

# **PROPOSED ARIES-PAULPUTS-KOKERBOOM 400KV LILO AND SUBSTATION UPGRADE PROJECT, NORTHERN CAPE PROVINCE**

## **LANDSCAPE & VISUAL IMPACT ASSESSMENT**

**January 2026**

**Prepared by:**

Environmental Planning and Design  
PO Box 40910,  
Musgrave Road,  
Durban,  
4062.

Tel: 083 703 2995

Email: jon@enviroconsult.co.za

**Prepared for:**

EIMS  
8 Dalmeny Road,  
Pine Park,  
Randburg  
2194

Tel: 011 789 7170

Email: lucien@eims.co.za



ENVIRONMENTAL PLANNING AND DESIGN

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# **1 INTRODUCTION**

## **1.1 GENERAL**

This Landscape and Visual Impact Assessment (LVIA) study forms part of the application for environmental authorisation being prepared by EIMS, for the National Transmission Company South Africa's proposed construction and operation of the Aries-Paulputs-Kokerboom 400 kV LILO and Substation Upgrade project in the Northern Cape Province.

## **1.2 PROJECT LOCATION**

The affected properties consists of the following farm portions: The proposed project is located on Farms Blad-Grond South No. 94 Portions 3, 0 (Remaining Extent), 1 (Remaining Extent), 4 (Remaining Extent), 5 (Remaining Extent), Blad-Grond North No. 77 Portion 2 (Remaining Extent), Steyns Puts 178 Portion 1 (Remaining Extent), Lucas Vlei No. 93 Portion 4 (Remaining Extent), 5 (Remaining Extent), Scuit-Klip No. 92 Portions 0 (Remaining Extent), 1 (Remaining Extent), 2 (Remaining Extent), 4, and Konkoonsies No. 91 Portion 1 and 6, in the Khâi-Ma and Kai !Garib Local Municipalities, Northern Cape. The site is approximately 30kms northeast of Pofadder.

The key points of the site are proposed powerline route – Start: 28°52'43.12"S; 19°33'53.35"E; Middle: 28°52'47.57"S; 19°33'56.49"E; End: 28°51'42.17"S; 20°0'18.92"E.

No site alternatives are under consideration.

## **1.3 BACKGROUND OF SPECIALIST**

Jon Marshall qualified as a Landscape Architect in 1978. He became a Chartered Member of the Landscape Institute (UK) in 1986. He is also a registered Landscape Architect (SACLAP) and has extensive experience of environmental impact assessment in South Africa.

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

He worked in the United Kingdom (1990 – 1995) for major supermarket chains including Sainsbury's and prepared CAD based visual impact assessments for public enquiry for new store development. He also prepared the VIA input to the environmental statement for the Cardiff Bay Barrage for consideration by the UK Parliament in the passing of the Barrage Bill (1993).

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

A brief CV is attached for information (**Appendix I**).

## **1.4 BRIEF AND RELEVANT GUIDELINES**

The brief is to assess the landscape and visual impact of the proposed project.

The requirement for this were highlighted in the EIMS Site Sensitivity Verification Report of the 6<sup>th</sup> August 2025 which indicated that the project could have a high Landscape and Visual impact.

In addition to the above, this document complies with Appendix 6 of the EIA Regulations which lists requirements of Specialist Reports, see schedule below.

<b>Regulation GNR 326 of 4 December 2014, as amended 7 April 2017, Appendix 6</b>	<b>Section of Report</b>
1. (1) A specialist report prepared in terms of these Regulations must contain-	1
a) details of-	
i. the specialist who prepared the report; and	
ii. the expertise of that specialist to compile a specialist report including a curriculum vitae;	
b) a declaration that the specialist is independent in a form as may be specified by the competent authority;	Separate document.
c) an indication of the scope of, and the purpose for which, the report was prepared;	1
(cA) an indication of the quality and age of base data used for the specialist report;	1
(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	3 & 4
d) the date and season of the site investigation and the relevance of the season to the outcome of the assessment;	1
e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;	1 & 4
f) details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives;	3
g) an identification of any areas to be avoided, including buffers;	4
h) a map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	Maps 2, 3, 4 and 5
i) a description of any assumptions made and any uncertainties or gaps in knowledge;	1
j) a description of the findings and potential implications of such findings on the impact of the proposed activity, (including identified alternatives on the environment) or activities;	4
k) any mitigation measures for inclusion in the EMPr;	5
l) any conditions for inclusion in the environmental authorisation;	5
m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;	5
n) a reasoned opinion-	6
i. whether the proposed activity, activities or portions thereof should be authorised;	
(iA) regarding the acceptability of the proposed activity or activities; and	
ii. if the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan;	

o) a description of any consultation process that was undertaken during the course of preparing the specialist report;	None
p) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	-
q) any other information requested by the competent authority.	-
2) Where a government notice <i>gazetted</i> by the Minister provides for any protocol or minimum information requirement to be applied to a specialist report, the requirements as indicated in such notice will apply.	1

Landscape and Visual Impact Assessment input has been undertaken in accordance with the following guideline documents:

- a. The Government of the Western Cape Guideline for Involving Visual and Aesthetic Specialists in EIA Processes (Western Cape Guideline), which is the only local relevant guideline, setting various levels of assessment subject to the nature of the proposed development and surrounding landscape; and
- b. The Landscape Institute and Institute of Environmental Management and Assessment (UK) Guidelines for Landscape and Visual Impact Assessment which provides detail of international best practice (UK Guidelines).

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

In accordance with the Western Cape Guidelines, the proposed project may be categorised as a Category 5 development as it is "**large scale infrastructure**". Due to the nature of the surrounding landscape which may be categorised as having "**high scenic significance**" also in accordance with the Western Cape Guidelines, the proposed development may be categorised as "**high visual impact expected**".

If a high visual impact is expected the guidelines also stipulate that a project will result in:

- Potential intrusion on protected landscapes or scenic resources;
- Noticeable change in visual character of the area; and
- Establishes a new precedent for development in the area.

This is actually not the case as:

- No protected landscapes will be affected;
- The existing landscape includes existing large scale 400kV overhead powerlines which do set an precedent for development; and
- A degree of degradation of the natural character of the area has occurred due to the development of existing large scale solar projects.

If a moderate visual impact might be expected, the Western Cape Guidelines indicate that a development will:

- Potentially some effect on protected landscapes or scenic resources;
- Some change in the visual character of the area;
- Introduces new development or adds to existing development in the area.

The proposed development will affect scenic resources, will result in some change in visual character of the affected area and will add to existing development in the area.

If a moderate visual impact might be expected, a Level 3 Assessment is required by the Western Cape Guidelines.

A Level 3 Assessment requires the following input:

- Identification of issues raised in scoping phase, and site visit;
- Description of the receiving environment and the proposed project;
- Establishment of view catchment area, view corridors, viewpoints and receptors;
- Indication of potential visual impacts using established criteria;
- Inclusion of potential lighting impacts at night;
- Description of alternatives, mitigation measures and monitoring programmes.
- Review by independent, experienced visual specialist (if required).

A Level 4 Assessment requires the same input as Level 3 plus "complete 3D modeling and simulations, with and without mitigation".

Based on the above information and because Level 4 Assessments works as a natural progression from Level 3, the assessment has been undertaken as a Level 3 Assessment on the understanding that if:

- Significant impacts are found; or
- If there is significant concern raised by receptors or the relevant authority.

The Assessment will be elevated to Level 4 with the inclusion of simulations from agreed / required viewpoints.

## **1.5 LIMITATIONS AND ASSUMPTIONS**

The following limitations and assumptions should be noted:

In the assessment tables the subjective judgement as to whether an impact is negative or positive is based on the assumption that the majority of people are likely to prefer to view a natural or a rural landscape than an industrial landscape.

A site visit was undertaken on the 11<sup>th</sup> November 2025 to verify the current landscape characteristics, potential receptors and potential impacts.

The site visit was planned to ensure that weather conditions were clear ensuring reasonable visibility.

The timing of photography was planned to ensure that the sun was as far as possible behind the photographer. This was to ensure that as much detail as possible was recorded in the photographs.

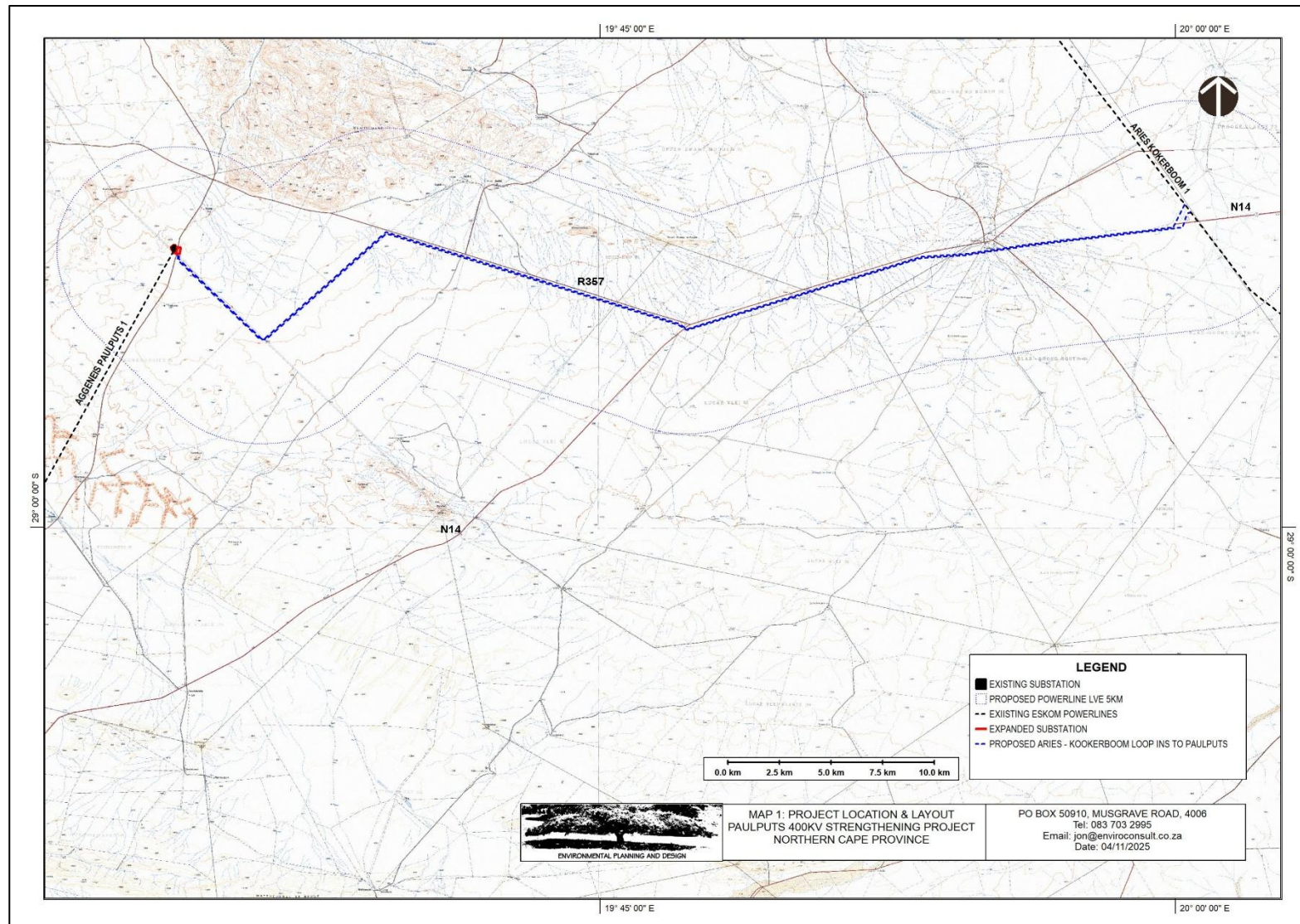
Visibility of the proposed facility has been assessed using the Global Mapper Viewshed tool.

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

Calculation of visibility is based purely on the Digital Elevation Model and does not take into account the screening potential of vegetation or other development.

The following GIS data sets were used in undertaking and presenting the assessments:

<b>DATA SET</b>	<b>SOURCE</b>	<b>YEAR</b>
South Africa Protected Areas Database (SAPAD)	Department of Environmental Affairs	2021
SRTM Worldwide Elevation Data	CIAT-CCAFS	2018
World Imagery	ESRI	2009 (updated 2021)
SA NLC (National Land Cover)	Department of Environmental Affairs	2022
1:50,000 raster mapping	Chief Directorate National Geo-Spatial Information of South Africa	Unknown
South African rivers in drainage region ALL	Department of Water Affairs	2012
Update of vegm2009	South African National Biodiversity Institute	2015
South Africa /Lesotho Roads	Open Street Map	2014

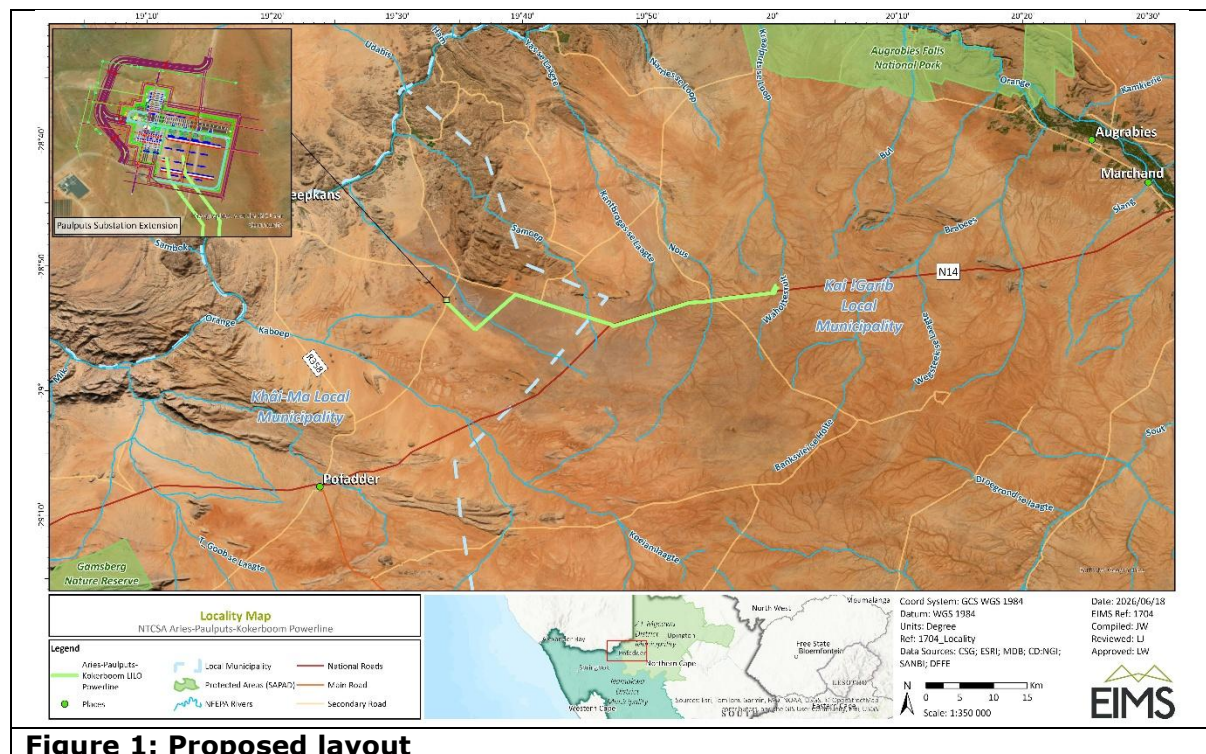


## 2. PROPOSED DEVELOPMENT AND ITS GENERAL VISIBILITY

### 2.1 PROJECT MOTIVATION

The need for the project is based on the Northern Cape Strengthening for Renewable Generation Integration (IRP 2019) report GP\_20/206. The project is part of the group of projects identified for the Northern Cape network strengthening requirements in meeting the IRP 2019 renewables generation integration. The installed generation capacity in the Northern Cape already exceeds the peak load in the province. Generation capacity is expected to increase in the province as a result of bulk renewable energy generation capacity allocation due to favorable sun and wind conditions. Therefore, significant network infrastructure is required to enable the integration and evacuation of power from the renewable energy plants anticipated in the province.

To provide future reliability and flexibility in the evacuation of renewable power from Paulputs Substation, an additional 400 kV infeed is proposed via a loop in loop out from the Aries – Kokerboom 400 kV line which is approximately 45 km away (A proposed layout is presented in **figure 1** below). Although there is uncertainty regarding the phasing of IPP integration at the various substations in the province, it is crucial that all project development activities are prioritised and advanced to a stage of execution readiness to ensure timeous integration of the expected renewable generation.



### 2.2 PROJECT DESCRIPTION

The following is the high-level scope of work:

- Loop in loop out the Aries – Kokerboom 400 kV line into Paulputs (~2 x 40 km);
- Establish/Equip 2 x 400 kV feeder bays at Paulputs Substation;
- Install a 100 MVA busbar reactor at Paulputs Substation
- Paulputs-Konkoonsies 33 kV OHL Deviation
- Build new MV OHL with new switchgear and equipment
- -± 1 km of new MV OHL (±800m of 33 kV OHL & ±200m of 19 kV SWER OHL)
- -New 33 kV Recloser
- -New 33 kV CT/VT metering unit
- -New 33/19 kV SWER Transformer
- New SWER 19 kV Single Phase Recloser
- -Disconnect, Decommission & Dismantle old equipment (the existing 33kV and associated infrastructure)

The project will therefore require upgrade work to be undertaken at both the Aggeneis and the Paulputs substations. Upgrade work at the Paulputs substation will require a significant expansion of the facility whilst at the Aggeneis substation work will be contained within the current footprint.



**Plate 1, View looking towards the existing Aggeneis Substation from the adjacent N14**



**Plate 2, View looking towards the existing Paulputs Substation from the adjacent local road**

The proposed powerline alignment and substation upgrade area are indicated on Map 1.

### **2.3 GENERAL VISIBILITY**

It is important to identify the extent of general visibility at an early stage in the assessment as this will define the extent of the study area.

The main elements that will have visual implications include:

- The Paulputs Substation expansion; and
- The Loop in loop out the Aries – Kokerboom 400 kV line.

The proposed upgrade works at the Aggeneis Substation are likely to have relatively minor visual implications as they are located within the existing footprint and the upgrade will be similar in nature to existing infrastructure.

### **2.4 POWER LINES AND PYLONS**

The pylons that will support the 400kV transmission lines may consist of two steel support structures including:

- Guyed V towers; or
- Cross-rope suspension towers.

fixed at the base where the two structures are fixed (**Plate 3**).

The V tower transmission lines will be suspended between and either side of the supports. These 30-35 m tall pylons use far less steel in their structure than the commonly seen self-supporting pylons.

The self-supporting strain towers are only likely to be used where the ground is unstable, where the line changes direction greater than 3° or where the terrain is too steep to accommodate the cross-rope suspension structure.

The reduced steel quantity of the V tower structure has the added benefit in that they are less visible and obtrusive within the landscape.



**Plate 3, Guyed V tower on the left and Self Supporting Strain Tower on right are the two alternative 400kV alternative towers.**

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

From short views the overhead conductors are generally relatively obvious.

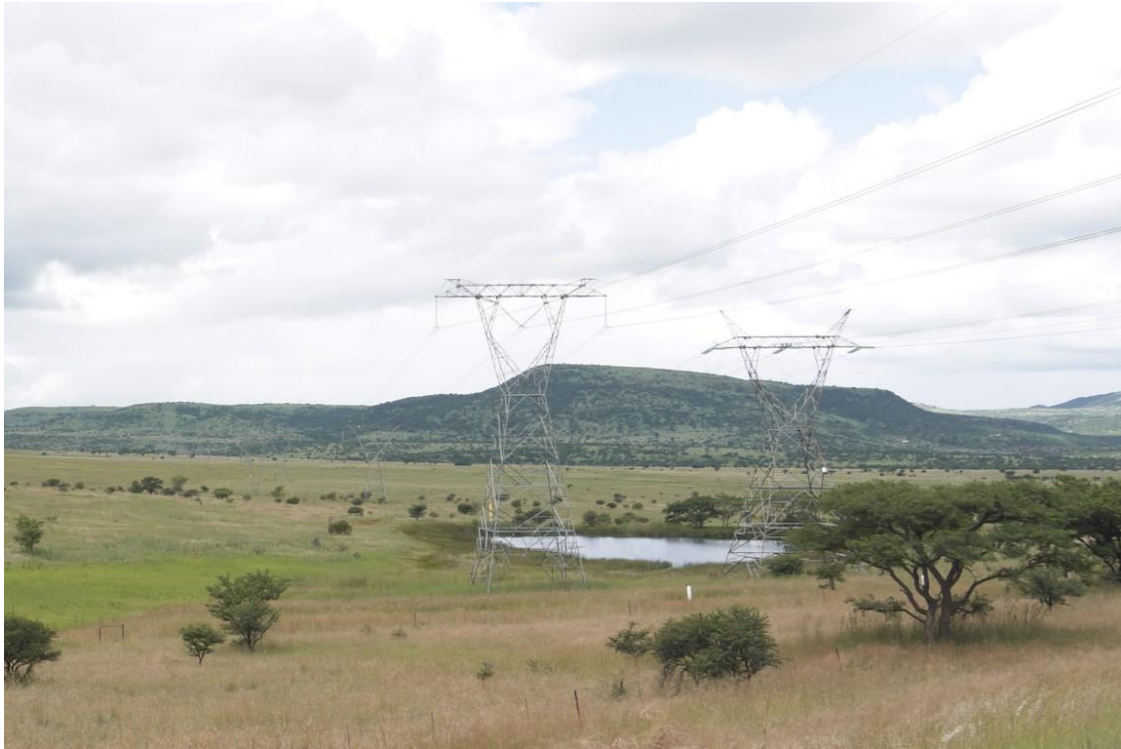
In order to provide an indication of the likely visual effect of the proposed infrastructure development, a photo survey of similar elements is presented below.

**Plates 4 to 7** are photographs of two existing overhead 400kV power lines, similar to the proposed 400kV overhead transmission line, indicating the types of impact that might be expected. From these photographs the following conclusions can be drawn:

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



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



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



**Plate 6 - Existing 400kV double overhead transmission lines are highly obvious as they cross ridgelines from short distance (approximately 1km).**



**Plate 7 - Existing 400kV double overhead transmission lines. Pylons are obvious in the mid distance (approximately 2-3km) but are not highly conspicuous at a distance (approximately 5-6km) as they cross the ridgeline.**

## **2.5 400KV SUB-STATION**

Views of the existing Hammersdale Sub-Station (**Plate 8**) indicate that from a distance the facility appears as a large cleared area. The detail of the majority of equipment is not obvious as there is such a mass of equipment in the compound. It is obvious however as a relatively continuous horizontal element beneath the ridgeline. The fact that the facility is cut into the hillside and backed by vegetation helps to make the facility less obvious in the landscape. Other than the extent of the compound, the most obvious elements are the pylons that support conductors linking into and out of the Sub-Station.



**Plate 8, Distance view (1.5-2.0km) of the existing Hammersdale 400kV Sub Station. Note the 400kV pylons entering the site are the tallest elements**

## **2.6 THE DEVELOPMENT PROCESS**

### **2.6.1 Overhead Powerline**

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

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

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

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

### **2.6.2 400kV Substation**

Construction of the Sub-Station is likely to be a more intense process. The built infrastructure including concrete bases, minor buildings, transformer bays and fencing are likely to appear first.

Large individual electrical elements such as transformers and busbars will then be transported to the site and installed. Electrical connections and cabling will then be undertaken alongside finishing works.

The main elements that are likely to have visual implications will therefore be in place with the built infrastructure.

## **2.7 LIKELY EXTENT OF VISIBILITY**

The Guidelines define the Visual Envelope as the extent of potential visibility. The only consideration necessary in defining this is to establish where the development may be visible from.

The extent of the area from which a site may be visible is dependent upon landscape features that might screen the site as well as the height of the development above the natural visual horizon (Where the sky appears to meet the Earth).

Assuming that the highest element of the proposed facility is in the order of 35m high the proposed power line could have an Approximate Limit of Visibility (**ALV**<sup>1</sup>) in a flat landscape for approximately 21.1km.

However, due to surrounding topography and the relative transparent nature of the structures, this distance is significantly foreshortened.

The observations reflected in this section indicate that the largest elements (400kV pylons) will have the greatest impact when within 1km of the viewer, may be visually obvious in the landscape, for approximately 5km. Past this distance their position is largely obvious through landscape changes (cleared servitudes). A Limit of Visual Effect<sup>2</sup> (**LVE**) of 5km

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<sup>1</sup> Absolute limit to which an element may be visible.

<sup>2</sup> Limit to which an element may be visually obvious with the human eye.

### **3 RECEIVING ENVIRONMENT, VIEW CATCHMENT AND LIKELY VISUAL IMPACTS**

#### **3.1 THE STUDY AREA**

It is possible that landscape change due to the proposed development could impact the character of the surrounding landscape. Landscape character can be derived from specific features relating to the urban or rural setting and may include key natural, historic or culturally significant elements. Importance might also relate to landscapes that are uncommon or under threat from development.

This section will:

- describe the types of landscapes that may be impacted;
- indicate likely degree of sensitivity; and
- describe how the landscape areas are likely to be impacted.

The study area is defined as the area over which the proposed project may be visible which is dependent on the height of the various project elements. As indicated previously, it has been assumed that the Limit of Visual Effect (**LVE**) will be 5km.

#### **3.2 LANDSCAPE CHARACTER**

Landscape character is defined as “a distinct, recognisable and consistent pattern of elements in the landscape that makes one landscape different from another”<sup>3</sup>.

The proposed site is located within the floor of a broad valley system that generally falls from the east to the west towards the Orange River. Beside the Orange River there is a near continuous range of rocky hills.

The landscape surrounding the site is arid, comprising relatively flat drainage plains with inselbergs or rocky outliers rising above the plains in the wider landscape.

Whilst the general area surrounding the proposed site appears relatively natural, with the exception of roads and scattered homesteads, there are a number of industrial elements that currently impact on the character of the site and its surroundings, these include;

- A quarry that is located approximately 13.5km to the north east of the site,
- An existing 220kV overhead power line that bisects the property
- The existing Paulputs Substation; and
- Two existing CSP Parabolic Trough projects that are located immediately east and south of the Paulputs Substation.

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

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

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<sup>3</sup> UK Guidelines

### **3.2.1 Landform and Drainage**

The site is located south of the Kalahari Basin. The landscape is sparsely vegetated and covered by pale red sands of aeolian sands of the Quaternary Gordonia Formation (Kalahari Group) (Almond).

The Orange River flows from north west to south east approximately 30km west of the proposed development site. The Orange River is a major regional river system that has its source in the mountains on the western edge of Lesotho, is joined by the Vaal and flows into the sea on the West Coast where it forms the border between South Africa and Namibia.

The site is located within a broad valley that drains towards the Orange River. The site is set at an elevation of between 840 – 940m above mean sea level (amsl).

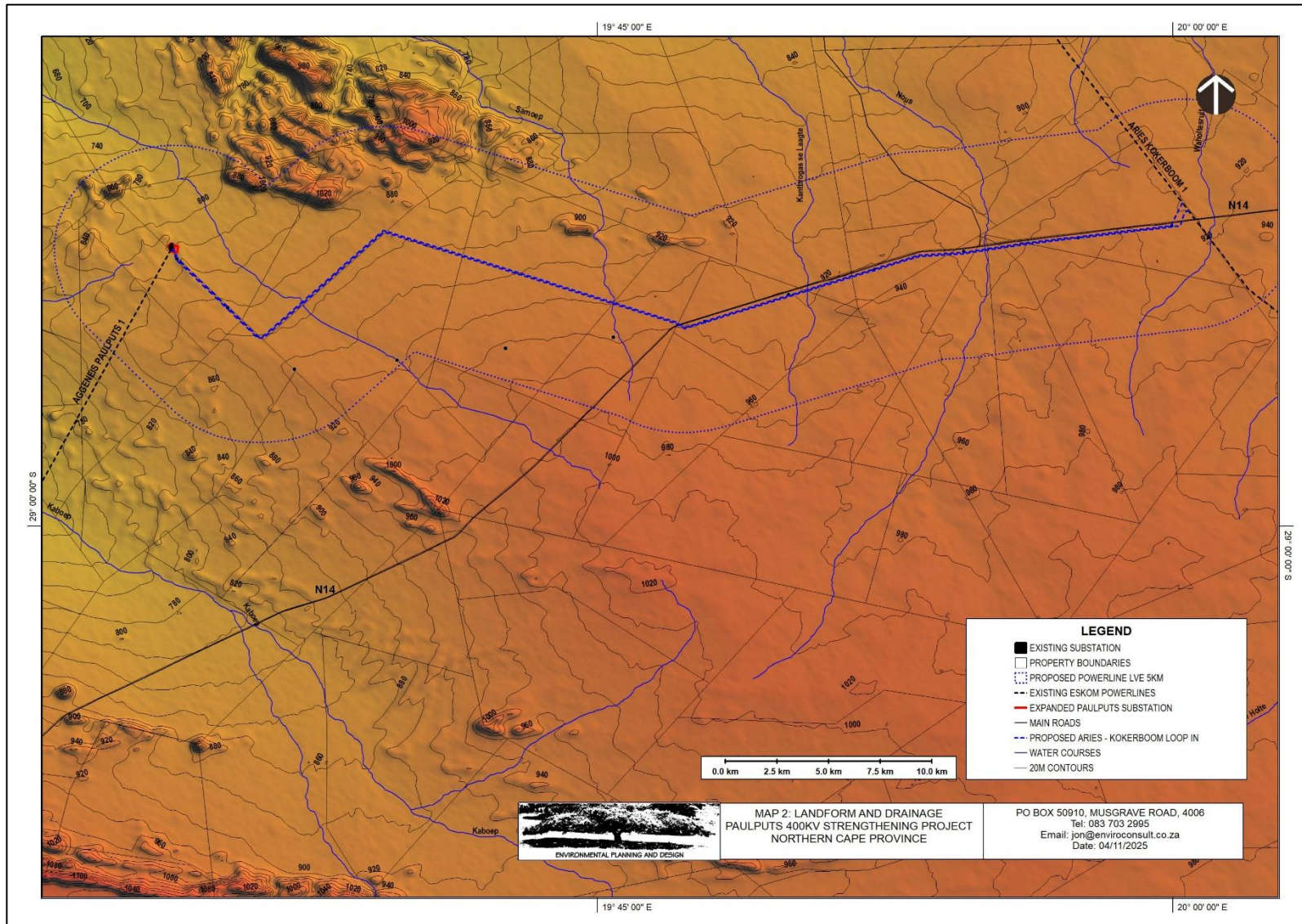
The valley floor surrounding the site is incised by a number of shallow water courses that drain towards the Orange River to the west. These water courses are non-perennial and only run for short periods of time during and after Summer and Autumn rains.

Most of the study area comprises fairly flat-lying terrain between the Inselberge or isolated rocky steep mountains. These landforms are concentrated to the north and south of the proposed project.

This landform is likely to have a number of implications for visibility of the proposed development;

- The small changes in elevation within the generally flat landscape could help provide screening of the proposed facility or could open up views over the proposed arrays.
- The scattered Inselberge are likely to provide localised screening for the proposed development.
- The way that the valley falls towards the Orange River is likely to open up long distance views from that direction.

**Refer to Map 2** for analysis of the landform and drainage.



### 3.2.2 Landcover

Landcover within the study area is indicated on Map 3. Landcover can be divided into the following types;

- **Sparse Shrubland.** This is the main landcover type surrounding the proposed development is natural area. This area is likely to be used largely for stock rearing and low intensity grazing. As this has not resulted in mass clearance of vegetation, the majority of the area retains a relatively natural appearance. Situated within this landcover are occasional homesteads that are scattered thinly throughout the area. The low density of development is no doubt a product of the low agricultural potential / carrying capacity of the area. Sheep farming is the main activity.
- **Bare Ground** is also a main landcover type within the study area. This is also a natural area which due to the general lack of vegetation is likely to be subject to even lower stock raising intensity.
- **Mine development** largely includes quarry sites.

**Refer to Map 3 for Landcover.**

### 3.2.3 Vegetation Patterns

The majority of the landscape is covered by low sparse grass and herbaceous vegetation. During much of the year this vegetation lies dormant and is brown due to lack of water. However during Summer and Autumn rains, the landscape rapidly becomes green and colourful as plants use this period to regenerate and reproduce.

Mucina, and Rutherford (Vegetation of South Africa, Lesotho and Swaziland, 2006) indicate that the vegetation types within the study area include;

- Bushmanland Arid Grassland which covers the area on which the site is located;
- Lower Gariep Broken Veld which covers the more rugged terrain particularly close to the Orange River;
- Eastern Gariep Plains Desert; and
- Bushmanland Sandy Grassland.

All natural vegetation types are highlighted as being associated with the farming of small stock particularly sheep and goats.

Whilst there are significant botanical differences between these vegetation types, in terms of visual impact, the main issue is that they are all very low and provide no screening ability.

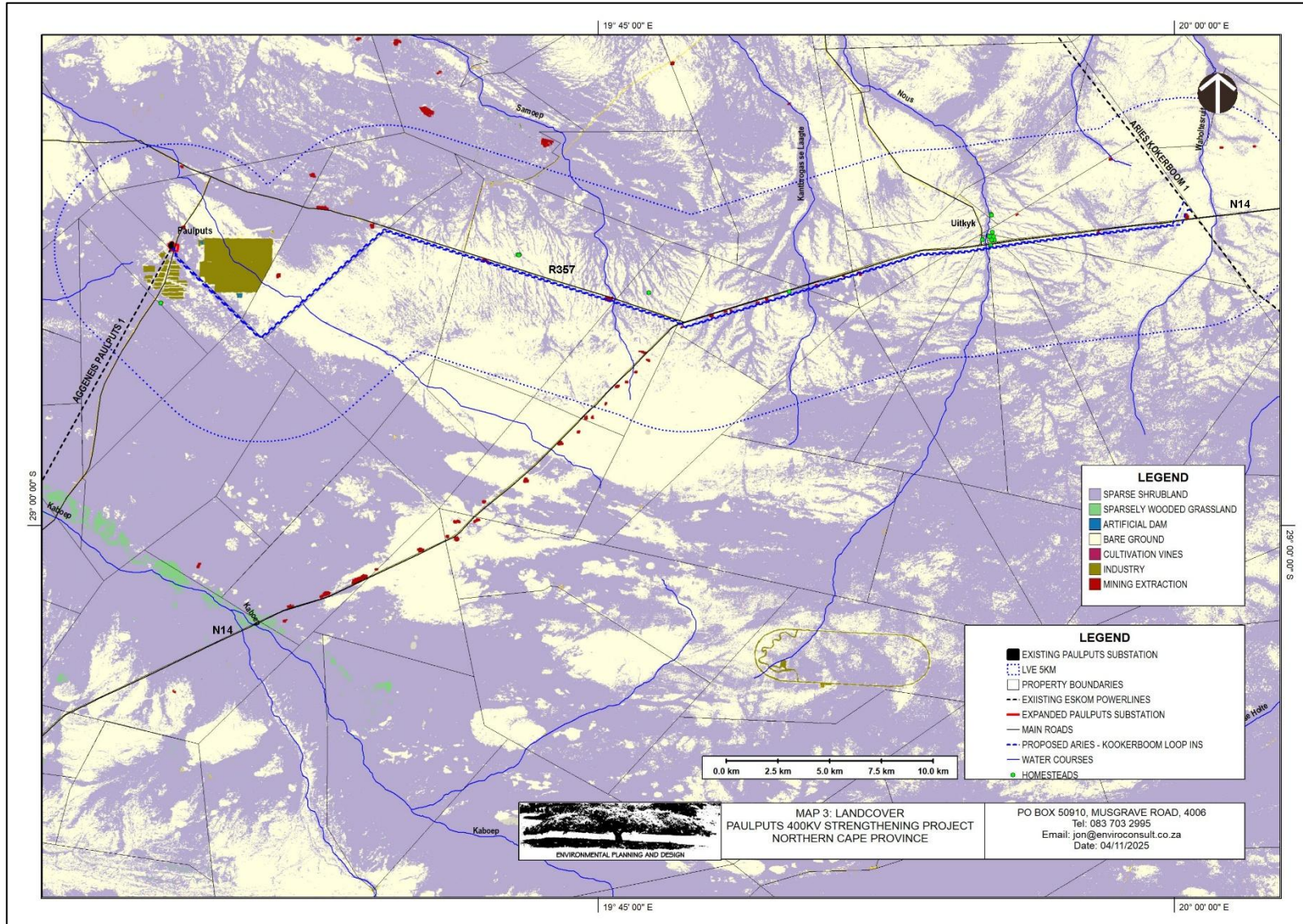
The existence of a Quiver tree (*Aloe dichotoma*) Forest is also reported in the vicinity of the project. Whilst quiver trees can grow to eight metres in height, the term forest in can be misleading as a quiver tree forest is generally comprised of a group of relatively isolated specimens.

From observations, whilst there are quiver trees in the vicinity or the project, there do not appear to be quiver tree forests.

The quiver tree is promoted as a natural feature that is symbolic of the region. The forest provides an area of interest that has potential to be used as an attraction particularly for

visitors that are attracted to the region for its natural attributes. Currently however, there appears to be no mapping or tourism documentation confirming its location and it is only obvious to the casual visitor over approximately 2 – 3 km of the R357.

The quiver tree is a red data (vulnerable) listed species that generally occurs within the “Eastern Gariep Plains Desert” as defined by Mucina & Rutherford. The area has no formal or informal protection status.



### **3.3 LANDSCAPE CHARACTER, QUALITY AND IMPORTANCE**

#### **3.3.1 General.**

There are no protected landscapes within the study area.

The entire study area is located within the Riemvasmaak Community Conservancy (RCC). This conservancy is 74 000ha in extent and is overseen by local Nama and Xhosa tribes. The RCC is reported to have been one of post-Apartheid South Africa's first land restitution project. It belongs to the local Nama and Xhosa descendants of the people who were resettled from the Area in 1974.

The area is therefore highly important to local communities and for this reason it is important to ensure that future potential use of the land for agriculture and tourism is not compromised by development.

The area is also a corridor for tourism related traffic using the N14 for access from the south west into the Kalahari region.

#### **3.3.2 Landscape Character Areas**

Landscape Character Areas (LCAs) are defined as "single unique areas which are the discrete geographical areas of a particular landscape type"<sup>4</sup>.

Visual Absorption Capacity (VAC) is *defined* as the landscape's ability to absorb physical changes without transformation in its visual character and quality. Where elements that contrast with existing landscape character are proposed, VAC is dependent on elements such as landform, vegetation and other development to provide screening of a new element. The scale and texture of a landscape is also critical in providing VAC, for example; a new large scale industrial development located within a rural small scale field pattern is likely to be all the more obvious due to its scale.

The affected landscape can be broadly divided into the following LCAs that are largely defined by the extent and nature of development:

##### **Upper Plain with isolated Inselberge LCA.**

This LCA is primarily important as a productive agricultural area. It is the LCA within which the proposed project is located.

The low intensity grazing regimes that appear to be adopted has also resulted in a relatively natural outlook that is typical of the area. The low density of development combines with relatively pristine vegetation to provide an outlook that is close to wilderness. The only elements that perhaps currently detract from this natural appearance are the occasional farmsteads, wind pumps, roads, overhead power lines and sub stations. As the viewer moves away from existing infrastructure, the natural character of the area becomes stronger. This natural outlook no doubt helps to contribute to the general attraction of the area for local and regional tourism.

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<sup>4</sup> Landscape Institute & Institute of Environmental Management and Assessment

The inselberges provide structure and focal points within the landscape. When travelling through the landscape, they compartmentalise the plain, foreshortening views and screening adjacent areas.

It is the contrast between what appears to be a planar topography and dramatic steep land forms as well as this compartmentalisation provided by the inselberges that maintains the interest of the viewer in the dramatic and ever changing scene.

### **Ridgelines and Rugged Topography LCA**

The continuous series of ridgelines that form the southern edge of the Orange River Valley to the north of the study area provides a dramatic backdrop for the area. From a visual perspective these ridgelines provide visual continuity behind an ever changing foreground.

In addition to the provision of a general backdrop that helps to define the regional character, the quiver tree forest currently provides additional local interest and has potential for use as a regional tourist attraction.

### **Industrial LCA**

This is comprised of the existing CSP projects and the Paulputs Substation at the western end of the proposed powerline elements of the project. This area is important for electricity generation and transmission. It should be noted that existing trough and substation infrastructure affect a limited area of the surrounding landscape due to, topography and the relatively low nature of the existing development.

## **LANDSCAPE CHARACTER AREAS**



**Plate 9, Industrial Landscape Character Area – Paulputs Substation**



**Plate 10, Industrial Landscape Character Area.** Existing CSP parabolic trough project.



**Plate 11, Upper Plain with isolated Inselberg Landscape Character Area.**



**Plate 12, Ridgelines / Rugged Topography Landscape Character Area.**

### **3.4 VISUAL RECEPTORS**

#### **3.4.1 Definition**

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

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

#### **3.4.2 Possible visual receptors and sensitivities**

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

##### **Area Receptors**

Within the vicinity of the project, the only potential area receptor is the small hamlet of Uitkyk.

##### **Linear Receptors**

Linear receptors in the vicinity of the project include the N14 and R357 roads. The N14 is probably the most important road as it is a strategic national route that is likely to carry a high proportion of recreational and tourism related traffic.

There are also local roads that provide access from the N14 to the Orange River and to a border crossing at Onseepkans.

The R357 is surfaced between the N14 and the Paulputs substation site and continues on to the Onseepkans border post at the Orange River to the west as an unsurfaced road. From close to the site a local road connects the R357 to the Orange River Corridor to the north west. There is a Guesthouse signposted along this road which indicates that these local roads are likely to have some tourism significance.

##### **Point Receptors**

A number of isolated homesteads have been identified within the study area. These are likely to be used largely by local stock farmers. It is possible that a limited number will have a secondary tourism use.

The closest visual receptors were ground truthed during the site visit. The main receptors that have been identified are indicated on **maps 6, 7, 8 and 9** indicating the Landscape Character Areas and the assessment of Zones of Theoretical Visibility (ZTV).

It should be noted that all point receptors were not visited to verify the nature of their use. It is assumed that this responsibility will fall within the project scoping exercise and / or the social specialist's input.

### **POSSIBLE SENSITIVE RECEPTORS**



**Plate 13, Isolated homesteads in the surrounding plain.**

## **POSSIBLE SENSITIVE RECEPTORS**



**Plate 14, the small hamlet of Uitkyk.**



**Plate 15, Local unsurfaced roads.**

## POSSIBLE SENSITIVE RECEPTORS



**Plate 16, The N14 which is a major regional route with obvious tourism importance.**

### 3.5 LANDSCAPE AND RECEPTOR SENSITIVITY

It is difficult to define hard and fast criteria for assessment of subjective issues. In order to provide both consistency and transparency to the assessment process, the table below indicates the criteria that are proposed to guide the judgement as to the sensitivity of the landscape character areas and the various visual receptors in their interaction with the identified LCAs.

<b>SENSITIVITY</b>	<b>LCA</b>	<b>RECEPTORS</b>
<b>Low</b>	Areas not recognised as having specific landscape value; <ul style="list-style-type: none"><li>• <b>The Industrial LCA;</b></li></ul>	Viewer's attention not focused on landscape. These include: <ul style="list-style-type: none"><li>• <b>Travellers on minor unsurfaced local roads</b></li></ul>
<b>Medium</b>	Landscape value is recognised locally, but is not protected; the landscape is relatively intact, with a	Viewers' attention may be focused on landscape. These include: <ul style="list-style-type: none"><li>• <b>Residents of Uitkyk and isolated homesteads;</b></li></ul>

SENSITIVITY	LCA	RECEPTORS
	<p>distinctive character; and the landscape is reasonably tolerant of change.</p> <p>These areas include:</p> <ul style="list-style-type: none"> <li>• <b>The Upper Plain with Isolated Inselberg LCA; and</b></li> <li>• <b>The Ridgelines and Rugged Topography LCA</b></li> </ul>	<ul style="list-style-type: none"> <li>• <b>Travellers on the N14 and R357</b></li> </ul>
<b>High</b>	<p>The qualities for which the landscape is valued are in a good condition, with a clearly apparent distinctive character. This distinctive character is susceptible to relatively small changes.</p> <p><b>There are no landscape character areas with a high significance.</b></p>	<p>Viewer's attention very likely to be focused on landscape, e.g. people experiencing views from important landscape features of local physical, cultural or historic interest and beauty spots. Large number of viewers and/or location in a highly valued landscape could elevate viewer sensitivity to the highest level.</p> <p><b>There are no receptors that are likely to have a high sensitivity.</b></p>

## 4 SITE SENSITIVITY

### 4.1 KEY LANDSCAPE OBSERVATIONS

The landscape is relatively typical of the region therefore, there are no No-Go areas within the proposed site area.

Sections of the affected natural landscape are degraded by industrial activities in the form of existing CSP solar projects and the Paulputs Substation.

In terms of landscape value, the majority of the potentially affected area is relatively natural in character and is largely comprised of a section of the **Upper Plain with Isolated Inselberg LCA**.

The proposed development is likely to be most obvious from adjacent sections of the N14 and the R357. The proposed powerline alignment runs parallel and close to the N14 for approximately 22km at the eastern end of the alignment. The proposed alignment then crosses the N14 and is aligned to the west for approximately 23km to the Paulputs Substation. This section of the alignment is generally aligned away from main roads but it is between approximately 1.0km and 7.5km from the R357.

The proposed powerline alignment also runs approximately 300m from the closest building in the Uytkyk hamlet.

#### 4.1.1 N14 and R357

In terms of 400kV overhead powerlines running in parallel to the N14, there is precedent in the area of Aggeneis close to the Aggeneis Substation where two such powerlines run parallel to the road. The closest of which is approximately 250m from the road (**plate 17**). Whilst the closest powerline is visually obvious, it does not dominate views from the road. It is therefore recommended that the closest that in areas that it runs parallel to the road, the powerline should be located a minimum distance of 250m from the N14.



**Plate 17, A 400kV overhead powerline running parallel and approximately 250m from the N14 close to the Aggeneis Substation.**

The R357 is also likely to be important for tourism and recreation, the same recommended minimum distance is also recommended for this road.

#### **4.1.2 Uitkyk hamlet and isolated homesteads**

In terms of Uitkyk, ideally, the proposed overhead powerline would not be highly obvious from residences. Section 2.3 indicates that a 400kV overhead powerline could be highly visible from a distance of approximately 1-2km. It is therefore recommended that, where possible, the proposed powerline should be located at a distance of 1km from homesteads including the Uitkyk hamlet. Where this is not possible a minimum distance of 250m should be used.

#### **4.2 SENSITIVE AREAS**

The assessment of site sensitivity within the potentially affected area seeks to both maintain key landscape features and minimise potential impacts for receptors.

Key Landscape Features within the potentially affected area include inselbergs and steep ridgelines as well as temporary watercourses.

Potential receptors include motorists on main roads and residents of homesteads.

The main element that could result in modification of landscape features or visual impacts on residents of homesteads is the proposed overhead 400kV overhead powerline.

The following Site Sensitive areas have been identified;

#### **4.2.1 No-Go Areas**

As there are no protected areas, no No-Go Areas have been identified.

#### **4.2.2 Highly Sensitivity Areas:**

Highly Sensitive Areas include;

- **Ridgelines.** The proposed 400kV powerline alignment should avoid these areas as its location within these areas could require a modification of the landform and / or could result in the overhead powerline being more visible than necessary.
- **Watercourses.** The proposed 400kV powerline alignment should avoid these areas. Where this is not possible such as areas where the alignment has to cross a watercourse, every effort should be made to keep pylons as far out of watercourses as possible.  
It should be noted that apparent wetland areas around the main watercourses have been mapped from aerial photography. The Wetland Consultant will accurately map potentially affected wetland areas. The landscape requirements will then defer to this more accurate information.
- **Areas within 250m of the N14 and the R357.** Where ever possible the overhead powerline should be aligned outside of this area. It is understood that this is not likely to be wholly possible as the powerline may have to cross one or both of these roads.

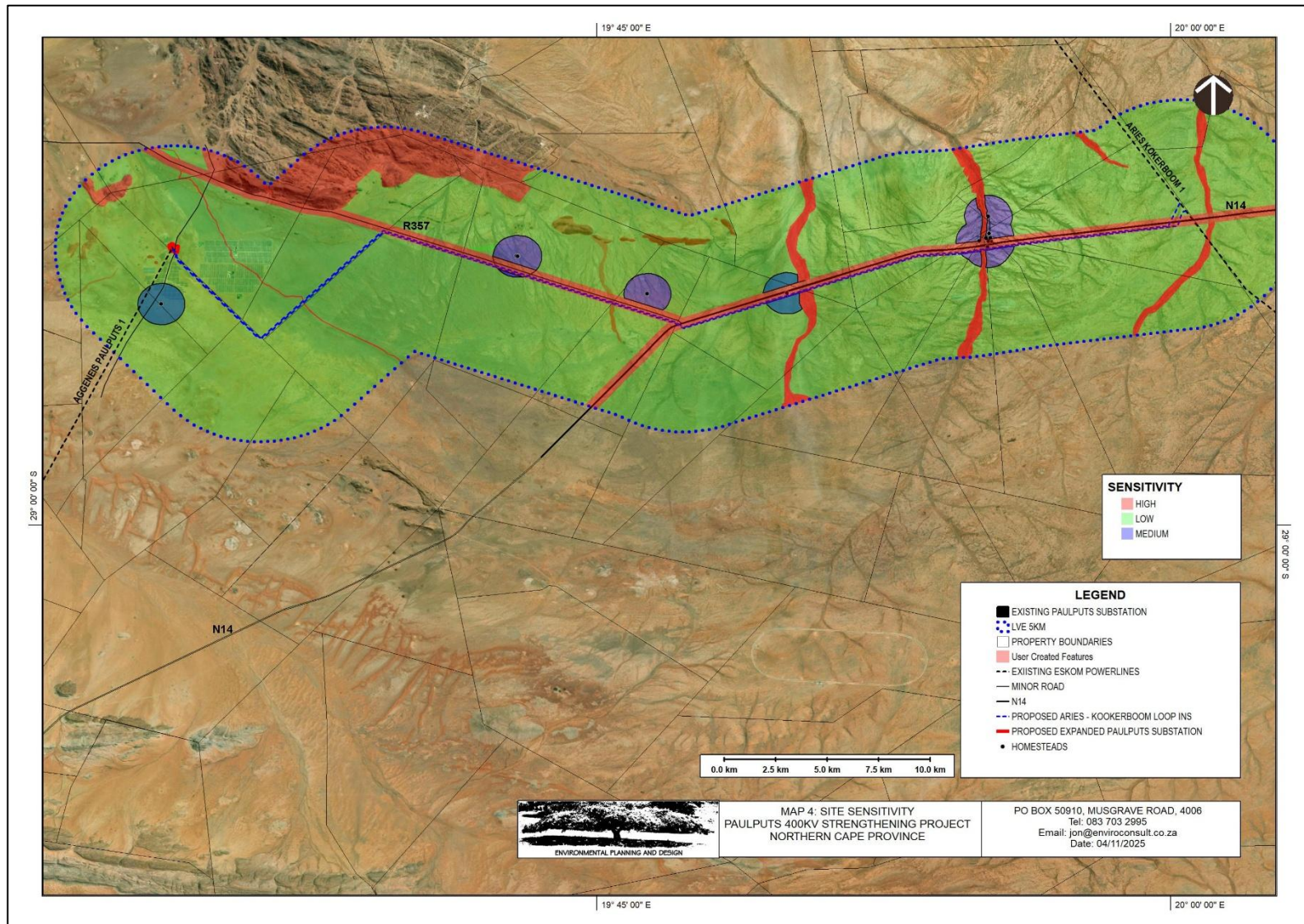
#### **4.2.3 Medium Sensitivity Areas:**

Medium Sensitive Areas include;

- **Areas within 1km of homesteads and the Uitkyk hamlet.** Where ever possible, the proposed 400kV overhead powerline should be aligned outside these areas. Where this is not possible, the powerline should be as far from homesteads as possible. In no case should the powerline be closer than 250m from a homestead.

#### **4.2.4 Low Sensitivity Areas:**

All other areas within the potentially affected area have a low sensitivity.



## **5 ASSESSMENT OF LIKELY LANDSCAPE AND VISUAL IMPACTS**

This section provides an indication of the affected landscape associated with the development proposal. It highlights potential sensitive receptors, defines the Zones of Theoretical Visibility, assesses the impact of the proposed alignment.

### **5.1 VISIBILITY, ZTV ANALYSIS**

Zones of Theoretical Visibility (ZTV) are defined as “a map usually digitally produced showing areas of land within which a development is theoretically visible<sup>5</sup>”.

ZTV s of the proposed development have been assessed using a GIS viewshed tool.

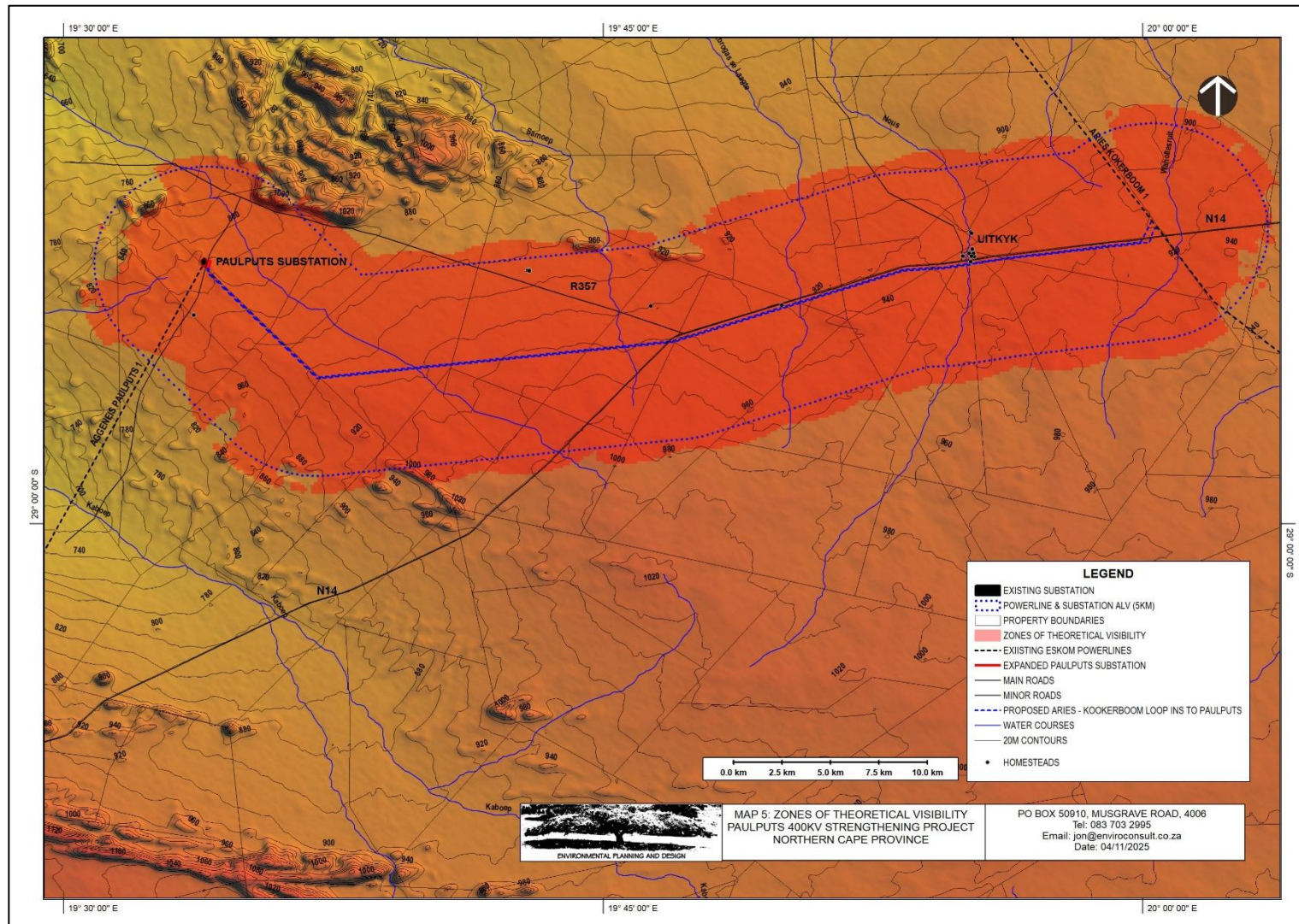
The assessment is based on terrain data that has been derived from satellite imagery. This data was originally prepared by NASA and is freely available on the CIAT-CCAFS website (<http://www.cgiar-csi.org>). This data has been ground truthed using a GPS as well as an online mapping programme.

Whilst the ZTV has been calculated from terrain data only, existing vegetation and development could have a modifying effect on the areas indicated, however, given the nature of the landscape this is likely to be minimal.

The ZTV analysis indicates that the proposed project is likely to be largely visible to the Approximate Limit of Visibility (ALV) with small areas screened by ridgelines. This means that views of the proposed development may be visible from the majority of road sections and homesteads within the ALV.

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<sup>5</sup> UK Guidelines



## 5.2 ASSESSMENT OF IMPACTS

### 5.2.1 Impacts to be Assessed

From the review of the proposed project and the nature of the affected landscape, the following possible landscape and visual impacts were identified:

- a) Landscape change due to the proposed project;
- b) Change in the character of views as experienced by travelers on the R357;
- c) Change in the character of views as experienced by travelers on the N14;
- d) Change in the character of views as experienced by residents of local homesteads; and
- e) Lighting impacts.

### 5.2.2 Assessment Methodology

The assessment methodology used is as required by EIMS. The broad approach is indicated below. The detailed methodology is indicated in Appendix IV.

The broad approach to the significance rating methodology is to determine the significance (S) of an environmental risk or impact by considering the consequence (C) of each impact (comprising Nature, Extent, Duration, Magnitude, and Reversibility) and relating this to the probability/ likelihood (P) of the impact occurring. The S is determined for the pre- and post-mitigation scenario. In addition, other factors, including cumulative impacts and potential for irreplaceable loss of resources, are used to determine a prioritisation factor (PF) which is applied to the S to determine the overall final significance rating (FS). The impact assessment will be applied to all identified alternatives.

### 5.2.3 Assessment of Issues

#### 5.2.3.1 The proposed development could change the character of the landscape (Landscape Change)

##### Construction Phase

###### **Nature of impact:**

The proposed site is located within two types of landscape including:

- A relatively natural area that is generally covered with natural vegetation, has isolated homesteads, a small hamlet and little in the way of electrical infrastructure (**Upper Plain LCA**);
- An area that has been industrialised by the development of renewable energy projects close to the Paulputs Substation and the Paulputs substation (**Industrial LCA**).

The majority of the proposed powerline alignment is within the Upper Plain LCA. There are 275/400kV powerlines within this LCA, However, the most obvious powerlines are medium voltage lines that run parallel to roads.

In most areas in the vicinity of the proposed site, existing high voltage powerlines are aligned away from main roads and settlements. The only area where high voltage powerlines are obvious close to roads and settlement areas is close to Aggeneis which is approximately 95km west of the proposed site. Close to Aggeneis, high and medium voltage overhead powerlines converge on the Aggeneis Substation. In this area 400kV

powerlines are obvious from the N14. Apart from locations where these powerlines cross the road, the closest that they run adjacent to the road is approximately 250m. From this distance the powerlines are visually obvious, however, they do not dominate the view from the road. This needs to be qualified in that Aggeneis is an industrial area with extensive mining areas in the vicinity.

The proposed powerline will run parallel to the N14 for approximately 48.8km. It will also cross the road twice. The proposed 400kV powerline will therefore be visually obvious but will not generally dominate views from the N14.

The proposed 400kV powerline will close to an parallel to the R357 for approximately 13.2km. Therefore, the proposed 400kV powerline is likely to be visually obvious from this road.

The entire expansion area of the Paulputs Substation and approximately 5km of the western end of the power line alignment will be within the Industrial LCA. Whilst the features will be visually obvious, they will not change the character of this landscape.

Both elements will have a negative detrimental impact on the landscape.

Impact levels will increase from the current situation to the end of construction and they are likely to remain at a consistent level through the operational phase.

It is likely that landscape disturbance will occur during construction. However, with mitigation this will be largely repaired by the commencement of the operational phase.

	<b>Without mitigation</b>	<b>With mitigation</b>
<b>IMPACT SIGNIFICANCE</b>		
<b>Nature</b>	Negative detrimental, <b>(-1)</b>	Negative detrimental, <b>(-1)</b>
<b>Extent</b>	Local, <b>(3)</b>	Local, <b>(3)</b>
<b>Duration</b>	Short term, <b>(2)</b>	Short term, <b>(2)</b>
<b>Magnitude</b>	Substation – Low <b>(3)</b> Powerline – High <b>(4)</b>	Substation –Low <b>(2)</b> Powerline– Moderate <b>(3)</b>
<b>Reversibility</b>	Significant time and cost <b>(3)</b>	Significant time and cost <b>(3)</b>
<b>Probability</b>	Substation –Low <b>(2)</b> Powerline– Medium <b>(3)</b>	Substation –Low <b>(2)</b> Powerline– Medium <b>(3)</b>
<b>Consequence</b>	Substation –Low <b>(-2.25)</b> Powerline– Medium <b>(-3)</b>	Substation –Low <b>(-2.25)</b> Powerline– Medium <b>(2.75)</b>
<b>Significance</b>	Substation – Low medium <b>(-4.5)</b> Powerline – Low medium <b>(-9)</b>	Substation – Low medium <b>(-4.5)</b> Powerline – Low medium <b>(-8.25)</b>
<b>Mitigation / Management:</b>		

Proposed mitigation is good practice, it may help minimise the appearance of disturbance around individual towers and the substation site, however, it is unlikely to significantly reduce the overall impact.

**Construction:**

- Control site access particularly during construction in order to minimise areas of disturbance;
- Undertake waste management in order to minimise the spread of waste from the site;
- Reinststate, augment and maintain retained natural vegetation ;
- Remove all temporary works;
- Monitor rehabilitated areas post-construction and implement remedial actions; and
- Minimise disturbance and maintain existing vegetation and newly planted vegetation as far as is possible both within and surrounding the development area.

**IMPACT PRIORITIZATION**

<b>Cumulative Impact</b>	Substation –Low <b>(1)</b> Powerline– Medium <b>(2)</b>
<b>Irreplaceable Loss</b>	Substation –Low <b>(1)</b> Powerline– Medium <b>(2)</b>
<b>Prioritisation factor</b>	Substation –Low <b>(1)</b> Powerline– Medium <b>(1.25)</b>
<b>Final Significance Rating</b>	Substation – Medium Low <b>(-4.5)</b>
<b>Final Significance Rating</b>	Powerline – Medium High <b>(-10.3125)</b>

**Cumulative Impacts:**

**Substation**

The substation will intensify the existing impact of industrial elements within its vicinity. However, this will be a localised cumulative impact, it will not extend the existing area of impact.

**Powerline**

The 400kV powerline will extend the existing impact area of similar infrastructure within the surrounding otherwise relatively natural landscape.

**Operational Phase**

**Nature of impact:**

Refer to the full descriptions of potential impacts under Construction Phase (above).

Both the proposed Paulputs substation extension and the proposed 400kV powerline are likely to have a negative detrimental impact on the landscape

	<b>Without mitigation</b>	<b>With mitigation</b>
<b>IMPACT SIGNIFICANCE</b>		

Nature	Negative detrimental, (-1)	Negative detrimental, (-1)
Extent	Local, (3)	Local, (3)
Duration	Short term, (2)	Short term, (2)
Magnitude	Substation –Low (2) Powerline– Moderate (3)	Substation –Low (2) Powerline– Moderate (3)
Reversibility	Significant time and cost (3)	Significant time and cost (3)
Probability	Substation –Low (2) Powerline– Medium (3)	Substation –Low (2) Powerline– Medium (3)
Consequence	Substation –Low (-2.25) Powerline– Medium (2.75)	Substation –Low (-2.25) Powerline– Medium (2.75)
Significance	Substation – Low medium (-4.5) Powerline – Low medium (-8.25)	Substation – Low medium (-4.5) Powerline – Low medium (-8.25)
<b>Mitigation / Management:</b> Proposed mitigation is good practice, it may help minimise the appearance of disturbance around individual towers and the substation site, however, it is unlikely to significantly reduce the overall impact. <b>Operational Phase :</b> <ul style="list-style-type: none"><li>Monitor rehabilitated areas post-construction and implement remedial actions as necessary.</li></ul>		
<b>IMPACT PRIORITIZATION</b>		
Cumulative Impact	Substation –Low (1) Powerline– Medium (2)	
Irreplaceable Loss	Substation –Low (1) Powerline– Medium (2)	
Prioritisation factor	Substation –Low (1) Powerline– Medium (1.25)	
Final Significance Rating	Substation – Medium Low (-4.5)	
	Powerline – Medium Low (-7.5)	
<b>Cumulative Impacts:</b> <b>Substation</b> The substation will intensify the existing impact of industrial elements within its vicinity. However, this will be a localised cumulative impact, it will not extend the existing area of impact.  <b>Powerline</b> The 400kV powerline will extend the existing impact area of similar infrastructure within the surrounding otherwise relatively natural landscape.		

### 5.2.3.2 The proposed development could change the character of the landscape as viewed from the R357

#### Construction & Operational Phases

##### **Nature of impact:**

The proposed Paulputs substation expansion will be approximately 3.3km from the road. The existing substation is visible from the road but is not highly visually obvious. The proposed extension will be partially screened from the road by a minor ridgeline. The lower sections of the substation and construction works will particularly be screened. Therefore it is highly unlikely to be highly visually obvious.

The proposed 400kV powerline will run close to and parallel with the road for approximately 13km. Outside this area, the powerline will be some distance from the road, at its furthest it will be approximately 6.4km from this road. Therefore the construction and operational phase powerline is likely to be visually obvious from this road.

Both the proposed Paulputs substation extension and the proposed 400kV powerline are likely to have a negative detrimental impact on views of the landscape

	<b>Without mitigation</b>	<b>With mitigation</b>
<b>IMPACT SIGNIFICANCE</b>		
<b>Nature</b>	Negative detrimental, <b>(-1)</b>	Negative detrimental, <b>(-1)</b>
<b>Extent</b>	Local, <b>(3)</b>	Local, <b>(3)</b>
<b>Duration</b>	Short term, <b>(2)</b>	Short term, <b>(2)</b>
<b>Magnitude</b>	Substation – Minor <b>(1)</b> Powerline – Moderate <b>(3)</b>	Substation – Minor <b>(1)</b> Powerline – Moderate <b>(3)</b>
<b>Reversibility</b>	Significant time and cost <b>(3)</b>	Significant time and cost <b>(3)</b>
<b>Probability</b>	Substation – Improbable <b>(1)</b> Powerline – Medium Probable <b>(3)</b>	Substation – Improbable <b>(1)</b> Powerline – Medium Probable <b>(3)</b>
<b>Consequence</b>	Substation –Low <b>(-2.25)</b> Powerline– Medium <b>(-2.75)</b>	Substation –Low <b>(-2.25)</b> Powerline– Medium <b>(-2.75)</b>
<b>Significance</b>	Substation – Low <b>(-2.25)</b>	Substation – Low <b>(-2.25)</b>
	Powerline – Low – Medium <b>(-8.25)</b>	Powerline – Low-Medium <b>(-8.25)</b>

##### **Mitigation / Management:**

Proposed mitigation is good practice, it may help minimise the appearance of disturbance around individual towers and the substation site, however, it is the benefits are unlikely to be obvious from the distances involved.

##### **Construction:**

- Control site access particularly during construction in order to minimise areas of disturbance;
- Undertake waste management in order to minimise the spread of waste from the site;

<ul style="list-style-type: none"> <li>• Reinstate, augment and maintain retained natural vegetation ;</li> <li>• Remove all temporary works;</li> <li>• Monitor rehabilitated areas post-construction and implement remedial actions; and</li> <li>• Minimise disturbance and maintain existing vegetation and newly planted vegetation as far as is possible both within and surrounding the development area.</li> <li>• Locate powerline as far from the road as possible.</li> </ul>	
<b>IMPACT PRIORITIZATION</b>	
<b>Cumulative Impact</b>	Substation – Low <b>(1)</b> Powerline – Medium <b>(2)</b>
<b>Irreplaceable Loss</b>	Substation – Low <b>(1)</b> Powerline – Low <b>(1)</b>
<b>Prioritisation factor</b>	Substation –Low <b>(1)</b> Powerline– Medium <b>(1.125)</b>
<b>Final Significance Rating</b>	Substation – Medium - Low Negative <b>(-2.25)</b>
	Powerline – Medium - High Negative <b>(-9.28)</b>
<p><b>Cumulative Impacts:</b></p> <p><b>Substation</b></p> <p>Views of the substation will marginally intensify the existing impact of industrial elements from the road. However, this will be a localised cumulative impact, it will not extend the existing area of impact.</p> <p><b>Powerline</b></p> <p>The 400kV powerline will be the only 400kV overhead powerline visible from this road.</p>	

### 5.2.3.3 The proposed development could change the character of the landscape as viewed from the N14

#### Construction Phase

##### Nature of impact:

In most areas in the vicinity of the proposed site, existing high voltage powerlines are aligned away from main roads. The only area where high voltage powerlines are obvious close to roads is close to Aggeneis which is approximately 95km west of the proposed site. Close to Aggeneis, high and medium voltage overhead powerlines converge on the Aggeneis Substation. In this area, 400kV powerlines are obvious from the N14. Apart from locations where these powerlines cross the road, the closest that they run adjacent to the road is approximately 250m. From this distance the powerlines are visually obvious, however, they do not dominate the view from the road.

At 250m from the road, which appears to be the case with the proposed alignment, the proposed powerlines will be conspicuous and will noticeably change the nature of views from the road but will not dominate views. Up to a distance of approximately 1km, the proposed 400kV powerline will be highly conspicuous. The further from the road they can be located, the less conspicuous that are likely to be.

Only the 400kV powerline will impact on this road.

	Without mitigation	With mitigation
IMPACT SIGNIFICANCE		
<b>Nature</b>	Negative detrimental, <b>(-1)</b>	Negative detrimental, <b>(-1)</b>
<b>Extent</b>	Local, <b>(3)</b>	Local, <b>(3)</b>
<b>Duration</b>	Short term, <b>(2)</b>	Short term, <b>(2)</b>
<b>Magnitude</b>	High <b>(4)</b>	Substation –Low <b>(2)</b> Powerline– Moderate <b>(3)</b>
<b>Reversibility</b>	Significant time and cost <b>(3)</b>	Significant time and cost <b>(3)</b>
<b>Probability</b>	Medium <b>(3)</b>	Medium <b>(3)</b>
<b>Consequence</b>	Medium <b>(-3)</b>	Medium <b>(2.75)</b>
<b>Significance</b>	Low medium <b>(-9)</b>	Low medium <b>(-8.25)</b>

**Mitigation / Management:**

Proposed mitigation is good practice, it may help minimise the appearance of disturbance around individual towers.

**Construction:**

- Control site access particularly during construction in order to minimise areas of disturbance;
- Undertake waste management in order to minimise the spread of waste from the site;
- Reinstate, augment and maintain retained natural vegetation ;
- Remove all temporary works;
- Monitor rehabilitated areas post-construction and implement remedial actions; and
- Minimise disturbance and maintain existing vegetation and newly planted vegetation as far as is possible both within and surrounding the development area.

IMPACT PRIORITIZATION	
<b>Cumulative Impact</b>	Medium <b>(2)</b>
<b>Irreplaceable Loss</b>	Medium <b>(2)</b>
<b>Prioritisation factor</b>	Medium <b>(1.25)</b>
<b>Final Significance Rating</b>	Medium High <b>(-10.3125)</b>

**Cumulative Impacts:**

The 400kV powerline will be the only 400kV overhead powerline visible from this road.

**Operational Phase**

**Nature of impact:**

Refer to the full descriptions of potential impacts under Construction Phase (above).

The proposed 400kV powerline is likely to have a negative detrimental impact on the landscape		
	Without mitigation	With mitigation
IMPACT SIGNIFICANCE		
Nature	Negative detrimental, (-1)	Negative detrimental, (-1)
Extent	Local, (3)	Local, (3)
Duration	Long term, (4)	Long term, (4)
Magnitude	Moderate (3)	Moderate (3)
Reversibility	Significant time and cost (3)	Significant time and cost (3)
Probability	Medium (3)	Medium (3)
Consequence	Medium (3.25)	Medium (3.25)
Significance	High medium (-9.75)	High medium (-9.75)
<b>Mitigation / Management:</b> Proposed mitigation is good practice, it may help minimise the appearance of disturbance around individual towers and the substation site, however, it is unlikely to significantly reduce the overall impact.		
<b>Operational Phase :</b> <ul style="list-style-type: none"><li>Monitor rehabilitated areas post-construction and implement remedial actions as necessary.</li></ul>		
IMPACT PRIORITIZATION		
Cumulative Impact	Powerline– Medium (2)	
Irreplaceable Loss	Powerline– Medium (2)	
Prioritisation factor	Powerline– Medium (1.25)	
Final Significance Rating	Powerline – Medium high (-12.18)	
<b>Cumulative Impacts:</b> <b>Powerline</b> The 400kV powerline will extend the existing impact area of similar infrastructure within the landscape surrounding the road which is generally a relatively natural landscape.		

#### 5.2.3.4 The proposed development could change the character of the landscape as viewed from local homesteads

##### Construction Phase

###### Nature of impact:

###### Nature of impact:

Only the proposed 400kV overhead powerlines are likely to be visually obvious from homesteads.

The analysis indicates that at 250m from the viewer, the proposed powerline will be visually obvious but will not dominate the view and that at approximately 1km they remain obvious whereas at a distance of 5km whilst they remain visible, they are more likely to blend into the background.

Approximately twelve (12) homesteads are within 5km and could have a view of the proposed powerline.

There are a two homesteads within 100m of the proposed 400kV powerline. Both of these homesteads are located on the eastern side of the N14, one opposite the small hamlet of Uitkyk and one approximately 4.6km north of the intersection of the N14 and the R357.

The next closest homestead is at Uitkyk and is approximately 316m from the proposed powerline.

	Without mitigation	With mitigation
IMPACT SIGNIFICANCE		
<b>Nature</b>	Negative detrimental, <b>(-1)</b>	Negative detrimental, <b>(-1)</b>
<b>Extent</b>	Local, <b>(3)</b>	Local, <b>(3)</b>
<b>Duration</b>	Short term, <b>(2)</b>	Short term, <b>(2)</b>
<b>Magnitude</b>	High <b>(4)</b>	Moderate <b>(3)</b>
<b>Reversibility</b>	Significant time and cost <b>(3)</b>	Significant time and cost <b>(3)</b>
<b>Probability</b>	High <b>(4)</b>	Medium <b>(3)</b>
<b>Consequence</b>	Medium <b>(-3)</b>	Medium <b>(2.75)</b>
<b>Significance</b>	High <b>(-12)</b>	Low medium <b>(-8.25)</b>

**Mitigation / Management:**

Proposed mitigation is good practice, it may help minimise the appearance of disturbance around individual towers.

**Construction:**

- Control site access particularly during construction in order to minimise areas of disturbance;
- Undertake waste management in order to minimise the spread of waste from the site;
- Reinstate, augment and maintain retained natural vegetation ;
- Remove all temporary works;
- Monitor rehabilitated areas post-construction and implement remedial actions; and
- Minimise disturbance and maintain existing vegetation and newly planted vegetation as far as is possible both within and surrounding the development area.

IMPACT PRIORITIZATION	
<b>Cumulative Impact</b>	Low <b>(1)</b>

<b>Irreplaceable Loss</b>	Medium <b>(2)</b>
<b>Prioritisation factor</b>	Medium <b>(1.125)</b>
<b>Final Significance Rating</b>	Medium High negative <b>(-9.28125)</b>
<b>Cumulative Impacts:</b> The 400kV powerline will be the only 400kV overhead powerline visible from the affected homesteads.	

### Operational Phase

<b>Nature of impact:</b> Refer to the full descriptions of potential impacts under Construction Phase (above).  The proposed 400kV powerline is likely to have a negative detrimental impact on the homesteads		
	<b>Without mitigation</b>	<b>With mitigation</b>
<b>IMPACT SIGNIFICANCE</b>		
<b>Nature</b>	Negative detrimental, <b>(-1)</b>	Negative detrimental, <b>(-1)</b>
<b>Extent</b>	Local, <b>(3)</b>	Local, <b>(3)</b>
<b>Duration</b>	Long term, <b>(4)</b>	Long term, <b>(4)</b>
<b>Magnitude</b>	Moderate <b>(3)</b>	Moderate <b>(3)</b>
<b>Reversibility</b>	Significant time and cost <b>(3)</b>	Significant time and cost <b>(3)</b>
<b>Probability</b>	High <b>(4)</b>	High <b>(4)</b>
<b>Consequence</b>	Medium <b>(-3.25)</b>	Medium <b>(-3.25)</b>
<b>Significance</b>	High medium <b>(-13.00)</b>	High medium <b>(-13.00)</b>
<b>Mitigation / Management:</b> Proposed mitigation is good practice, it may help minimise the appearance of disturbance around individual towers and the substation site, however, it is unlikely to significantly reduce the overall impact.		
<b>Operational Phase :</b> <ul style="list-style-type: none"> <li>Monitor rehabilitated areas post-construction and implement remedial actions as necessary.</li> </ul>		
<b>IMPACT PRIORITIZATION</b>		
<b>Cumulative Impact</b>	Low <b>(1)</b>	
<b>Irreplaceable Loss</b>	Medium <b>(2)</b>	
<b>Prioritisation factor</b>	Medium <b>(1.125)</b>	
<b>Final Significance Rating</b>	High negative <b>(-14.625)</b>	

**Cumulative Impacts:****Powerline**

The 400kV powerline could extend the numbers of homesteads impacted by high voltage powerlines in the region.

### 5.2.3.5 Lighting within the proposed development could cause light pollution and nuisance for neighbours

**Construction Phase****Nature of impact:**

The environment surrounding the proposed facility is largely dark at night. Existing lighting is typically comprised of:

- Low intensity lighting associated with individual dwellings;
- Lighting associated with the existing Paulputs Substation and solar projects at the western end of the proposed project; and
- Vehicle lights that may be driving through the area.

Lighting associated with the proposed development could include:

- Temporary security and safety lighting during the construction phase;

Therefore, it is only the proposed substation that is likely to be lit. As the proposed substation extension will be located immediately adjacent to the existing Paulputs substation which is lit, it may marginally increase the area that is lit and the existing lighting intensity within the area.

Due to distance, it is unlikely that light spill from the substation will cause nuisance for residents of the closest homestead which is approximately 2,5km to the south of the proposed substation expansion.

From the site visit, it appears that there may also be lighting of solar projects in the vicinity of the existing Paulputs Substation as there are columns with what appears to be lighting and / or security cameras on project boundaries. This could further intensify existing impacts.

	Without mitigation	With mitigation
IMPACT SIGNIFICANCE		
<b>Nature</b>	Negative detrimental, <b>(-1)</b>	Negative detrimental, <b>(-1)</b>
<b>Extent</b>	Local, <b>(3)</b>	Local, <b>(3)</b>
<b>Duration</b>	Long term, <b>(4)</b>	Long term, <b>(4)</b>
<b>Magnitude</b>	Low <b>(3)</b>	Minor <b>(1)</b>
<b>Reversibility</b>	Minimal time and cost <b>(1)</b>	Minimal time and cost <b>(1)</b>
<b>Probability</b>	Low <b>(2)</b>	Improbable <b>(1)</b>
<b>Consequence</b>	Low <b>(-2.25)</b>	Low <b>(-1.75)</b>
<b>Significance</b>	Low medium <b>(-2.75)</b>	Low medium <b>(-2.25)</b>

**Mitigation / Management:****Planning:**

- Careful design of security and operational lighting to minimise impacts on surrounding areas and receptors;
- Minimise lighting particularly in natural sections of the proposed project;
- High mast lighting should not be used.

**Operation:**

<ul style="list-style-type: none"> <li>Ensure that the intention of the original lighting design is maintained throughout the construction phase.</li> </ul>	
<b>IMPACT PRIORITIZATION</b>	
<b>Cumulative Impact</b>	Low <b>(1)</b>
<b>Irreplaceable Loss</b>	Low <b>(1)</b>
<b>Prioritisation factor</b>	Low <b>(1)</b>
<b>Final Significance Rating</b>	Low negative <b>(2.25)</b>
<b>Cumulative Impacts:</b> <b>Substation</b> <p>The substation is likely to intensify the existing impact of lighting within its vicinity. However, this will be a localised and is unlikely to extend the cumulative effect of lighting.</p>	

### Operational Phase

<b>Nature of impact:</b> <p>Lighting associated with the proposed development could include:</p> <ul style="list-style-type: none"> <li>Security lighting within the proposed substation during the operational phase; and</li> <li>Operational lighting within the proposed substation during the operational phase.</li> </ul> <p>Therefore, it is only the proposed substation that is likely to be lit. As the proposed substation extension will be located immediately adjacent to the existing Paulputs substation which is lit, it may marginally increase the area that is lit and the existing lighting intensity within the area.</p> <p>traditional area which is likely to currently have low lighting levels associated with traditional settlement, it is possible that substation lighting and particularly security lighting could make the development highly obvious during the hours of darkness. However, with mitigation, it is possible that lighting levels during normal operations will be similar to adjacent settlement.</p> <p>Due to distance, it is unlikely that light spill from the substation will cause nuisance for residents of the closest homestead which is approximately 2,5km to the south of the proposed substation expansion.</p> <p>From the site visit, it appears that there may also be lighting of solar projects in the vicinity of the existing Paulputs Substation as there are columns with what appears to be lighting and / or security cameras on project boundaries. This could further intensify existing impacts.</p>		
	<b>Without mitigation</b>	<b>With mitigation</b>
<b>IMPACT SIGNIFICANCE</b>		
<b>Nature</b>	Negative detrimental, <b>(-1)</b>	Negative detrimental, <b>(-1)</b>
<b>Extent</b>	Local, <b>(3)</b>	Local, <b>(3)</b>
<b>Duration</b>	Short term, <b>(2)</b>	Short term, <b>(2)</b>
<b>Magnitude</b>	Low <b>(3)</b>	Minor <b>(1)</b>
<b>Reversibility</b>	Minimal time and cost <b>(1)</b>	Minimal time and cost <b>(1)</b>

Probability	Low (2)	Improbable (1)
Consequence	Low (-2.25)	Low (-1.75)
Significance	Low medium (-4.5)	Low medium (-1.75)
<b>Mitigation / Management:</b> Planning: <ul style="list-style-type: none"><li>Careful design of security and operational lighting to minimise impacts on surrounding areas and receptors;</li><li>Ensure that security lighting is only activated when necessary, the use of movement sensors and / or infra-red systems should be considered;</li><li>High mast lighting should not be used.</li></ul> Operation: <ul style="list-style-type: none"><li>Ensure that the intention of the original lighting design is maintained throughout the operational phase.</li></ul>		
IMPACT PRIORITIZATION		
Cumulative Impact	Low (1)	
Irreplaceable Loss	Low (1)	
Prioritisation factor	Low (1)	
Final Significance Rating	Low negative (1.75)	
<b>Cumulative Impacts:</b> <b>Substation</b> The substation is likely to intensify the existing impact of lighting within its vicinity. However, this will be a localised and is unlikely to extend the cumulative effect of lighting.		

## 6 IMPACT STATEMENT

### 6.1 EXISTING LANDSCAPE

The following Landscape Character Areas (**LCAs**) were identified:

- **Upper Plain with isolated Inselberge LCA** which is comprised of main lowland landscape between the main ridgelines and rugged topography adjacent to the Orange River. Due largely to low intensity grazing, the area has retained a largely natural appearance that is punctuated with isolated low ridgelines and inselbergs that provide a degree of screening / Visual absorption Capacity (VAC);
- **Ridgelines and Rugged Topography LCA** which is comprised of the continuous series of ridgelines that form the southern edge of the Orange River Valley to the north of the study area that provides a dramatic backdrop for the area. A degree of VAC is likely to be provided by the landform which is likely to limit visibility to the north;
- **Industrial LCA** which is comprised of the existing CSP projects and the Paulputs Substation.

There are no protected areas that are likely to be affected by the proposed development.

### 6.2 VISUAL RECEPTORS

#### Area Receptors

Area Receptors include the small hamlet of Uitkyk.

#### Linear Receptors:

Linear receptors generally include routes through the area include the N14 and R357 roads.

#### Point Receptors

Point receptors include isolated homesteads.

### 6.3 LANDSCAPE & RECEPTOR SENSITIVITY

SENSITIVITY	LCA	RECEPTORS
<b>Low</b>	Areas not recognised as having specific landscape value; <ul style="list-style-type: none"><li>• <b>The Industrial LCA;</b></li></ul>	Viewer's attention not focused on landscape. These include: <ul style="list-style-type: none"><li>• <b>Travellers on minor unsurfaced local roads</b></li></ul>
<b>Medium</b>	Landscape value is recognised locally, but is not protected; the landscape is relatively intact, with a distinctive character; and the	Viewers' attention may be focused on landscape. These include: <ul style="list-style-type: none"><li>• <b>Residents of Uitkyk and isolated homesteads;</b></li><li>• <b>Travellers on the N14 and R357</b></li></ul>

SENSITIVITY	LCA	RECEPTORS
	<p>landscape is reasonably tolerant of change.</p> <p>These areas include:</p> <ul style="list-style-type: none"> <li>• <b>The Upper Plain with Isolated Inselberg LCA;</b></li> <li>and</li> <li>• <b>The Ridgelines and Rugged Topography LCA</b></li> </ul>	
<b>High</b>	<p>The qualities for which the landscape is valued are in a good condition, with a clearly apparent distinctive character. This distinctive character is susceptible to relatively small changes.</p> <p><b>There are no landscape character areas with a high significance.</b></p>	<p>Viewer's attention very likely to be focused on landscape, e.g. people experiencing views from important landscape features of local physical, cultural or historic interest and beauty spots. Large number of viewers and/or location in a highly valued landscape could elevate viewer sensitivity to the highest level.</p> <p><b>There are no receptors that are likely to have a high sensitivity.</b></p>

#### 6.4 LIKELY VISIBILITY AND POSSIBLE LANDSCAPE AND VISUAL IMPACTS

From review of the ZTV analysis, the following was noted that the proposed project is likely to be largely visible to the Approximate Limit of Visibility (ALV) with small areas screened by ridgelines. This means that views of the proposed development may be visible from the majority of road sections and homesteads within the ALV.

From the review of the proposed project, the nature of the affected landscape and possible receptors, the following possible landscape and visual impacts were identified:

- Landscape change due to the proposed project;
- Change in the character of views as experienced by travelers on the R357;
- Change in the character of views as experienced by travelers on the N14;
- Change in the nature of views as experienced by residents of homesteads; and
- Lighting impacts.

##### **Landscape change due to the proposed project**

The proposed development is located within an area that is largely natural in character although the proposed substation is located within an area that is largely industrial in character.

The proposed substation site is located within an area that has been developed with large solar projects as well as the existing Paulputs Substation.

The proposed power 400kV powerline is generally located within a largely natural landscape with relatively minor electrical infrastructure including smaller medium voltage powerlines largely beside roads.

The western most section of the proposed 400kV powerline is aligned away from roads and settlement. The eastern most section is aligned close to the N14 as well as a number of homesteads including a single homestead to the east of the N14 and the Uitkyk Hamlet that is located close to the western side of the N14.

With mitigation measures all possible landscape impacts were assessed as likely to have a low significance.

During construction potential landscape impacts due to the proposed substation were assessed as likely to have a medium low significance and the proposed 400kV powerline was assessed as likely to have a medium high significance. The difference was due to the fact that the proposed substation is located within an industrial area whereas the substation is located within a relatively natural landscape.

#### **Change in the character of the landscape as viewed from the R357**

The proposed 400kV powerline will run close to and parallel with the road for approximately 13km. Outside this area, the powerline will be some distance from the road, at its furthest it will be approximately 6.4km from this road. Therefore the construction and operational phase powerline is likely to be visually obvious from this road.

The proposed substation expansion is unlikely to be visually obvious from this road.

Visual impacts associated with both the proposed substation were assessed as likely to have a low significance both during the construction and operational phases.

Visual impacts associated with both the proposed substation were assessed as likely to have a low significance both during the construction and operational phases.

and the 400kV powerline were assessed as likely to have a low-medium significance both during the construction and operational phases of the project.

#### **Change in the character of the landscape as viewed from the N14**

Only the proposed 400kV powerline will impact on the N14.

With the exception of the existing Aries – Kokerboom 400kV powerline road crossing at the eastern end of the proposed project, in most areas in the vicinity of the proposed site, existing high voltage powerlines are aligned away from main roads. The only area where high voltage powerlines are obvious running parallel to the road is close to Aggeneis which is approximately 95km west of the proposed site. Close to Aggeneis, high and medium voltage overhead powerlines converge on the Aggeneis Substation. In this area, 400kV powerlines are obvious running parallel to the N14. Apart from locations where these powerlines cross the road, the closest that they run adjacent to the road is approximately 250m. From this distance the powerlines are visually obvious, however, they do not dominate the view from the road.

The proposed 400kV powerline also appears to be located approximately 250m from the N14. At 250m from the road, the proposed powerlines will be conspicuous and will

noticeably change the nature of views from the road but will not dominate views. Up to a distance of approximately 1km, the proposed 400kV powerline will be highly conspicuous. The further from the road they can be located, the less conspicuous that are likely to be.

The assessed impact during both the construction and the operational phases was assessed as medium high.

### **Change in the character of the landscape as viewed from homesteads**

Only the proposed 400kV overhead powerlines are likely to be visually obvious from homesteads.

Approximately twelve (12) homesteads are within 5km and could have a view of the proposed powerline.

There are two homesteads within 100m of the proposed 400kV powerline. Both of these homesteads are located on the eastern side of the N14, one opposite the small hamlet of Uitkyk and one approximately 4.6km north of the intersection of the N14 and the R357.

It is because of the two closest homesteads that the possible impact was assessed as likely to have a high medium significance during construction and a high significance during the operational phase. The main reason for the difference is that the construction phase is relatively short compared with the operational phase.

### **Lighting impacts**

The environment surrounding the proposed facility is largely dark at night. Existing lighting is typically comprised of:

- Low intensity lighting associated with individual dwellings;
- Lighting associated with the existing Paulputs Substation and solar projects at the western end of the proposed project; and
- Vehicle lights that may be driving through the area.

Permanent lighting associated with the proposed development could include:

- Security lighting within the proposed substation; and
- Operational lighting within the proposed substation.

Lighting during both the construction and operational phases of the proposed project was assessed as likely to have a low negative visual impacts.

## **6.5 CONCLUSION**

As long as the identified mitigation measures are used, due to the likely relatively low levels of landscape and visual impact, there is no reason from a landscape and visual impact perspective why the proposed development should not be authorised.

In terms of the alternative powerline alignments, it is recommended that the proposed alignment is reviewed particularly in areas where it is likely to impact the closest homesteads.

## REFERENCES

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**APPENDIX I**

**SPECIALIST'S BRIEF CV**



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

**Qualifications**  
Education Diploma in Landscape Architecture, Gloucestershire College of Art and Design, UK (1979)  
 Environmental Law, University of KZN (1997)  
Professional Registered Professional Landscape Architect (SACLAP)  
 Chartered Member of the Landscape Institute (UK)  
 Member of the International Association of Impact Assessment, South Africa

**Languages**

<u>English</u> -	Speaking	-	Excellent
-	Reading	-	Excellent
-	Writing	-	Excellent

**Contact Details**

Post: 13 Askew Grove  
 Glenwood  
 Durban  
 4001  
 Cell: +27 83 7032995

#### General

Jon qualified as a Landscape Architect (Dip LA) at Cheltenham (UK) in 1979. He has been a chartered member of the Landscape Institute UK since 1986. He is also a Registered Landscape Architect and has had extensive experience as an Environmental Assessment Practitioner within South Africa.

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

He has worked in the United Kingdom (1990 - 1995) for major supermarket chains including Sainsbury's and prepared CAD based visual impact assessments for public enquiries for new store development. He also prepared the VIA input to the environmental statement for the Cardiff Bay Barrage for consideration by the UK Parliament in the passing of the Barrage Act (1993).

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

VIA work undertaken during the last twelve months includes wind energy projects, numerous solar plant projects (CSP and PV) and electrical infrastructure.

## **Select List of Visual Impact Assessment Projects**

- **Geelkop Solar PV projects** – Landscape and Visual Impact Assessment for seven proposed solar PV projects near Upington in the Northern Cape Province for Atlantic Renewable Energy Partners.
- **Makapanstad Agri- Hub** – Landscape and Visual Impact Assessment for proposed Agri-Hub development at Makapanstad in the North West Province for the Department of Rural Development and Land Reform.
- **Madikwe Sky Bubble** - Landscape and Visual Impact Assessment for proposed development of up-market accommodation at the Molori concession within the Madikwe Game Reserve.
- **Hartebeest Wind Energy Facility** – Landscape and Visual Impact Assessment Addendum Report for the proposed upgrading of turbine specifications for an authorised WEF near MoOrreesburg in the Western Cape Province for a private client.
- **Selati Railway Bridge** - Landscape and Visual Impact Assessment for proposed development of up-market accommodation on a railway bridge at Skukuza in the Kruger Park.
- **Kangala Mine Extension** - Landscape and Visual Impact Assessment for a proposed extension to the Kangala Mine in Mpumalanga for Universal Coal.
- **Khunab Solar Developments** – Landscape and Visual Impact Assessment for four proposed solar PV projects near Upington in the Northern Cape Province for a private client.
- **Sirius Solar Developments** – Landscape and Visual Impact Assessment for four proposed solar PV projects near Upington in the Northern Cape Province for Sola Future Energy.
- **Aggeneys Solar Developments** – Landscape and Visual Impact Assessment for two proposed solar PV projects near Aggeneys in the Northern Cape Province for a private client.
- **Hyperion Solar Developments** – Landscape and Visual Impact Assessment for four proposed solar PV projects near Kathu in the Northern Cape Province for Building Energy South Africa.
- **Eskom Combined Cycle Power Plant** - Landscape and Visual Impact Assessment for proposed gas power plant in Richards Bay, KwaZulu Natal Province.
- **N2 Wild Coast Toll Road, Mineral Sources and Auxiliary Roads** – VIA for the Pondoland Section of this project for the South African National Roads Agency.
- **Mpushini Park Ashburton** – VIA for a proposed amendment to an authorised development plan which included residential, office park and light industrial uses to logistics and warehousing.
- **Moedeng PV Solar Project** - VIA for a solar project near Vrybury in the North West Province for a private client.
- **Establishment of Upmarket Tourism Accommodation on the Selati Bridge, Kruger National Park** – Assessment of visual implications of providing tourism accommodation in 12 railway carriages on an existing railway bridge at the Skukuza Rest Camp in the Kruger Park.
- **Jozini TX Transmission Tower** – Assessment of visual implications of a proposed MTN transmission tower on the Lebombo ridgeline overlooking the Pongolapoort Nature reserve and dam.
- **Bhangazi Lake Development** – Visual Impact Assessment for a proposed tourism development within the iSimangaliso Wetland Park World Heritage Site.
- **Palesa Power Station** - VIA for a new 600MW power station near Kwamhlanga in Mpumalanga for a private client.
- **Heuningklip PV Solar Project** – VIA for a solar project in the Western Cape Province for a private client.
- **Kruispad PV Solar Project** – VIA for a solar project in the Western Cape Province for a private client.
- **Doornfontein PV Solar Project** – VIA for a solar project in the Western Cape Province for a private client.
- **Olifantshoek Power Line and Substation** – VIA for a new 10MVA 132/11kV substation and 31km

powerline, Northern Cape Province, for Eskom.

- **Noupoort Concentrating Solar Plants** - Scoping and Visual Impact Assessments for two proposed parabolic trough projects.
- **Drakensberg Cable Car** – Preliminary Visual Impact Assessment and draft terms of reference as part of the feasibility study.
- **Paulputs Concentrating Solar Plant (tower technology)** – Visual Impact Assessment for a new CSP project near Pofadder in the Northern Cape.
- **Ilanga Concentrating Solar Plants 1, 2, 3, 4 & 5** – Scoping and Visual Impact Assessments for the proposed extension of five authorised CSP projects including parabolic trough and tower technology within the Karoshhoek Solar Valley near Upington in the Northern Cape.
- **Ilanga Concentrating Solar Plants 1, 2, 3, 4 & 5 Shared Infrastructure** –Visual Impact Assessment for the necessary shared infrastructure including power lines, substation, water pipeline and roads for these projects.
- **Ilanga Concentrating Solar Plants 7, 8 & 9** - Scoping and Visual Impact Assessments for three new CSP projects including parabolic trough and tower technology within the Karoshhoek Solar Valley near Upington in the Northern Cape.
- **Sol Invictus Solar Plants** - Scoping and Visual Impact Assessments for three new Solar PV projects near Pofadder in the Northern Cape.
- **Gunstfontein Wind Energy Facility** – Scoping and Visual Impact Assessment for a proposed WEF near Sutherland in the Northern Cape.
- **Moorreesburg Wind Energy Facility** – Visual Impact Assessment for a proposed WEF near Moorreesburg in the Western Cape.
- **Semonkong Wind Energy Facility** - Visual Impact Assessment for a proposed WEF near Semonkong in Southern Lesotho.
- **Great Karoo Wind Energy Facility** – Addendum report to the Visual Impact Assessment Report for amendment to this authorised WEF that is located near Sutherland in the Northern Cape. Proposed amendments included layout as well as rotor diameter.
- **Perdekraal East Power Line** – Visual Impact Assessment for a proposed power line to evacuate power from a wind energy facility near Sutherland in the Northern Cape.
- **Tshivhaso Power Station** – Scoping and Visual Impact Assessment for a proposed new power station near Lephalale in Limpopo Province.
- **Saldanha Eskom Strengthening** – Scoping and Visual Impact Assessment for the upgrading of strategic Eskom infrastructure near Saldanha in the Western Cape.
- **Eskom Lethabo PV Installation** - Scoping and Visual Impact Assessment for the development of a solar PV plant within Eskom's Lethabo Power Station in the Free State.
- **Eskom Tuthuka PV Installation** - Scoping and Visual Impact Assessment for the development of a solar PV plant within Eskom's Thutuka Power Station in Mpumalanga.
- **Eskom Majuba PV Installation** - Scoping and Visual Impact Assessment for the development of a solar PV plant within Eskom's Majuba Power Station in Mpumalanga.
- **Golden Valley Power Line** - Visual Impact Assessment for a proposed power line to evacuate power from a wind energy facility near Cookhouse in the Eastern Cape.
- **Mpophomeni Shopping Centre** – Visual impact assessment for a proposed new shopping centre close to the southern shore of Midmar Dam in KwaZulu Natal.
- **Rheebokfontein Power Line** - Addendum report to the Visual Impact Assessment Report for amendment to this authorised power line alignment located near Darling in the Western Cape.
- **Woodhouse Solar Plants** – Scoping and Visual Impact Assessment for two proposed solar PV projects near Vryburg in the North West Province.

- **AngloGold Ashanti, Dokyiwa (Ghana)** – Visual Impact Assessment for proposed new Tailings Storage Facility at a mine site working with SGS as part of their EIA team.
- **Gateway Shopping Centre Extension (Durban)** – Visual Impact Assessment for a proposed shopping centre extension in Umhlanga, Durban.
- **Kouroussa Gold Mine (Guinea)** – Visual impact assessment for a proposed new mine in Guinea working with SGS as part of their EIA team.
- **Mampon Gold Mine (Ghana)** - Visual impact assessment for a proposed new mine in Ghana working with SGS as part of their EIA team.
- **Telkom Towers** – Visual impact assessments for numerous Telkom masts in KwaZulu Natal.
- **Eskom Isundu Substation** – Visual Impact Assessment for a proposed major new Eskom substation near Pietermaritzburg in KwaZulu Natal.
- **Eskom St Faiths Power Line and Substation** – Visual Impact Assessment for a major new substation and associated power lines near Port Shepstone in KwaZulu Natal.
- **Eskom Ficksburg Power Line** – Visual Impact Assessment for a proposed new power line between Ficksburg and Cocolan in the Free State.
- **Eskom Matubatuba to St Lucia Power Line** – Visual Impact Assessment for a proposed new power line between Mtubatuba and St Lucia in KwaZulu Natal.
- **Dube Trade Port, Durban International Airport** – Visual Impact Assessment
- **Sibaya Precinct Plan** – Visual Impact Assessment as part of Environmental Impact Assessment for a major new development area to the north of Durban.
- **Umdloti Housing** – Visual Impact Assessment as part of Environmental Impact Assessment for a residential development beside the Umdloti Lagoon to the north of Durban.
- **Tata Steel Ferrochrome Smelter** - Visual impact assessment of proposed new Ferrochrome Smelter in Richards Bay as part of EIA undertaken by the CSIR.
- **Durban Solid Waste Large Landfill Sites** – Visual Impact Assessment of proposed development sites to the North and South of the Durban Metropolitan Area. The project utilised 3d computer visualisation techniques.
- **Hillside Aluminium Smelter, Richards Bay** - Visual Impact Assessment of proposed extension of the existing smelter. The project utilised 3d computer visualisation techniques.
- **Estuaries of KwaZulu Natal Phase 1** – Visual character assessment and GIS mapping as part of a review of the condition and development capacity of eight estuary landscapes for the Town and Regional Planning Commission. The project was extended to include all estuaries in KwaZulu Natal.
- **Signage Assessments** – Numerous impact assessments for proposed signage developments for Blast Media.
- **Signage Strategy** – Preparation of an environmental strategy report for a national advertising campaign on National Roads for Visual Image Placements.
- **Zeekoegatt, Durban** - Computer aided visual impact assessment. EDP acted as advisor to the Province of KwaZulu Natal in an appeal brought about by a developer to extend a light industrial development within a 60 metre building line from the National N3 Highway.
- **La Lucia Mall Extension** - Visual impact assessment using three dimensional computer modelling / photo realistic rendering and montage techniques for proposed extension to shopping mall for public consultation exercise.
- **Redhill Industrial Development** - Visual impact assessment using three dimensional computer modelling / photo realistic rendering and montage techniques for proposed new industrial area for public consultation exercise.
- **Avondale Reservoir** - Visual impact assessment using three dimensional computer modelling / photo realistic rendering and montage techniques for proposed hilltop reservoir as part of Environmental Impact Assessment for Umgeni Water.

- **Hammersdale Reservoir** - Visual impact assessment using three dimensional computer modelling / photo realistic rendering and montage techniques for proposed hilltop reservoir as part of Environmental Impact Assessment for Umgeni Water.
- **Southgate Industrial Park, Durban** - Computer Aided Visual Impact Assessment and Landscape Design for AECL.
- **Sainsbury's Bryn Rhos** - Computer Aided Visual Impact Assessment/ Planning Application for the development of a new store within the Green Wedge North of Swansea.
- **Ynyston Farm Access** - Computer Aided Impact Assessment of visual intrusion of access road to proposed development of Cardiff for the Land Authority for Wales.
- **Cardiff Bay Barrage** – Preparation of the Visual Impact Statement for inclusion in the Impact Statement for debate by parliament (UK) prior to the passing of the Cardiff Bay Barrage Bill.
- **A470, Cefn Coed to Pentrebach** - Preparation of landscape frameworks for the assessment of the impact of the proposed alignment on the landscape for The Welsh Office.
- **Sparkford to Ilchester Bye Pass** - The preparation of the landscape framework and the draft landscape plan for the Department of Transport.
- **Green Island Reclamation Study** - Visual Impact Assessment of building massing, Urban Design Guidelines and Masterplanning for a New Town extension to Hong Kong Island.
- **Route 3** - Visual Impact Assessment for alternative road alignments between Hong Kong Island and the Chinese Border.
- **China Border Link** - Visual Impact Assessment and initial Landscape Design for a new border crossing at Lok Ma Chau.
- **Route 81, Aberdeen Tunnel to Stanley** - Visual Impact Assessment for alternative highway alignments on the South side of Hong Kong Island.

## **APPENDIX II**

### **GUIDELINES FOR INVOLVING VISUAL AND AESTHETIC SPECIALISTS IN EIA PROCESSES**

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

# GUIDELINE FOR INVOLVING VISUAL AND AESTHETIC SPECIALISTS IN EIA PROCESSES



PROVINCIAL GOVERNMENT OF THE WESTERN CAPE:  
DEPARTMENT OF ENVIRONMENTAL AFFAIRS  
AND DEVELOPMENT PLANNING



# GUIDELINE FOR INVOLVING VISUAL AND AESTHETIC SPECIALISTS IN EIA PROCESSES

*Edition 1*

*Issued by:*

Provincial Government of the Western Cape  
Department of Environmental Affairs and Development Planning  
Utilitas Building, 1 Dorp Street  
Private Bag X9086  
Cape Town 8000  
South Africa

*Prepared by:*

Bernard Oberholzer Landscape Architect  
PO Box 26643  
Hout Bay, 7872, South Africa  
email: bola@wol.co.za

*Coordinated by:*

CSIR Environmentek  
P O Box 320  
Stellenbosch 7599  
South Africa

*Contact person:*

Frauke Münster  
Tel: +27 21 888-2538  
(fmunster@csir.co.za)

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*This guideline should be cited as:*

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

# ACKNOWLEDGEMENTS

## *Steering committee:*

Paul Hardcastle	-	DEA&DP
Ayub Mohammed	-	DEA&DP
Susie Brownlie	-	de Villiers Brownlie Associates
Keith Wiseman	-	City of Cape Town
Mike Burns	-	CSIR Environmentek
Paul Lochner	-	CSIR Environmentek
Pete Ashton	-	CSIR Environmentek

## *Focus group participants:*

Paul Hardcastle	-	DEA&DP
Washiela Anthony	-	DEA&DP
Danie Smit	-	DEAT
Eileen Weinronk	-	City of Cape Town
Menno Klapwijk	-	Cave Klapwijk and Associates
Graham Young	-	Landscape Consultant
Bernard Oberholzer	-	Bernard Oberholzer Landscape Architect (BOLA)
Nicolas Baumann	-	Baumann & Winter Heritage Consultants
Sarah Winter	-	Baumann & Winter Heritage Consultants
Tanya de Villiers	-	Chittenden Nicks deVilliers Africa
Frauke Münster	-	CSIR Environmentek

## *Internal review:*

Mike Burns	-	CSIR Environmentek
Eileen Weinronk	-	City of Cape Town
Paul Hardcastle	-	DEA&DP
Washiela Anthony	-	DEA&DP

## *Stakeholders engaged in the guideline development process:*

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

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

## *Finalisation of report figures and formatting:*

Magdel van der Merwe and Elna Logie, DTP Solutions

## PREFACE

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

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

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

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

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

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

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

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

	ISSUES
<b>TIMING</b>	<ul style="list-style-type: none"> <li>When should specialists be involved in the EIA process; i.e. at what stage in the EIA process should specialists be involved (if at all) and what triggers the need for their input?</li> </ul>
<b>SCOPE</b>	<ul style="list-style-type: none"> <li>Which aspects must be addressed through specialist involvement; i.e. what is the purpose and scope of specialist involvement?</li> <li>What are appropriate approaches that specialists can employ?</li> <li>What qualifications, skills and experience are required?</li> </ul>
<b>QUALITY</b>	<ul style="list-style-type: none"> <li>What triggers the review of specialist studies by different roleplayers?</li> <li>What are the review criteria against which specialist inputs can be evaluated to ensure that they meet minimum requirements, are reasonable, objective and professionally sound?</li> </ul>

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

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

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

#### *Who is the target audience for these guidelines?*

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

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

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

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

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

*What will these guidelines not do?*

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

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

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

*How are these guidelines structured?*

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

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

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

## SUMMARY

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

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

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

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

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

management controls at the implementation stage.

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

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

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

**Part C** deals with the choice of an appropriate visual specialist, and the preparation of the terms of reference (TOR) for the visual input. Three types of visual assessment are put forward, each requiring different expertise, namely:

- Type A: assessments involving large areas of natural or rural landscape;
- Type B: assessments involving local areas of mainly built environment;
- Type C: assessments involving smaller scale sites with buildings, or groups of buildings.

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

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

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

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

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

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

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

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

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

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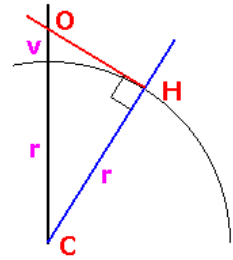
## **APPENDIX III**

### **FORMULA FOR DERIVING THE APPROXIMATE VISUAL HORIZON**


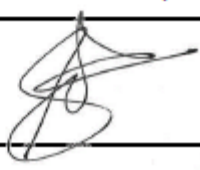

### The Mathematics behind this Calculation

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

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



**APPENDIX IV**  
**DETAILED ASSESSMENT METHODOLOGY**

TITLE:		ENVIRONMENTAL IMPACT ASSESSMENT RATING PROCEDURE			
<div style="text-align: center;">  </div>					
REV:	02	AUTHOR		APPROVED	
EFFECTIVE DATE:	NAME:	L. WHITLOW		NAME:	A. SMITH
	DATE:	29 January 2025		DATE:	29 January 2025
	SIGN:			SIGN:	
COPY / STATUS No:		MASTER COPY		DOCUMENT No:	PRO 106

<b>TITLE:</b>	<b>ENVIRONMENTAL IMPACT ASSESSMENT RATING PROCEDURE</b>	<b>DOC No:</b>	<b>PRO 106</b>	<b>REV:</b>	<b>02</b>	<b>Page 2 of 7</b>
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### 1. Purpose

The purpose of this procedure is to guide the undertaking of an impact and risk assessment process, as required under the regulations promulgated under the National Environmental Management Act (Act 107 of 1998 - NEMA).

### 2. Scope

This procedure provides the methodology to be applied to environmental impacts and risks identified during the Environmental Impact Assessment Process. The methodology ensures that consistent impact assessment rating is carried out that is legally compliant and aligned with EIMS's objective of providing a quality service.

### 3. References

GNR. 982 National Environmental Management Act (Act No. 107 of 1998): Environmental Impact Assessment Regulations, 2014 – hereafter referred to as the Regulations.

### 4. Additional Guidelines and References

<b>Guidelines and Reference Docs (not exhaustive – please verify with the applicable competent authority).</b>	
Compulsory Compliance: GNR. 982 National Environmental Management Act (Act No. 107 of 1998 - NEMA): Environmental Impact Assessment Regulations, 2014.	National
Companion Guideline for Implementation: Environmental Management Assessment Regulations, 2010 - GN 805/2012 (NEMA)	National
DEAT (2002) Impact Significance, Integrated Environmental Management, Information Series 5, Department of Environmental Affairs and Tourism (DEAT), Pretoria	National

### 5. Definitions and Abbreviations

Refer to Chapter 1 of the Regulations.

### 6. Procedure

The impact significance rating methodology, as presented herein and utilised for all EIMS Impact Assessment Projects, is guided by the requirements of the NEMA EIA Regulations 2014 (as amended). The approach may be altered or substituted on a case by case basis if the specific aspect being assessed requires such- such instances require prior EIMS Project Manager approval. The broad approach to the significance rating methodology is to determine the significance (S) of an environmental risk or impact by considering the consequence (C) of each impact (comprising Nature, Extent, Duration, Magnitude, and Reversibility) and relating this to the probability/ likelihood (P) of the impact occurring. The S is determined for the pre- and post-mitigation scenario. In addition, other factors, including cumulative impacts and potential for irreplaceable loss of resources, are used to determine a prioritisation factor (PF) which is applied to the S to determine the overall final significance rating (FS). The impact assessment will be applied to all identified alternatives.

#### a. Determination of Significance

The final significance (FS) of an impact or risk is determined by applying a prioritisation factor (PF) to the post-mitigation environmental significance. The significance is dependent on the consequence (C) of the particular impact and the probability (P) of the impact occurring. Consequence is determined through the consideration of the Nature (N), Extent (E), Duration (D), Magnitude (M), and Reversibility (R) applicable to the specific impact.

For the purpose of this methodology the consequence of the impact is represented by:

$$C = \frac{(E + D + M + R) * N}{4}$$

Each individual aspect in the determination of the consequence is represented by a rating scale as defined in Table 1 below.

<b>TITLE:</b>	<b>ENVIRONMENTAL IMPACT ASSESSMENT RATING PROCEDURE</b>	<b>DOC No:</b>	<b>PRO 106</b>	<b>REV:</b>	<b>02</b>	<b>Page 3 of 7</b>
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Table 1: Criteria for Determining Impact Consequence

Aspect	Score	Definition
Nature	- 1	Likely to result in a negative/ detrimental impact
	+1	Likely to result in a positive/ beneficial impact
Extent	1	Activity (i.e. Highly localised, limited to the area applicable to the specific activity)
	2	Site (i.e. within the development property or site boundary, or the area within a few hundred meters of the site)
	3	Local (i.e. beyond the site boundary within the Local administrative boundary (e.g. Local Municipality) or within consistent local geographical features, or the area within 5 km of the site)
	4	Regional (i.e. Far beyond the site boundary, beyond the Local administrative boundaries within the Regional administrative boundaries (e.g. District Municipality), or extends into different distinct geographical features, or extends between 5 and 50 km from the site).
	5	Provincial / National / International (i.e. extends into numerous distinct geographical features, or extends beyond 50 km from the site).
Duration	1	Immediate (<1 year, quickly reversible)
	2	Short term (1-5 years, less than project lifespan)
	3	Medium term (6-15 years)
	4	Long term (15-65 years, the impact will cease after the operational life span of the project)
	5	Permanent (>65 years, no mitigation measure of natural process will reduce the impact after construction/ operation/ decommissioning).
Magnitude/ Intensity	1	Minor (where the impact affects the environment in such a way that natural, cultural and social functions and processes are not affected)
	2	Low (where the impact affects the environment in such a way that natural, cultural and social functions and processes are slightly affected, or affected environmental components are already degraded)
	3	Moderate (where the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; moderate improvement for +ve impacts; or where change affects area of potential conservation or other value, or use of resources).
	4	High (where natural, cultural or social functions or processes are altered to the extent that it will temporarily cease; high improvement for +ve impacts; or where change affects high conservation value areas or species of conservation concern)
	5	Very high / don't know (where natural, cultural or social functions or processes are altered to the extent that it will permanently cease, substantial improvement for +ve impacts; or disturbance to pristine areas of critical conservation value or critically endangered species)
Reversibility	1	Impact is reversible without any time and cost.

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	2	Impact is reversible without incurring significant time and cost.
	3	Impact is reversible only by incurring significant time and cost.
	4	Impact is reversible only by incurring very high time and cost.
	5	Irreversible Impact.

Once the C has been determined, the significance is determined in accordance with the standard risk assessment relationship by multiplying the C and the P. Probability is rated/ scored as per Table 2.

It is noted that both environmental risks as well as environmental impacts should be identified and assessed. Environmental Risk can be regarded as the potential for something harmful to happen to the environment, and in many instances is not regarded as something that is expected to occur during normal operations or events (e.g. unplanned fuel or oil spills at a construction site). Probability and likelihood are key determinants or variables of environmental risk. Environmental Impact can be regarded as the actual effect or change that happens to the environment because of an activity and is typically an effect that is expected from normal operations or events (e.g. vegetation clearance from site development results in loss of species of concern). Typically the probability of an unmitigated environmental impact is regarded as highly likely or certain (management and mitigation measures would ideally aim to reduce this likelihood where possible). In summary, environmental risk is about what could happen, while environmental impact is about what does happen.

Table 2: Probability/ Likelihood Scoring

<b>Probability</b>	1	Improbable (Rare, the event may occur only in exceptional circumstances, the possibility of the impact materialising is very low as a result of design, historic experience, or implementation of adequate corrective actions; <5% chance).
	2	Low probability (Unlikely, impact could occur but not realistically expected; >5% and <20% chance).
	3	Medium probability (Possible, the impact may occur; >20% and <50% chance).
	4	High probability (Likely, it is most probable that the impact will occur- > 50 and <90% chance).
	5	Definite (Almost certain, the impact is expected to, or will, occur, >90% chance).

The result is a qualitative representation of relative significance associated with the impact. Significance is therefore calculated as follows:

$$S = C \times P$$

Table 3: Determination of Significance

<b>Consequence</b>	5- Very High <sup>1</sup>	5	10	15	20	25
	4- High	4	8	12	16	20
	3- Medium	3	6	9	12	15
	2- Low	2	4	6	8	10
	1- Very low	1	2	3	4	5

<sup>1</sup> In the event that an impact or risk has very high or catastrophic consequences, but the likelihood/ probability is low, then the resultant significance would be Low-medium. This does in certain instances detract from the relative important of this impact or risk and must consequently be flagged for further specific consideration, management, mitigation, or contingency planning.

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		1- Improbable	2- Low	3- Medium/ Possible	4- High/ Probable	5- Highly likely/ Definite
	Probability					

The outcome of the significance assessment will result in a range of scores, ranging from 1 through to 25. These significance scores are then grouped into respective classes as described in Table 4.

Table 4: Significance Scores

S Score	Description
≤4.25	Low (i.e. where this impact is unlikely to be a significant environmental risk/ reward).
>4.25, ≤8.5	Low-Medium (i.e. where the impact could have a significant environmental risk/ reward).
>8.5, ≤13.75	High-Medium (i.e. where the impact could have a significant environmental risk/ reward).
>13.75	High (i.e. where the impact will have a significant environmental risk/ reward).

The impact significance will be determined for each impact without relevant management and mitigation measures (pre-mitigation significance), as well as post implementation of relevant management and mitigation measures (post-mitigation significance). This allows for a prediction in the degree to which the impact can be managed/mitigated.

#### b. Impact Prioritization

Further to the assessment criteria presented in the section above, it is necessary to consider each potentially significant impact in terms of:

1. Cumulative impacts; and
2. The degree to which the impact may cause irreplaceable loss of resources.

To ensure that these factors are considered, an impact prioritisation factor (PF) will be applied to each impacts' post-mitigation significance (post-mitigation). This prioritisation factor does not aim to detract from the significance ratings but rather to focus the attention of the decision-making authority on the higher priority/significance issues and impacts. The PF will be applied to the post-mitigation significance based on the assumption that relevant suggested management/mitigation impacts are implemented.

Table 5: Criteria for Determining Prioritisation

<b>Cumulative Impact (CI)</b>	Low (1)	Considering the potential incremental, interactive, sequential, and synergistic cumulative impacts, it is unlikely that the impact will result in spatial and temporal cumulative change.
	Medium (2)	Considering the potential incremental, interactive, sequential, and synergistic cumulative impacts, it is probable that the impact will result in spatial and temporal cumulative change.
	High (3)	Considering the potential incremental, interactive, sequential, and synergistic cumulative impacts, it is highly probable/ definite that the impact will result in spatial and temporal cumulative change.
	Low (1)	Where the impact is unlikely to result in irreplaceable loss of resources.

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<b>Irreplaceable Loss of Resources (LR)</b>	Medium (2)	Where the impact may result in the irreplaceable loss (cannot be replaced or substituted) of resources but the value (services and/or functions) of these resources is limited.
	High (3)	Where the impact may result in the irreplaceable loss of resources of high value (services and/or functions).

The value for the final impact priority is represented as a single consolidated priority, determined as the sum of each individual criteria represented in Table 5. The impact priority is therefore determined as follows:

$$\text{Priority} = CI + LR$$

The result is a priority score which ranges from 2 to 6 and a consequent PF ranging from 1 to 1.5 (Refer to Table 6).

Table 6: Determination of Prioritisation Factor

Priority	Prioritisation Factor
2	1
3	1.125
4	1.25
5	1.375
6	1.5

In order to determine the final impact significance (F5), the PF is multiplied by the post-mitigation significance scoring. The ultimate aim of the PF is an attempt to increase the post mitigation environmental risk rating by a factor of 0.5, if all the priority attributes are high (i.e. if an impact comes out with a high medium environmental risk after the conventional impact rating, but there is significant cumulative impact potential and significant potential for irreplaceable loss of resources, then the net result would be to upscale the impact to a higher significance).

Table 7: Final Environmental Significance Rating

Significance Rating	Description
<-25	<b>Very High (Impacts in this class are extremely significant and pose a very high environmental risk. In certain instances these may represent a fatal flaw. They are likely to have a major influence on the decision and may be difficult or impossible to mitigate. Offset's may be necessary.</b>
<-13.75 to -25	High negative (These impacts are significant and must be carefully considered in the decision-making process. They have a high environmental risk or impact and require extensive mitigation measures).
-8.5 to -13.75	Medium-High negative (i.e. Impacts in this class are more substantial and could have a significant environmental risk. They may influence the decision to develop in the area and require more robust mitigation measures).
<-4.25 to <-8.5	Medium- Low negative (i.e. These impacts are slightly more significant than low impacts but still do not pose a major environmental risk. They might require some mitigation measures but are generally manageable).

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<b>Significance Rating</b>	<b>Description</b>
-1 to -4.25	Low negative (i.e. Impacts in this class are minor and unlikely to have a significant environmental risk. They do not influence the decision to develop in the area and are typically easily mitigated.
0	No impact
1 to 4.25	Low positive
>4.25 to <8.5	Medium-Low positive
8.5 to 13.75	Medium-High positive
>13.75	High positive

The significance ratings and additional considerations applied to each impact will be used to provide a quantitative comparative assessment of the alternatives being considered. In addition, professional expertise and opinion of the specialists and the environmental consultants will be applied to provide a qualitative comparison of the alternatives under consideration. This process will identify the best alternative for the proposed project.

#### 7. Responsibilities

It is the responsibility of each EIMS employee, and each external Specialist appointed by EIMS to ensure that this procedure is carried out as described. All the personnel within the organization have the responsibility to report any deviations/changes from the procedures to management. This is to ensure that the necessary changes are documented after approval.

It is the responsibility of the consultant (as applicable) assigned with the task of report compilation to ensure that this methodology/ procedure is strictly applied. It is the responsibility of the assigned Consultant or Quality Reviewer to review and verify that the procedure has been complied with, and such documented at the specified quality check intervals.

#### 8. Records

<b>RECORD</b>	<b>STORAGE LOCATION</b>	<b>STORAGE SYSTEM</b>	<b>RESPONSIBLE PERSON</b>	<b>RETENTION PERIOD</b>
Significance Rating Input Spreadsheet	Project File - /Server/assignments/ Job#/Records	Electronic- Scanned PDF	Project Manager	10 Years

#### 9. Record of Changes, Revisions and Cancellations

<b>RECORD OF CHANGES, REVISIONS AND CANCELLATIONS</b>		
<b>DATE</b>	<b>NATURE / DETAIL OF CHANGE</b>	<b>REV No.</b>
3/12/2024	Update impact criteria descriptions.	01
29/01/2025	Corrections to Significance class numbering	02