines should be set back from the northern-most ridge top as far as possible so that no part of the powerlines are visible from within the valley. In this context it is preferable that the powerlines be aligned along one of the valleys within the Longmore Forest. The EIA Team-preferred alignment has attempted to achieve this routing recommendation as far as possible.

The 3D visualisation modelling has revealed that the lines in the vicinity of the Sand River Dam *would be visible* from the road in the valley. As stated above, it is thus critical that these lines be moved to the south and out of the viewshed of the valley and the road.

Figure 44 – The ridge on the southern side of the Elands River Valley as viewed from the Elands River Road

Secondly, in an overall context, the proposed power lines should not be routed over hills, koppies or ridges, and these areas should be avoided where at all possible. In many parts of the study area, higher sloping ground has retained its natural vegetation as the terrain has restricted clearing of vegetation for purposes such as cultivation or human habitation. Therefore running powerlines over such areas would have an impact on this natural vegetation, particularly thicket vegetation which is present within the eastern part of the study area. A strip of vegetation may need to be cleared under the powerlines in these areas to allow a sufficient clearance between the lines and the vegetation to be maintained, resulting in a visible strip which would be particularly visible in areas of higher elevation. As described in the table above, there are a few parts of the corridor where the alignment should avoid areas of higher ground. Where the proposed lines would have to cross over a ridge, such as the ridge to the north-west of Humansdorp, the lines should be routed through a low point or saddle within the ridge to minimise the visual intrusion associated with the power lines and to prevent the power lines from breaking the horizon as far as possible.

Figure 45 – A number of high voltage powerlines on high ground in the vicinity of the Grassridge Substation

Related to the point above, a mitigation measure that should be considered in the final routing of the powerline is the avoidance of areas of natural thicket vegetation. It is not certain whether a strip of vegetation would need to be cleared (and kept clear) of vegetation under the powerlines within the thicket (valley bushveld) parts of the study area. This routing principle could potentially be contradictive to the principle of avoiding sensitive receptor locations (typically areas of permanent human habitation such as households) as far as possible as this could take the power lines into natural areas away from human habitation. The principle of avoiding areas of human habitation has a higher priority than avoiding natural areas altogether. However, where possible, the proposed powerlines should be routed along areas of existing impact where thicket vegetation remains such as roads, boundary lines or 'cut lines'.

6.7 Overall Visual Impact Assessment Rating

The EIA requires that an overall rating for visual impact be provided to allow visual impact to be assessed alongside other environmental parameters. SiVEST has developed an impact rating matrix for this purpose. The tables below present the impact matrix for visual impacts associated with the northern corridor.

Please refer to Appendix B below for an explanation of the impact rating methodology.

IMPACT TABLE	
Environmental Parameter	Visual Impact
Issue/Impact/Environmental Effect/Nature	The proposed power lines within the Northern Corridor could exert a visual impact by altering the visual environment of the study area. They could be perceived as an unwelcome visual intrusion by sensitive receptors in the area, in particular those receptors within a natural or rural visual setting. Three sets of parallel-running powerlines could increase the potential visual impact potential. The nature of the impact is dependent on factors such as the orientation of the receptor location, distance of the lines away from the proposed receptor and the nature of the visual environment.
Extent	Local / District (2)
Probability	Definite (4)
Reversibility	Partly reversible (2)
Irreplaceable loss of resources	Significant loss of resources* (3)
Duration	Long term (3)
Cumulative effect	High cumulative impact** (4)
Intensity/magnitude	High (3)
Significance Rating	**High Negative Impact**

	Pre-mitigation impact rating	Post mitigation impact rating
Extent	2	2
Probability	4	4
Reversibility	2	2
Irreplaceable loss	3	2
Duration	3	3
Cumulative effect	4	4
Intensity/magnitude	3	2
Significance rating	-54 (high negative)	-6 (medium negative)
Mitigation measures	▪ Avoid areas of visual sensitivity as detailed above. ▪ Use the EIA Team-preferred alignment for the final alignment of the proposed power lines ▪ In general: i) avoid crossing areas of high elevation, especially ridges, koppies or hills ii) align powerlines as far away from sensitive receptor locations as possible iii) avoid areas of natural thicket vegetation where possible, and in these areas align the powerlines along existing linear impacts within the vegetation such as fence lines or cut lines	

Table 11 – Overall Impact Assessment Rating for the visual environment

* - Please note in this context ‘resources’ has been defined as the visual environment; thus a loss of resource would be defined as the degree of change in the visual environment.

** - Please note this is assuming the development of some or all the proposed wind farms in the area

7 CONCLUSIONS

The visual report has utilised the EIA Team-preferred route for the Northern Corridor as the basis on which to assess the potential visual impacts associated with the proposed three sets of power lines in the Northern Corridor. Due to the size of the study area, a large number of sensitive visual receptors that could potentially be affected by the proposed power lines have been identified. A visual impact assessment matrix has been developed to assess the likely visual impact of the proposed power lines on each sensitive receptor location. Viewed in conjunction with the visual modelling for certain critical areas along the route, this matrix has provided an accurate representation of the degree of visual impact associated with the proposed power lines. The visual impacts associated with the upgrading of the existing Dedisa and Grassridge Substations have also been assessed, and the assessment has concluded that the upgrading will not result in a significant change to the existing visual (baseline) environment in the surrounding areas in both a day time and night-time context.

A relatively small percentage of receptors have been assessed to be likely to experience significant visual impacts related to the proposed power lines. This is due in many respects to the careful routing of the EIA Team-preferred alignment away from areas of visual sensitivity and away from sensitive visual receptors as far as possible. A number of significant visually-sensitive areas have been purposefully avoided by the proposed alignment, thus preventing visual impacts from occurring within these areas.

An assessment of the cumulative impact of a number of (primarily wind farm) developments has been undertaken. This assessment has concluded that if all developed, these wind farm developments would significantly alter the visual character of certain parts of the study area along with the proposed power lines. The change in visual character would have a concomitant effect on the visual absorption capacity of the area and would entail that the proposed 3 parallel-running power lines would be less visually intrusive than if the power lines were to be developed without any other developments occurring.

It is very important to note that this assessment has been based upon the EIA Team-preferred alignment, and that changing this alignment may result in more intensive visual impacts on receptors. In this context it is critical that the recommendations made in terms of routing in the recommendations section above be adhered to in the final routing of the power lines. The EIA Team-preferred corridor that is revised with the recommendations made in this report should be used as far as possible as the basis on which to finalise the lines.

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Appendix A

MAPS

Appendix B

EIA IMPACT ASSESSMENT METHODOLOGY

Environmental Impact Assessment

EIA is the systematic process of identifying, assessing and reporting environmental impacts associated with an activity and its reasonable alternatives. The Environmental Impact Assessment can be performed or conducted during the following phases of a proposed project activity

- Basic Assessment Phase
- Scoping Phase
- Environmental Impact Phase

The purpose of the EIA is to:

- Address issues that have been identified.
- Assess alternatives to the proposed activity in a comparative manner.
- Assess all identified impacts and determine the significance of each impact.
- Formulate mitigation measures.

The EIA Phase of the project has focused on consulting with Interested and / or Affected Parties as well as conducting specialist studies to address the potential impacts identified.

To conduct an EIA, environmental parameters which are likely to be affected by the proposed activity need to be identified. Table 1 below outlines the environmental parameters which have been classified into biophysical (relating to natural environment) and social (relating to interaction with humans).

Environmental Impact Assessment Methodology

The EIA Methodology assists in evaluating the overall effect of a proposed activity on the environment. The determination of the effect of an environmental impact on an environmental parameter is determined through a systematic analysis of the various components of the impact. This is undertaken using information that is available to the environmental practitioner through the process of the environmental impact assessment. The impact evaluation of predicted impacts was undertaken through an assessment of the significance of the impacts.

Determination of Significance of Impacts

Significance is determined through a synthesis of impact characteristics which include context and intensity of an impact. Context refers to the geographical scale i.e. site, local, national or global whereas Intensity is defined by the severity of the impact e.g. the magnitude of deviation from background conditions, the size of the area affected, the duration of the impact and the overall probability of occurrence. Significance is calculated as shown in Table 3.

Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. The total number of points scored for each impact indicates the level of significance of the impact.

Impact Rating System

Impact assessment must take account of the nature, scale and duration of effects on the environment whether such effects are positive (beneficial) or negative (detrimental). Each issue / impact is also assessed according to the project stages:

- planning
- construction
- operation
- decommissioning

Where necessary, the proposal for mitigation or optimisation of an impact should be detailed. A brief discussion of the impact and the rationale behind the assessment of its significance has also been included.

Rating System Used To Classify Impacts

The rating system is applied to the potential impact on the receiving environment and includes an objective evaluation of the mitigation of the impact. Impacts have been consolidated into one rating. In assessing the significance of each issue the following criteria (including an allocated point system) is used:

NATURE		
Include a brief description of the impact of environmental parameter being assessed in the context of the project. This criterion includes a brief written statement of the environmental aspect being impacted upon by a particular action or activity.		
GEOGRAPHICAL EXTENT		
This is defined as the area over which the impact will be expressed. Typically, the severity and significance of an impact have different scales and as such bracketing ranges are often required. This is often useful during the detailed assessment of a project in terms of further defining the determined.		
1	Site	The impact will only affect the site
2	Local/district	Will affect the local area or district
3	Province/region	Will affect the entire province or region
4	International and National	Will affect the entire country

PROBABILITY		
This describes the chance of occurrence of an impact		
1	Unlikely	The chance of the impact occurring is extremely low (Less than a 25% chance of occurrence).
2	Possible	The impact may occur (Between a 25% to 50% chance of occurrence).
3	Probable	The impact will likely occur (Between a 50% to 75% chance of occurrence).
4	Definite	Impact will certainly occur (Greater than a 75% chance of occurrence).
REVERSIBILITY		
This describes the degree to which an impact on an environmental parameter can be successfully reversed upon completion of the proposed activity.		
1	Completely reversible	The impact is reversible with implementation of minor mitigation measures
2	Partly reversible	The impact is partly reversible but more intense mitigation measures are required.
3	Barely reversible	The impact is unlikely to be reversed even with intense mitigation measures.
4	Irreversible	The impact is irreversible and no mitigation measures exist.
IRREPLACEABLE LOSS OF RESOURCES		
This describes the degree to which resources will be irreplaceably lost as a result of a proposed activity.		
1	No loss of resource.	The impact will not result in the loss of any resources.
2	Marginal loss of resource	The impact will result in marginal loss of resources.
3	Significant loss of resources	The impact will result in significant loss of resources.
4	Complete loss of resources	The impact is result in a complete loss of all resources.
DURATION		
This describes the duration of the impacts on the environmental parameter. Duration indicates the lifetime of the impact as a result of the proposed activity		
1	Short term	The impact and its effects will either disappear with mitigation or will be mitigated through natural process in a span shorter than the construction phase (0 – 1 years), or the impact and its effects will last for the period of a relatively short construction period and a limited recovery time after construction, thereafter it will be entirely negated (0 – 2 years).

2	Medium term	The impact and its effects will continue or last for some time after the construction phase but will be mitigated by direct human action or by natural processes thereafter (2 – 10 years).
3	Long term	The impact and its effects will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural processes thereafter (10 – 50 years).
4	Permanent	The only class of impact that will be non-transitory. Mitigation either by man or natural process will not occur in such a way or such a time span that the impact can be considered transient (Indefinite).
CUMULATIVE EFFECT		
This describes the cumulative effect of the impacts on the environmental parameter. A cumulative effect/impact is an effect which in itself may not be significant but may become significant if added to other existing or potential impacts emanating from other similar or diverse activities as a result of the project activity in question.		
1	Negligible Cumulative Impact	The impact would result in negligible to no cumulative effects
2	Low Cumulative Impact	The impact would result in insignificant cumulative effects
3	Medium Cumulative impact	The impact would result in minor cumulative effects
4	High Cumulative Impact	The impact would result in significant cumulative effects
INTENSITY / MAGNITUDE		
Describes the severity of an impact		
1	Low	Impact affects the quality, use and integrity of the system/component in a way that is barely perceptible.
2	Medium	Impact alters the quality, use and integrity of the system/component but system/ component still continues to function in a moderately modified way and maintains general integrity (some impact on integrity).
3	High	Impact affects the continued viability of the system/component and the quality, use, integrity and functionality of the system or component is severely impaired and may temporarily cease. High costs of rehabilitation and remediation.
4	Very high	Impact affects the continued viability of the system/component and the quality, use, integrity and functionality of the system or component permanently ceases and is irreversibly impaired (system collapse). Rehabilitation and remediation often impossible. If possible rehabilitation and remediation often unfeasible due to extremely high costs of rehabilitation and remediation.

SIGNIFICANCE

Significance is determined through a synthesis of impact characteristics. Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. This describes the significance of the impact on the environmental parameter. The calculation of the significance of an impact uses the following formula:

(Extent + probability + reversibility + irreplaceability + duration + cumulative effect) x magnitude/intensity.

The summation of the different criteria will produce a non weighted value. By multiplying this value with the magnitude/intensity, the resultant value acquires a weighted characteristic which can be measured and assigned a significance rating.

Points	Impact Significance Rating	Description
6 to 28	Negative Low impact	The anticipated impact will have negligible negative effects and will require little to no mitigation.
6 to 28	Positive Low impact	The anticipated impact will have minor positive effects.
29 to 50	Negative Medium impact	The anticipated impact will have moderate negative effects and will require moderate mitigation measures.
29 to 50	Positive Medium impact	The anticipated impact will have moderate positive effects.
51 to 73	Negative High impact	The anticipated impact will have significant effects and will require significant mitigation measures to achieve an acceptable level of impact.
51 to 73	Positive High impact	The anticipated impact will have significant positive effects.
74 to 96	Negative Very high impact	The anticipated impact will have highly significant effects and are unlikely to be able to be mitigated adequately. These impacts could be considered "fatal flaws".
74 to 96	Positive Very high impact	The anticipated impact will have highly significant positive effects.

Appendix C

SUMMARY OF VISUAL IMPACTS OF PROPOSED DEVELOPMENTS

Location relative to the Thyspunt Transmission Line Corridors	Impact on sense of place and landscape character	Extent of visual exposure	Sensitive receptors	Visually exposed residences / communities	Visually exposed roads	Lighting impacts	Other visual impacts
PROPOSED THYSPUNT NUCLEAR POWER STATION (NPS)							
Approx. 3.5km south of the HV yard.	Permanently alter the scenic natural character and remote sense of place.	East-west dunes partially contain the visual impact to a 5km radius along the coastline.	Coastal resort communities in Oyster Bay and Cape St Francis are sensitive as they are expanding. The N2 is sensitive as it is an important tourism route.	Oyster Bay, Cape St Francis and the proposed rocky coast development.	Dunes visually screen the plant from coastal roads.	Red flashing light on the meteorological and radio masts will increase the visibility of the plant at night; however existing lighting will reduce the impact.	Meteorological (120m) and radio (95m) masts will be visible for approx. 10km.
JEFFREY'S BAY WIND ENERGY FACILITY (WEF)							
Partially within the southern corridor, approx. 6km east of Humansdorp.	Although man-made features have transformed the natural landscape,	The wind farm will be visible within a 20km radius of the site.	Paradise beach and Cape St Francis Proposed Conservancy are sensitive due to	Coastal resorts in Jeffrey's bay, inland residences in Humansdorp, and surrounding	Short sections of the N2 and R330 will be exposed to the wind farm.	The flashing red light on some of the turbines will result in a visual impact at night; however future	Visual impact on tourists visiting protected areas and viewpoints in the region. The shadow

Location relative to the Thyspunt Transmission Line Corridors	Impact on sense of place and landscape character	Extent of visual exposure	Sensitive receptors	Visually exposed residences / communities	Visually exposed roads	Lighting impacts	Other visual impacts
	pristine views from farms to the north and north-west will be altered.		pristine views. The N2 is sensitive as it is an important tourism route.	farm residents.		development is expected to reduce this.	flicker effect will impact residences and motorists on the N2.
HAPPY VALLEY WIND ENERGY FACILITY (WEF)							
Partially within and directly west of the northern corridor, approx. 2.7km north-west of Kruisfontein.	Permanently alter the rural scenic quality of the landscape and transform the natural ridge.	The wind farm will be visible within a 5-10m radius of the site, with a greater visibility to the south as a result of mountains and hills in the north.	ThabaManzi Game Lodge and residents in Kruisfontein. The N2 is sensitive as it is an important tourism route.	Residents in Kruisfontein and surrounding farm residents.	Sections of the N2, R102 and secondary roads within the region.	The flashing red light on some of the turbines will result in a visual impact at night.	Potentially placing the turbines on a ridge will significantly increase the visibility wind farm.
OYSTER BAY WIND ENERGY FACILITY (WEF)							
Approx. 2km west of the northern/southern corridor approx. 6km north of Oyster Bay.	The scenic quality and pastoral character will be transformed.	The wind farm will be visible within a 10km radius of the site with the highest visual impact	Numerous conservation areas located within close proximity of the site and the N2	Oyster Bay (within a 5km radius), Kruisfontein (within a 10km radius) and	Large sections of the N2, R102 and R330 and interrupted sections of the R62 and R332.	The flashing red light on some of the turbines will result in a visual impact at night.	Impact on tourism will be high as the area has valuable tourism routes, towns and conservation

Location relative to the Thyspunt Transmission Line Corridors	Impact on sense of place and landscape character	Extent of visual exposure	Sensitive receptors	Visually exposed residences / communities	Visually exposed roads	Lighting impacts	Other visual impacts
		experienced within a 5km radius of the site.	which is an important tourism route.	surrounding farm residents.			areas.
WESTERN KOUGA WIND ENERGY FACILITY (WEF)							
Approx. 12km west of the northern/southern corridor, close to the mouth of the Tsitsikamma River.	The natural untransformed and pastoral character will be transformed.	Views beyond a 5km radius may contain more of the wind farm.	Several protected areas in the region.	Farmsteads in close proximity will be highly exposed, and Oyster Bay will have a low visual exposure.	Sections of the gravel road connecting St Francis Bay with Oyster Bay.	The flashing red light on some of the turbines will result in a visual impact at night.	A group of three labourers cottages will be affected by the shadow flicker effect.
CENTRAL KOUGA WIND ENERGY FACILITY (WEF)							
Partially within the northern/southern corridor, approx. 3km north of Thyspunt.	The natural untransformed and pastoral character will be transformed.	Views beyond a 5km radius may contain more of the wind farm.	Cape St Francis Conservancy and several protected areas in the region.	Inland towns of Humansdorp and Kruisfontein as well as farmsteads in close proximity.	Sections of the gravel road connecting St Francis Bay with Oyster Bay.	The flashing red light on some of the turbines will result in a visual impact at night.	
EASTERN KOUGA WIND ENERGY FACILITY (WEF)							
Approx. 10km east of the northern/southern	The natural quality of the coastal resort	Views beyond a 5km radius may contain more of	Cape St Francis Proposed Conservancy,	Resort towns in Paradise Beach, along the	Large sections along the R330 between	The flashing red light on some of the turbines will	

Location relative to the Thyspunt Transmission Line Corridors	Impact on sense of place and landscape character	Extent of visual exposure	Sensitive receptors	Visually exposed residences / communities	Visually exposed roads	Lighting impacts	Other visual impacts
corridor and 3km north of Thyspunt.	towns and pastoral character will be significantly altered.	the wind farm.	Sekoeirivier Nature Reserve and the Kromme River Mouth Private Nature Reserve.	Kromme River and in St Francis Bay, as well as farmsteads in close proximity.	Humansdorp and St Francis Bay.	result in a visual impact at night.	
DEEP RIVER WIND ENERGY FACILITY (WEF)							
Approx. 9km west of the northern / southern corridor and 15km west of Humandsdorp / Kruisfontein.	The picturesque rural character and high tourism value of the natural surrounds will be altered.	The wind farm will be visible within a 10km radius of the site with the highest visual impact experienced within a 5km radius of the site. Mountains and hills will limit views in the north and south.	Protected areas including; Thaba Manzi and Jumanji Game Farms, the Kromrivierspoort Natural Heritage Site and part of the State Forest.	Settlements and homesteads, particularly those within the river valley. Residents in Humansdorp and Kruisfontein will be subject to low visual impacts.	Discontinuous stretches of the N2, R102, R62 and the southern part of the R330.	The flashing red light on some of the turbines will result in a visual impact at night. Security and after-hour lighting will alter the sense of place as the adjacent area has a relatively low population.	Cut and fill for access roads may scar the landscape. The wind farm will impact on the tourism value of the picturesque surrounds.

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