Ummbila Emoyeni Renewable Energy Farm (Pty) Ltd

PROPOSED UMMBILA EMOYENI RENEWABLE ENERGY FARM – GRID CONNECTION FACILITY, MPUMALANGA PROVINCE

LANDSCAPE & VISUAL IMPACT ASSESSMENT REPORT

October 2022

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1 INTRODUCTION

1.1 GENERAL

This Landscape and Visual Impact Assessment (LVIA) study forms part of the Basic Assessment process that is being undertaken for the Grid Connection Infrastructure for the proposed Ummbila Emoyeni Renewable Energy Farm by Savannah Environmental (Pty) Ltd on behalf of Emoyeni Renewable Energy Farm (Pty) Ltd.

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

This LVIA Report has been prepared for inclusion in the project Basic Assessment Report.

1.2 PROJECT LOCATION

Emoyeni Renewable Energy Farm (Pty) Ltd is proposing the development of a Renewable Energy Farm on a site located ~6km south-east of Bethal and 1km east of Morgenzon, within the Mpumalanga Province. The project site is located across the Govan Mbeki, Lekwa, and Msukaligwa Local Municipalities within the Gert Sibande District.

This project is planned as part of a larger cluster of renewable energy projects (to be known as the Ummbila Emoyeni Renewable Energy Farm), which include one 666MW Wind Energy Facility, one 150MW Solar Energy Facility, and a grid connection solution for both facilities.

The approximate geographic coordinates of the centre of the proposed Renewable Energy Project Focus Area (Site Area) are;

South	26^0	32′	23.42″
East	29^0	33′	48.47″

The Project Focus Area over which the Ummbila Emoyeni Renewable Energy Farm as proposed comprises the following farm portions:

Parent Farm Number	Farm Portions
Farm 261 – Naudesfontein	15, 21
Farm 264 – Geluksplaats	0, 1, 3, 4, 5, 6, 8, 9, 11, 12
Farm 268 – Brak Fontein Settlement	6,7,10,11,12
Farm 420 – Rietfontein	8,9,10,11,12,15,16,18,19,22,32
Farm 421 - Sukkelaar	2, 2, 7, 9, 9 10, 10 11, 11 12, 12 22 ,25, 34, 35, 36, 37, 37, 38, 39, 40, 42, 42
Farm 422 – Klipfontein	0, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 13, 14, 16, 17, 18, 19, 20, 21, 22, 23
Farm 423 – Bekkerust	0, 1, 2, 4, 5, 6, 10, 11, 12, 13 14, 15, 17, 19, 20, 22, 23, 2425
Farm 452 – Brakfontein	5
Farm 454 – Oshoek	4, 13, 18

Farm 455 – Ebenhaezer	0, 1, 2, 3
Farm 456 – Vaalbank	1, 2, 3, 4, 7, 8, 13, 15, 16, 17, 18, 19
Farm 457 – Roodekrans	0, 1, 4, 7, 22, 23, 23
Farm 458 – Goedgedacht	0, 2, 4, 4, 5, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 21, 21, 22, 25, 26, 27, 28, 29, 31, 32, 33, 34, 35, 37, 39
Farm 467 – Twee Fontein	0, 1, 4, 5, 6, 7, 8, 10
Farm 469 – Klipkraal	5, 6, 7, 8
Farm 548 – Durabel	0

(Map 1: Site Layout).

1.3 BACKGROUND OF SPECIALIST

Jon Marshall (Pr. LArch, CMLI, Dip LA) qualified as a Landscape Architect in 1978. He has been a Chartered Member of the Landscape Institute (UK) since 1986. He is also a registered Landscape Architect 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.

LVIA work will be 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 t and surrounding landscape, and

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

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

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

The required specialist report has also be undertaken in accordance with Appendix 6 of the EIA Regulations, as amended (GN No. 326 of 7 April 2017).

From reference to the Western Cape Guideline, a Level 3 Assessment was considered appropriate which includes the following input:

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

1.5 LIMITATIONS AND ASSUMPTIONS

The following limitations and assumptions should be noted:

A site visit was undertaken over a two day period (8th and 9th June 2022).

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

GIS data sets used in the assessment are either available on line to the public or have been sourced from relevant government departments.

Photographs were taken with a Canon EOS M50 camera fitted with a 22mm lens.

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

DATA SET	SOURCE	YEAR
South Africa Protected Areas Database (SAPAD)	Department of Environmental Affairs	2021
SRTM Worldwide Elevation Data	CIAT-CCAFS	2018
World Imagery	ESRI	2009 (updated 2021)
Renewable Energy EIA Applications	Department of Environmental Affairs	February 2021
REDZ Database	Department of Environmental Affairs	2016 and 2020
SA NLC (National Land Cover)	Department of Environmental Affairs	2018
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
Mpumalanga Cadastral	Chief Surveyor-General, Department of Rural Development and Land Reform	August 2021 (last updated)

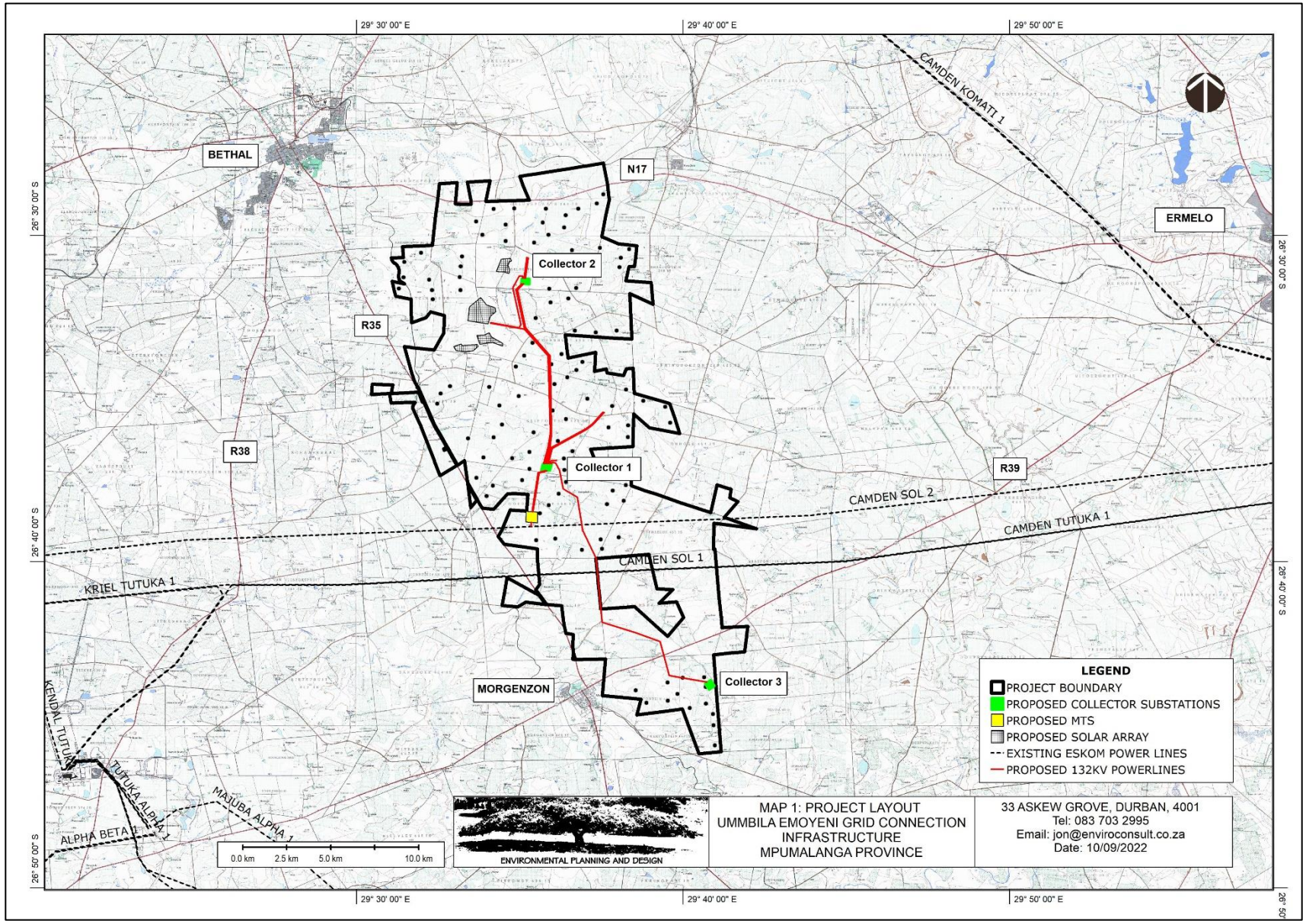
Update of vegm2009	South African National Biodiversity Institute	2015
South Africa /Lesotho Roads	Open Street Map	2014

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

The majority of data sets have been used for assessment context. This has largely been sourced from government departments. Whilst this has been mainly mapped at national scale it was found to be largely sufficient to provide context for the assessments. Where additional detail was required, such as the location of local roads and homesteads, this was mapped on site and / or captured from online mapping.

The visibility assessments were based on terrain data that has been derived from satellite imagery (STRM Worldwide Elevation Data). 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. This is the key data on which the definition of possible affected landscapes and receptors was based and is considered sufficient for this purpose.

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.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BETHAL
N17
ERMELO
CAMDEN KOMATI 1
Collector 2
R35
R38
Collector 1
R39
CAMDEN SOL 2
CAMDEN TUTUKA 1
CAMDEN SOL 1
KRIEL TUTUKA 1
MORGENZON
Collector 3
KENDAL TUTUKA 1
TUTUKA ALPHA 1
MAJUBA ALPHA 1
ALPHA BETA 1
0.0 km 2.5 km 5.0 km 10.0 km
LEGEND
PROJECT BOUNDARY
PROPOSED COLLECTOR SUBSTATIONS
PROPOSED MTS
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ENVIRONMENTAL PLANNING AND DESIGN
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UMMBILA EMOYENI GRID CONNECTION INFRASTRUCTURE
MPUMALANGA PROVINCE
33 ASKEW GROVE, DURBAN, 4001
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Email: jon@enviroconsult.co.za
Date: 10/09/2022

2. PROJECT DESCRIPTION

2.1 PROJECT MOTIVATION AND CONTEXT

The supply of electricity in South Africa has recently become constrained, primarily because of insufficient generation capacity, but also due to constraints on the transmission and distribution of electricity. This situation and its repercussions (load shedding and tariff increase) threaten economic development of the country.

The proposed project is necessary to connect the Wind Energy Facilities and the Solar Energy Faciities within the Ummbila Emoyeni Renewable Energy Farm into the National Grid.

2.2 PROJECT DESCRIPTION

Refer to Map1 for the proposed project layout.

The following infrastructure is proposed:

Infrastructure	Footprint and dimensions
Onsite substations	» Development footprint: 3 IPP collector substations of 5ha each (Assessed as part of WEF and SEF projects) » Capacity: 33kV/132kV
132kV power lines	» Servitude width: 18m » Height: up to 40m » Length: To be determined in EIA Phase » Corridor width for assessment in EIA: 300m
Main Transmission Substation	» Development footprint: 600m x 600m » Capacity: 400/132kV » Height: Up to 30m
Power line connection to national grid	» Capacity and circuit: 400kV loop-in loop-out » Servitude: 55m per line » Height: Up to 40m » Corridor width for assessment in EIA: 300m
Height of the power line towers (pylons)	40m
Access and internal roads	Access will likely be via the main road between Bethal and Morgenzon. This is the R35, a tarred and provincial road. Existing roads on the affected properties will be used where feasible and practical to provide direct access to the EGI. Where necessary, new access roads (up to 12 wide) will be established to provide access to the Main Transmission Substation (MTS). During construction, a permanent access road along the length of the power line corridor (300m wide) between 4 - 6m wide will be established to allow for large crane movement. This track will then be utilised for maintenance during operation.

Temporary infrastructure	Temporary infrastructure, including laydown areas and a concrete batching plant, will be required during the construction phase. All temporary infrastructure will be rehabilitated following the completion of the construction phase, where it is not required for the operation phase.

3 DESCRIPTION OF RECEIVING ENVIRONMENT AND POSSIBLE RECEPTORS

3.1 THE STUDY AREA

The study area is comprised of the area over which the proposed development may be visible. The Approximate Limit of Visibility (ALV) is generally dictated by the curvature of the earth. In order to provide an indication of this, a universally accepted navigational calculation (**Appendix III**) has been used to calculate the likely distance that the proposed structures might be visible over.

Being the tallest elements, the power line towers are theoretically the most visible elements These structures standing at up to 40m high could be visible for up to 22.6km. This distance has therefore been used as the ALV.

In reality these distances will be reduced by:

- Landform, vegetation and other structures that may screen views;
- Weather conditions that limit visibility. This could include hazy conditions during fine weather as well as mist and rain;
- Scale and colour of individual elements making it difficult to differentiate structures from the background; and
- The fact that as the viewer gets further away, the apparent height of visible elements reduces. At the limit of visibility it will only be possible that the very tip of an object may be visible. This reducing scale means that an object will become increasingly more difficult to see as the distance from it increase.

3.2 LANDSCAPE CHARACTER

Defining the character of the landscape is the first step in understanding the landscape and visual implications of the proposed development.

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

Landscape character has been defined from the author's knowledge of the area and from reference to available online mapping and aerial photography. The key character components have been identified but they will be subject to verification and a more detailed assessment.

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

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

3.2.1 Landform and Drainage

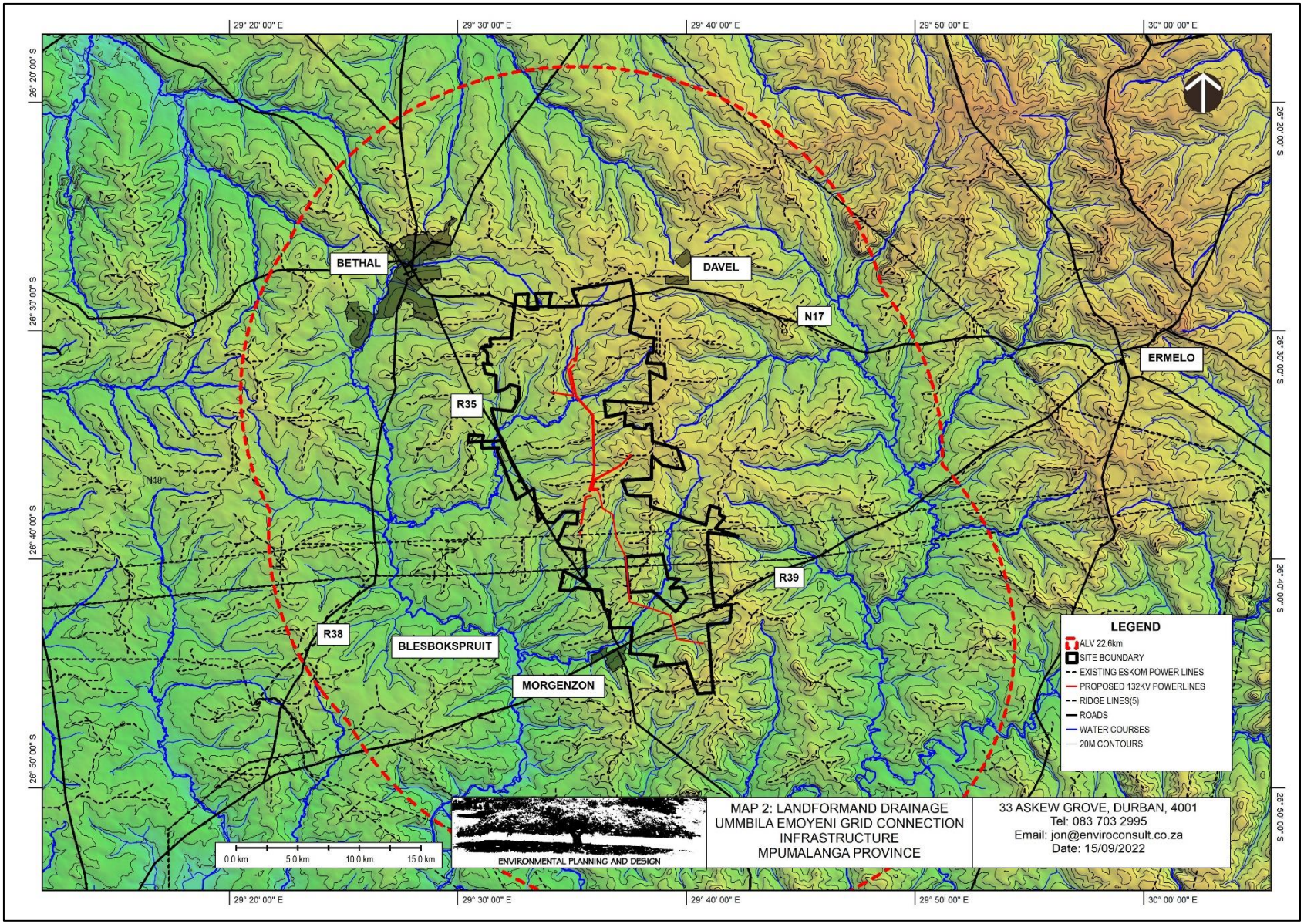
The general landform is undulating and is comprised of a series of similar size rounded ridgelines that extend approximately 20-30m above broad valley lines.

The proposed focus area is located across a series of valley and ridgelines that run in a general east to west direction. The valley lines all feed into the Bleboksprui which flows in a north to south direction approximately 8.5km to the west of the proposed site.

The Blesbokspruit flows into the Vaal River approximately 15km to the south-west of the site.

The landform described above is only likely to screen the proposed development when the viewer is within a minor valley. As a viewer rises up the valley side, views of the proposed development are likely to become possible. The landform described may have greatest screening capacity to the north and south and mean that the proposed project may be more widely visible to the east and west.

Refer to Map 2, Landform and Drainage.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SITE BOUNDARY
EXISTING ESKOM POWER LINES
PROPOSED 132KV POWERLINES
RIDGE LINES(5)
ROADS
WATER COURSES
20M CONTOURS
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5.0 km
10.0 km
15.0 km
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3.2.2 Nature of Development and Land Cover

Land cover can broadly be divided into four main categories, including:

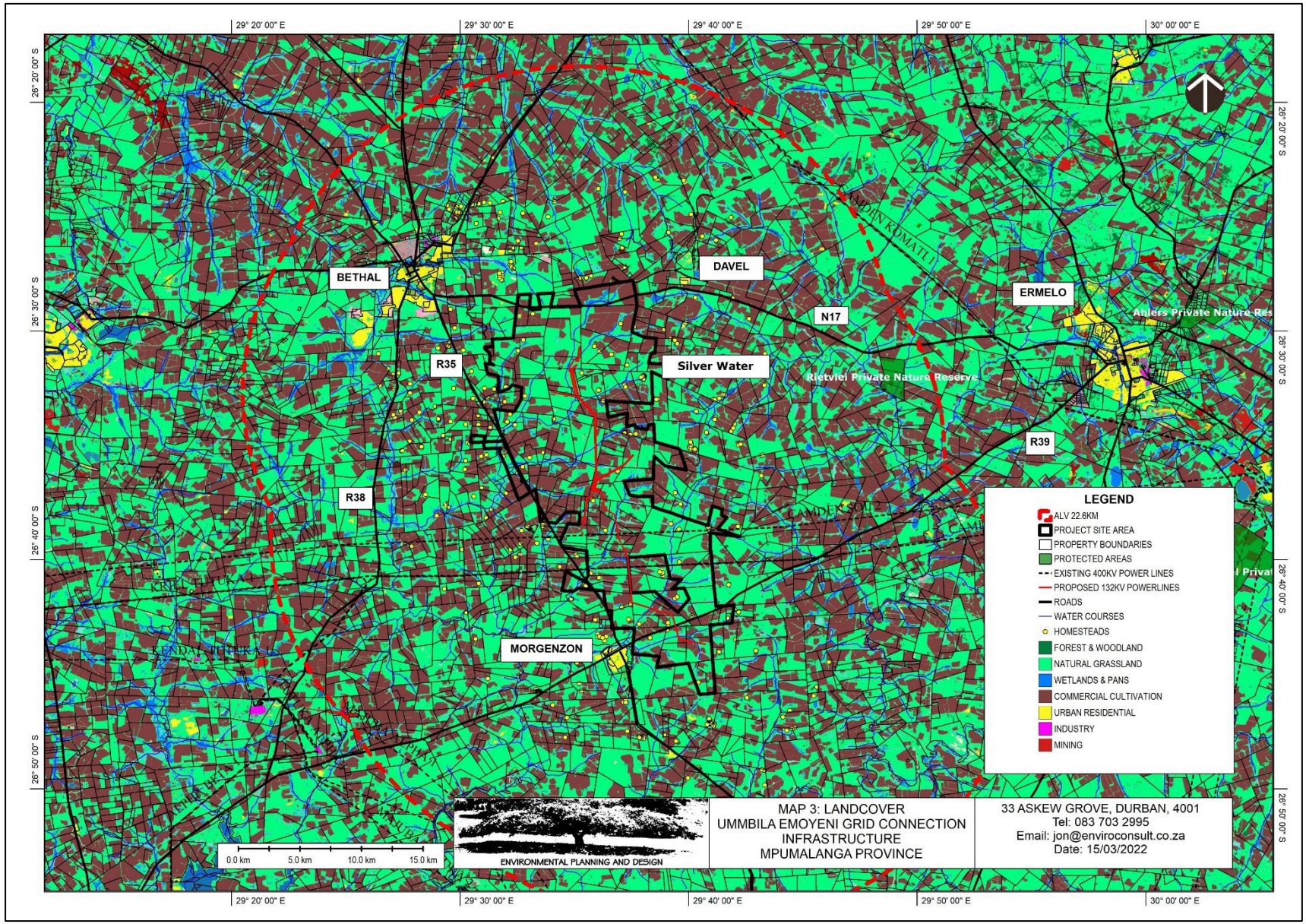
- Natural Grassland which is interspersed with areas of cultivation but is largely uninterrupted by cultivation;
- Arable agriculture / cultivation which in interspersed within the natural grassland matrix. Main crop types include sunflower seed production, sorghum, rye and potatoes;
- Settlement that occurs in the form of isolated homesteads throughout the study area that are generally related to agricultural uses. There is a tourism related establishment (Silver Water Game Lodge) located within the north-eastern section of the proposed site. This facility is focused around a dam.
- Settlement in the form of towns and villages is limited. The closest settlements include:
    - Morgenzon which is a small town on the R39 less than 1km to the west of the proposed focus area. Residential areas of the town are located on the eastern side facing towards the proposed site. Also on the eastern side of the settlement is a land fill site as well as industrial operations;
    - Bethal which is also a small town is located on the N17 approximately 6.2km to the north west of the proposed focus area. Residential areas are located on the eastern side of the town facing towards the proposed site; and
    - Ermelo which 1s located approximately 32km to the east of the proposed focus area. This settlement is the district centre of the Sibande District.

Local roads in the area include:

- The N17 which is a major national distributor route linking Springs and areas to the west through Bethal and Ermelo to Eswatini in the east. This is a busy road that carries business, tourism and local traffic. The road runs through the northern section of the proposed focus area;
- The R35 which links Bethal and areas to the north with Morgenzon and the R39 to the south. This regional distributor runs close to and through western sections of the proposed focus area;
- The R38 which links Bethal with the R39 and Standerton to the south west; and
- The R39 which links Errmelo, Morgenzon and Standerton to the south. This road runs through the southern section of the proposed focus area.

All of these roads are busy national / regional distributors that are likely to carry a full range of traffic types including tourism related traffic. However, it needs to be stated that tourism related traffic is most likely to be using these routes as a means to travelling to more distant attractions. It is unlikely that much of this traffic will view travelling through this area as a tourism experience.

Electrical infrastructure is relatively common in the area including low voltage, medium and high voltage lines running through the development area and in close proximity to roads.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PROPERTY BOUNDARIES
PROTECTED AREAS
EXISTING 400KV POWER LINES
PROPOSED 132KV POWERLINES
ROADS
WATER COURSES
HOMESTEADS
FOREST & WOODLAND
NATURAL GRASSLAND
WETLANDS & PANS
COMMERCIAL CULTIVATION
URBAN RESIDENTIAL
INDUSTRY
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0.0 km
5.0 km
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Other land cover includes heavy industry including mining operations and electricity generation. However, these uses are generally located some distance from the proposed focus area. These industrial uses are generally large, isolated, individual industrial operations within the surrounding rural landscape.

Major high voltage overhead power lines cross the proposed project area including:

- The Camden Sol 2 400kV power line; and
- The Camden Tutuka 400kV power line

The Rietvlei Private Nature Reserve, that is located approximately 15.7km lo the east of the proposed site. It is This protected area that is comprised largely of open grassland. It is located mainly within a shallow valley. During clear conditions, views of the proposed turbines are likely to be visible from higher sections of the western slope.

There are a number of other protected areas within the ALV including:

- The Ahlers Private Nature Reserve which is located approximately 40km from the proposed project and to the east of Ermelo;
- The Langcarel Private Nature Reserve which is located approximately 30km to the east of the proposed project and approximately 14km south of Ermelo; and
- The Majuba Nature Reserve which is located approximately 32km to the south of the proposed project and immediately adjacent to the Majuba Cast Fired Power Station.

There are also a number of protected areas close to the ALV of the proposed project. It is highly unlikely that the project will be visible to naked eye from these areas.

It is highly unlikely that the proposed project will impact these areas.

Refer to Map 3, Landcover.

3.2.3 Vegetation Patterns

The following vegetation types are evident within the proposed study area;

a) Natural vegetation that is generally associated with natural areas indicated on Map 3 (Landcover);
b) Agricultural vegetation that is comprised of cultivated fields as indicated on Map 3 and vegetation which is largely comprised of alien trees and shrubs around homesteads and on field boundaries; and
c) Vegetation associated with settlement areas which is generally comprised of alien vegetation.

a) Natural Vegetation

Mucina and Rutherford[1] indicate that the predominant vegetation types within the vicinity of the proposed site include:

[1] The Vegetation of South Africa, Lesotho and Swaziland

- Soweto Highveld Grassland
- Amersfoort Highveld Clay Grassland
- Eastern Highveld Grassland

Whilst botanically these vegetation types are different, from a visual perspective, they are all similar, appearing as monocultures of low grasses. This helps to create an open landscape within which vegetation contributes very little towards Visual Absorption Capacity.

b) Agricultural Vegetation

Agriculture in the proposed study area is largely arable crop production including sunflower seed, sorghum, rye and potatoes.

Both Sorghum and Sun Flowers grow to approximately 1.5m. This means that views from areas planted with crops are likely to be screened as the crops reach their ultimate height but after harvesting and during the early growth stage, views are likely to be open.

Within the agricultural areas there are small patches of alien species including gum trees on field edges, along roads and around homesteads. There are also patches of woody vegetation along main drainage lines.

In visual terms therefore, agricultural areas generally contribute to an open landscape with occasional screening.

c) Vegetation Associated with Settlement Areas

This largely includes ornamental and alien shrubs and trees. Within and adjacent to settlement areas this vegetation can provide a large degree of screening.

3.2.4 Landscape Character

The affected landscape can be divided into the following general character types:

Rural Landscape Areas. This is the type of landscape that dominates the affected landscape. It is typified by relatively uniform rolling topography that is covered by a matrix of arable agriculture set in a framework natural grassland.

Due to the relatively low topography, and generally low vegetation, it is an open landscape over which long views are possible particularly when the viewer is located on the summit of a ridgeline.

Within this general pattern homesteads are located that are made obvious due to their associated alien and ornamental vegetation.

There are also stands of alien trees many of which are Eucalyptus that are largely located along property boundaries and unused agricultural land.

The rolling topography generally provides a large degree of VAC particularly for relatively low development such as the proposed project.

Urban Landscape Areas those are generally densely developed residential areas with small commercial areas. There are also small areas of industry also associated with urban

areas. VAC is generally high, with views of the surrounding landscape generally only possible from urban edges.

Industrial Landscape Areas Mpumalanga is known for its mining industry as well as other heavy industrial operations. These industries generally create their own visual presence that can over-ride surrounding characteristics. The closest large scale mining / industrial operation is Tutuka Power Station which has the New Denmark Coat Mine immediately to the north of it from which is fed coal by conveyor belt. This facility is approximately 28km from the proposed project.

Other large scale industrial operations include:

- The SASOL plant at Secunda which is approximately 32km to the west of the proposed site;
- The Sibonelo Colliery which is located approximately 30 km to the north-west of the proposed site; and
- The Sudor Coal Mine that is located approximately 20km to the north of the proposed site.

Due to distance, these activities have no apparent influence on landscape character in the vicinity of the proposed site. They may however influence people's perception of landscape character for some of the longer views particularly for the Wind Energy section of the overall project. However, they are unlikely to have any influence on the Grid Connection Infrastructure.

Within the Study Limit, the landscape character is comprised mainly of Rural Landscape Character Areas. The only exceptions to this are the settlements of Bethal and Morgonzon that are Urban Landscape Character Areas.

Plate 1, Rural Landscape Character Zone

This landscape is typified by low rolling hills and a matrix of natural grassland and arable crop production with isolated homesteads.

Plate 2, Urban Landscape Character Area

This landscape is typified by relatively dense development with street trees and garden vegetation. Buildings and vegetation largely screen external views.

Plate 3, Industrial Landscape Character Zone
Large scale industry (Tutuka Power Station) is located some distance from the proposed site and in most conditions is unlikely to be visually obvious.

3.3 VISUAL RECEPTORS

3.3.1 Definition

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

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

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

3.3.2 Identified visual receptors

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

- Area Receptors may include;
    - The towns of **Bethal and Morgenzon;** and

- The **Silver Water Reserve**.

- Point Receptors that include;
  - There are a number of **Local Farmsteads and Homesteads** located both within the site area and the surrounding landscape.

- Linear Receptors or routes through the area that include;
  - **The N17, the R35, the R38 and the R39 as well as the unsurfaced local roads that run through the study area.** All of these are used mainly by local people with little tourism / recreational importance.

Plate 4, Local Agricultural Homestead

Plate 5, Local Farm Workers Homestead

Plate 6, Silver Water Private Nature Reserve

Plate 7, Urban Edge of Bethal looking towards the proposed site

Plate 8, Local Roads including main roads such as the N17

Plate 9, Local Roads including unsurfaced roads such as this access road to Silver Waters Private Nature Reserve

3.4 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.

SIGNIFICANCE	LCA	RECEPTORS
Low	Areas not recognised as having specific landscape value. **The Urban and the Industrial LCAs;**	Viewers' attention not focused on landscape. These include: • **Residents of urban areas**
Medium	Landscape value is recognised locally, but is not protected; the landscape is relatively intact, with a distinctive character; and the landscape is reasonably tolerant of change. These areas include: • **The Rural Landscape LCA.**	Viewers' attention may be focused on landscape. These include: • **Homesteads; and** • **Users of main and unsurfaced roads.**

SIGNIFICANCE	LCA	RECEPTORS
High	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. **There are no character areas with a high significance.**	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. These include: • **Visitors to the Silver Water Nature Reserve.**

4 SITE SENSITIVITY

4.1 GENERAL

This site sensitivity analysis and development guidelines were compiled at the initial stage of the assessment in order to inform the scoping stage as well as the site layout.

4.2 DEVELOPMENT GUIDELINES

The elements associated with the proposed grid connection are to a degree subject to the locations of the proposed renewable energy projects.

A key consideration is the location of the proposed MTS relative to the renewable energy projects and the connection point on the existing 400kV overhead power line. The closer that it is located to the connection point the shorter the necessary additional 400kV loop in / loop out overhead power line is likely to be.

Whilst this could mean that necessary overhead power line connections between the renewable energy projects and the MTS may be longer, these are likely to be lower power lines with significantly lower impacts.

At this early stage therefore a key consideration form minimising landscape and visual impacts is to locate the MTS as close to the existing 400kV overhead power line as possible as this is likely to minimise the extent of largest elements associated with the proposed grid connection that are likely to result in the largest impacts. It will also ensure that the impacts associated with these elements are most likely to impact areas that are currently affected by views of the existing 400kV overhead power line which is likely to help safeguard other areas of the landscape that are currently unaffected.

If the necessary overhead power lines and MTS were to be located in a manner that prevented them being visible to stakeholders, the entire focus area would be indicated as being highly sensitive. This wouldn't provide guidance of any value.

It also needs to be borne in mind that the overhead power lines and the MTS are likely to be visible to differing extents and distances.

The directly affected landscape is neither protected nor is it rare so from a landscape perspective there are no no-go areas.

The sensitivity rationale that has been used is indicated in the descriptions of each area, it relates to:

- Protection of natural features; and
- Guiding development away from areas of the site that would make it most obvious to surrounding sensitive receptors.

Highly Sensitivity Areas include:

- Areas immediately surrounding settlement and homesteads development of which is likely to significantly change the character of views for residents. A 1000m buffer is proposed which should be sufficient to ensure that development does not totally

dominate views. It is possible that receptors (owners /residents) have no concern regarding the development of these areas, in which case the sensitivity rating will reduce;

- Areas on and immediately beside ridgelines as the development of these areas is likely to be more visible to surrounding areas including protected areas. A 1000m buffer is proposed; and
- Corridors beside the main roads that could be affected including the N2, the R35, the R 38 and the R39. This is deemed sensitive because development in this corridor is likely to be highly obvious to people travelling along the roads the proposed 1000m corridor should be sufficient to ensure that development does not totally dominate views.

Medium Sensitivity Areas include:

- Watercourses and a buffer of 250m either side of watercourses. These areas are proposed in order to protect these natural features within the proposed focus area.

Low Sensitivity Areas include:

- Valley side slopes the development of which is likely to make the project least obvious from surrounding areas. The fact that development may be focused on areas with relatively low sensitivity does not preclude the necessity for mitigation.

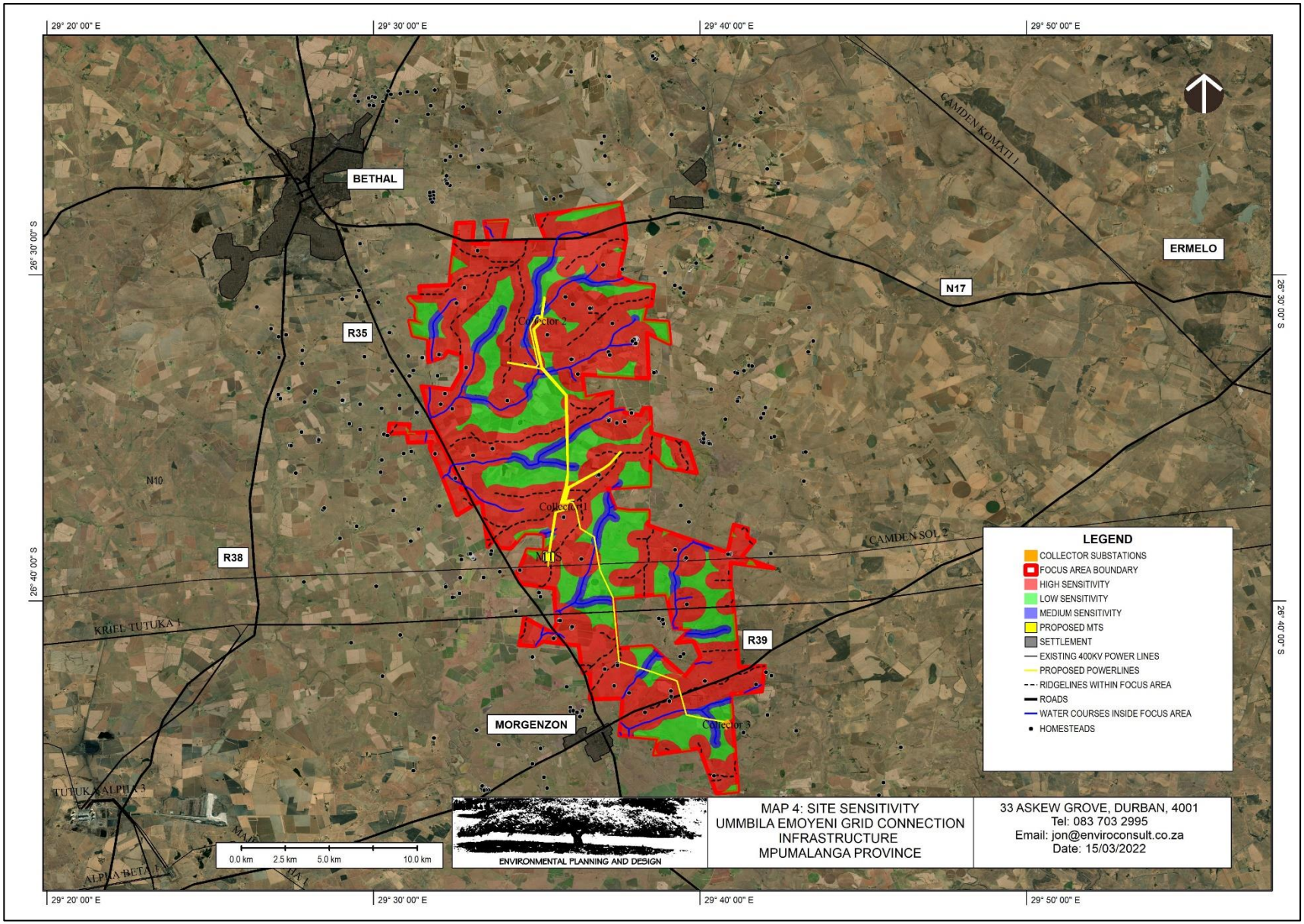
4.3 REVIEW OF DEVELOPMENT LAYOUT

Map 4 indicates the sensitivity analysis overlaid with the development proposals.

It is noted that the MTS and the larger power lines have been located as close to the connection point with the existing Eskom 400kV overhead power line as possible. As indicated above this is critical in helping to minimise the extent of larger power lines.

It is also obvious that this has resulted in the MTS being located on a ridgeline but this is a necessity given the relative location of the Eskom Line.

Due to the location of the MTS, only smaller 132kV powerlines are likely to cross the majority of ridgelines and impact on local receptors.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26° 30' 00" S
26° 40' 00" S
BETHAL
ERMELO
MORGENZON
N17
R35
R38
R39
N10
CAMDEN KOMATI 1
CAMDEN SOL 2
KRIEL TUTUKA 1
TUTUKA ALPHA 3
ALPHA BETA 1
Collector 2
Collector 1
Collector 3
NMTS
LEGEND
COLLECTOR SUBSTATIONS
FOCUS AREA BOUNDARY
HIGH SENSITIVITY
LOW SENSITIVITY
MEDIUM SENSITIVITY
PROPOSED MTS
SETTLEMENT
EXISTING 400KV POWER LINES
PROPOSED POWERLINES
RIDGELINES WITHIN FOCUS AREA
ROADS
WATER COURSES INSIDE FOCUS AREA
HOMESTEADS
0.0 km 2.5 km 5.0 km 10.0 km
ENVIRONMENTAL PLANNING AND DESIGN
MAP 4: SITE SENSITIVITY
UMMBILA EMOYENI GRID CONNECTION INFRASTRUCTURE
MPUMALANGA PROVINCE
33 ASKEW GROVE, DURBAN, 4001
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Date: 15/03/2022

5 THE NATURE OF POTENTIAL VISUAL IMPACTS

5.1 GENERAL

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

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

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

Landscape and visual assessment can be a subjective judgement. To a large degree however, it should relate to the relative importance of the landscape and the receptors involved.

The landscape is affected by industry and particularly electrical infrastructure including, the Camden Sol and Camden Tutuka 400kV overhead transmission lines.

5.2 LIKELY VISIBILITY OF INFRASTRUCTURE

5.2.1 132kV Power Lines

The proposed power line section of the development will consist of a single circuit overhead power line with a transmitting capacity of up to 132kV. The maximum height of a 132kV power line with a height up to 40m. A 132kV power line is usually in the order of 30m high with a span between towers of up to 250m. The additional height is included in case the topography requires a taller tower.

Plate 10 is a view along the line of an existing overhead 132kV power line. This power line is similar in scale to the proposed overhead power line. The images indicate the types of impact that might be expected from the proposed project.

The relative slenderness and colouring (galvanised grey) of the power line towers has a major effect in reducing visibility to the human eye. This is likely to significantly modify the ALV of the various elements of the proposed project.

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

From this review it is obvious that whilst the theoretical distance that a 132kV power line may be visible from is 15.2km in reality and in the majority of conditions it is unlikely to be obvious at distances greater than 2-3km.

The following visual limits have been drawn from these observations:

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

b) The visual mass of the overhead power line is unlikely to be visually obvious from distances greater than 3km.

A distance of 3km from the proposed power line alignment has therefore been adopted as the **Limit of Visual Effect (LVE)**. The LVE is indicated on mapping in order to define the study area.

Plate 10 - A view along the line of a 132kV overhead power line with monopole towers

5.2.2 400kV Loop In Loop Out Power Lines

400kV loop in loop out power lines are necessary to link the MTS into the National Grid. The towers of these power lines are typically 40m high.

Plates 11 to 14 are photographs of two existing overhead power lines approximately 40m high overhead power lines, indicating the types of impact that might be expected. From these photographs the following conclusions can be drawn;

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

Whilst a 40m high power line might be theoretically visible for approximately 22.6km, due its relative transparency, this part of the assessment indicates that it is unlikely to be visually obvious in the landscape for more than 6km. In order to ensure that the assessment reflects a worst case scenario, a **Limit of Visual Effect (LVE)** of 7km has been assumed.

Plate 11 - Existing 400kV double overhead transmission lines approximately 40m high), 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.

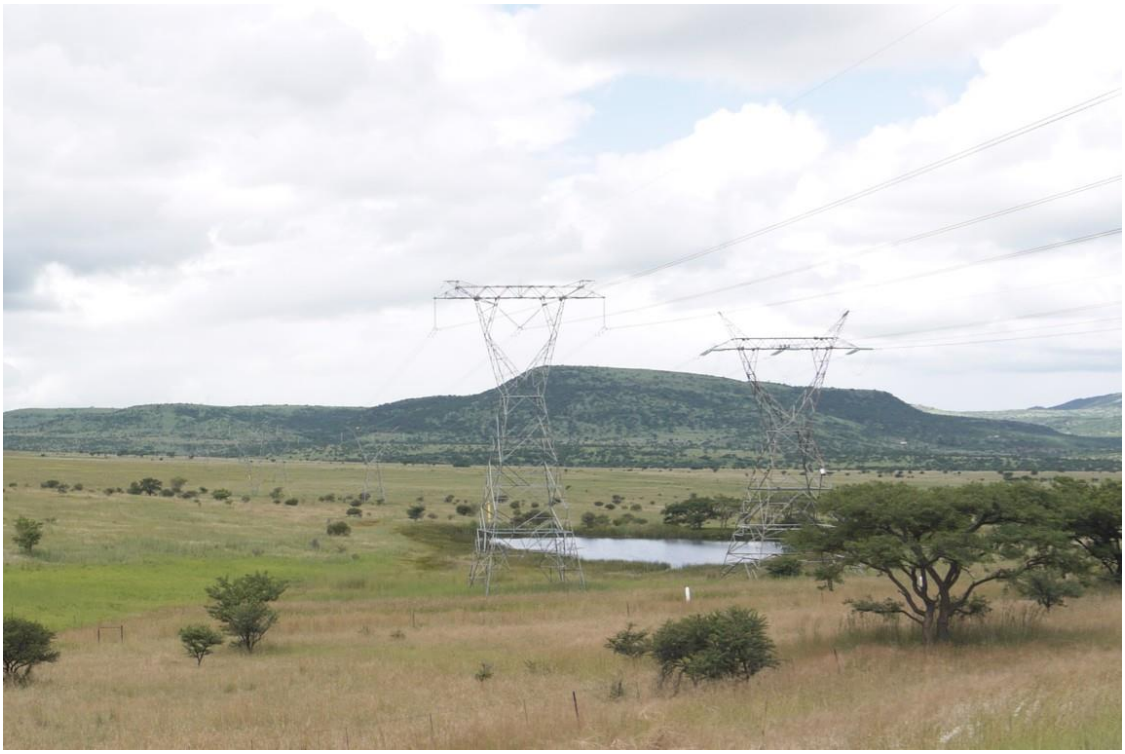


Plate 12 - Existing 400kV double overhead transmission lines approximately 40m high. Clearance of the servitude is the most obvious landscape change at a distance (approximately 5-7km)

Plate 13 - Existing approximately 40m high, double overhead transmission lines are highly obvious as they cross ridgelines viewed from short distance (approximately 1km).

Plate 14 - Existing approximately 40m high power lines, Towers are obvious in the mid distance (approximately 2-3km) but are not highly conspicuous at a distance (approximately 5-6km) as they cross the ridgeline.

5.2.3 Main Transmission Sub-station

MTS sub-stations generally take several years to construct. The majority of heavy construction work will be completed in 12 to 18 months. The remainder of the time is likely to be taken by installation of equipment and structures.

Site preparation will generally include the following activities:

- Vegetation clearance – removal or cutting of any vegetation if present (bush cutting);
- Levelling and grading of the sub-station area. This will involve the use of large earthmoving and compaction equipment;
- Civils work including the construction of concrete bases, ducting, roads and treatment of the bulk of the sub-station area which may include soil poisoning and the laying of crushed stone;
- Building work which will include the construction of minor buildings and fences.
- Installation works which include the installation and energising of electrical equipment.

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

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

Plates 15 to 18 inclusive indicate the nature of views of the various elements from close range where detail is visible and industrial nature of the steel structures is obvious.

Plate 15 - Sub-station Bus Bars maximum height 22.5m

Plate 16 – Transformer approximate height 10m

Plate 17 - Transformer showing oil reservoir and fans for cooling

Plate 18 - Sub-station & Communication Tower

From a distance, due to the transparency of a large proportion of the structures, the visual influence of a sub-station generally reduces. Plate 19 indicates a view of the existing Hector Sub-Station near Hammersdale. This indicates that from a distance of 1.5 – 2km the impact has reduced significantly. The detail of the majority of equipment is not obvious and the eye generally reads the stronger colours associated with vegetation and landform.

Other than the extent of the compound, the most obvious elements are the pylons that support conductors linking into and out of the sub-station.

The impact can therefore be generally divided into:

- The elements that combine to form the bulk of the opaque lower band of structures including the transformers, minor buildings, and fencing. These elements are up to 10m hight; and
- The lattice structures including bus bars and towers that support the power lines that enter and leave the substation which are up to 40m high as such the visibility of these elements is likely to be similar to power lines considered previously.

Plate 19, Distance view (1.5-2.0km) of the existing Hammersdale 400kV Sub Station. Note the 400kV pylons entering the site are the tallest elements

5.3 VISUAL LIMITS

Taking into account the analysis indicated and the foreshortening of visibility due to:

- Atmospheric conditions that limit visibility. This could include hazy conditions during fine weather as well as mist and rain;
- Scale and colour of individual elements making it difficult to differentiate structures from the background; and
- The fact that as the viewer gets further away, the apparent height of visible elements reduces. At the limit of visibility it will only be possible that the very tip of an object may be visible. This reducing scale means that an object will become increasing more difficult to see as the distance from it increases.

the following limits are used in this assessment:

- The Approximate Limit of Visibility meaning the approximated absolute limit to which an element may be visible; and
- The Limit of Visual Effect meaning the distance to which an element is likely to be seen as a separate element in its own right before it blends into the background or is too small to register on the human eye.

The larger and bulkier an element may be, the closer these distances are likely to be.

Approximate Visual Limits

ELEMENT	APPROXIMATE LIMIT OF VISIBILITY	LIMIT OF VISUAL EFFECT
132kV Power line, up to 30m high	19.6 kilometres	3 kilometres
40kV loop in – loop out power lines and MTS lattice structures up to 40m high	22.6 kilometres	7 kilometres
Substation lower infrastructure, up to 10m	11.3 kilometres	3 kilometres

6 VISIBILITY OF THE PROPOSED DEVELOPMENT

6.1 ZONES OF THEORETICAL VISIBILITY

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

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

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

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

6.2 APPROACH TO THE ASSESSMENT

Power line alignments and substation locations have been provided for the development. This has been used to produce the detailed ZTV mapping.

Both the ALV and the LVE of each element is indicated on the ZTV mapping in order to provide an indication of the ultimate visibility of each element and likely area within which each element may be visually obvious.

6.3 VISIBILITY OF THE PROPOSED DEVELOPMENT

Map 5 indicate the likely visibility of the proposed 132kV powerlines. This shows that whilst the power lines may be physically visible as far as the ALV to the west of the site, they are highly unlikely to be visually obvious outside the site area.

Map 6 indicate the likely visibility of the proposed lower section (10m) of the MTS powerlines. This shows that whilst it appears that the substation looks like its located on a ridgeline, it is in fact located in a shallow valley adjacent to a ridgeline. The visual effect of this is that the bulk of the substation is only visible intermittently. Apart from approximately 3km of the R39, the substation is likely to be mainly visible from inside the site area.

Map 7 indicate the likely visibility of the proposed 400kV loop in / loop out power line that connects to the existing Eskom 400kV power line as well as the higher lattice elements within the MTS. It shows that, because these elements are located close to a ridgeline, they are likely to be visible throughout the majority of the LVE. The ZTV also shows that these elements are likely to be most visible to the west.

6.4 CUMULATIVE IMPACTS

Although there are several low voltage power lines supported by wooden poles, the site area is relatively free of power lines and other electrical infrastructure.

The exception to this is the area where the Camden / Sol 2 400kV and the Camden / Tutuka 1 400kV power lines cross the site. However, due to the topography these powerlines are largely hidden from surrounding areas. They only become highly obvious as they cross ridgelines.

The proposed MTS and 400kV loop in / loop out power lines will exacerbate the impact of HV power lines in the area. However, as they are so close to the existing lines, they are unlikely to extend the existing area of impact.

The introduction of the new 132kV power lines will add to the sight of electrical infrastructure in the landscape however, this will only affect the site area. Given the possible development of renewable energy projects within the site, this is likely to be seen as in keeping with the overall development.

There is also another WEF project (Hendrina) that is proposed approximately 25km to the north of the Ummbila WEF. At the time of reporting it is understood that application documents have just been submitted to the Competent Authority for this project.

In terms of cumulative effects, this project will result in additional new grid connection infrastructure being developed.

In addition to the Hendrina project, large scale electrical infrastructure is likely to be obvious in and around the other major industrial projects in the region including Tutuka Power Station. Therefore, the proposed project could increase regional perceptions, however, because impacts are largely limited to the site area, this effect is also likely to be minimal.

Refer to Map 8, Cumulative Influences.

Plate 20, Other than several low voltage lines on wooden poles, the site landscape is largely devoid of electrical infrastructure.

Plate 20, Camden / Sol 2 and the Camden / Tutuka 1 400kV power lines crossing the site are largely hidden within valley systems.

Plate 21, Camden / Sol 2 and the Camden / Tutuka 1 400kV power lines crossing the site are highly obvious as they cross ridgelines.

29° 20' 00" E

29° 40' 00" E

30° 00'

26° 40' 00" S

BETHAL

DAVEL

N17

ERMELO

Rietvlei Private Nature Reserve

R35

R38

R39

MORGENZON

VP6

Lang

26° 40' 00" S

LEGEND

- ALV 132KV POWERLINE 19.6KM
- LVE 132KV POWEVRLINE
- PROPERTY BOUNDARIES
- PROTECTED AREAS
- SITE BOUNDARY
- ZTV 132KV POWERLINES
- PROPOSED 132KV POWERLINES
- ROADS
- HOMESTEADS WITHIN SITE AND 9KM OF SITE

0.0 km 5.0 km 10.0 km

ENVIRONMENTAL PLANNING AND DESIGN

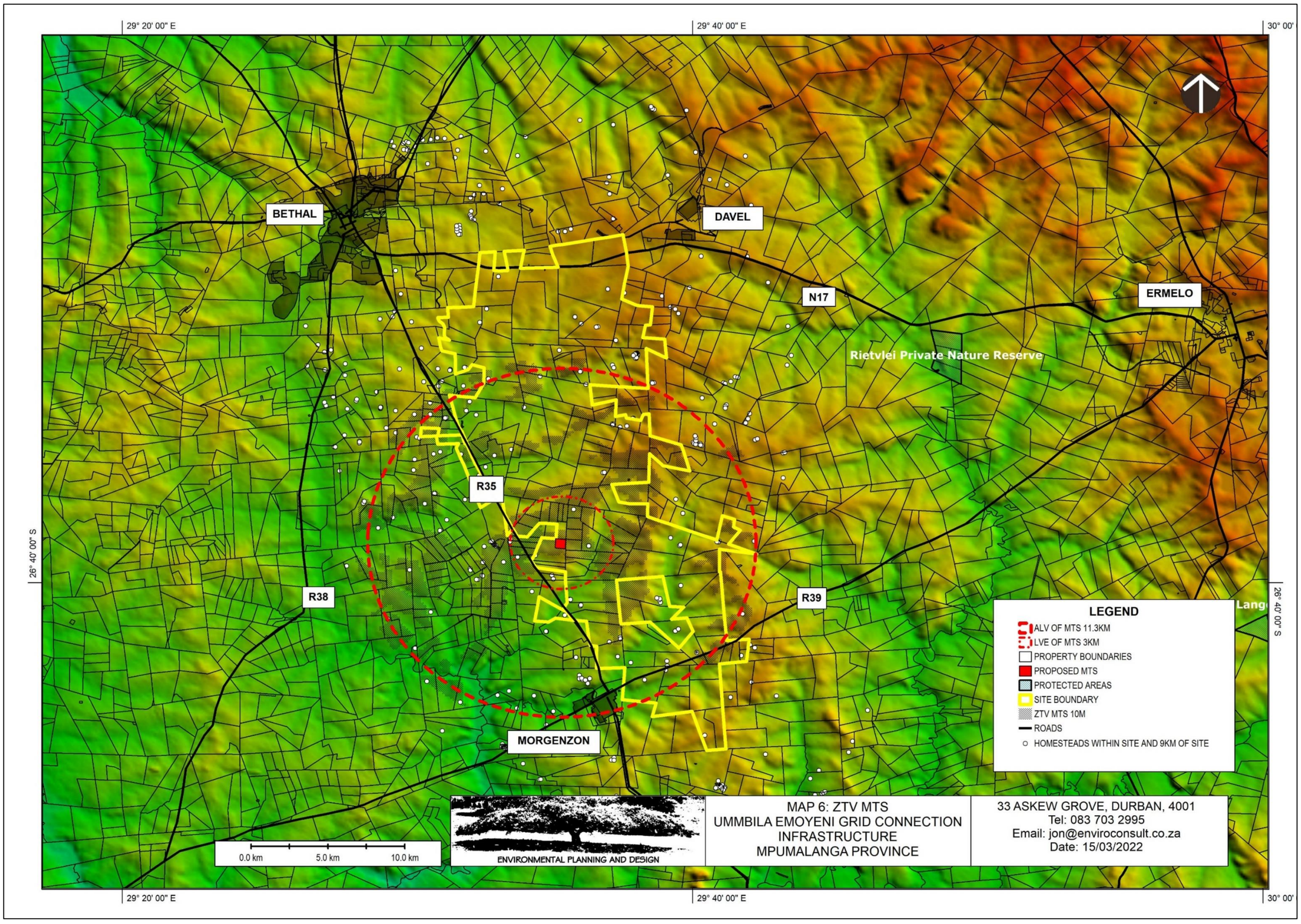
MAP 5: ZTV 132kV POWERLINES
UMMBILA EMOYENI GRID CONNECTION INFRASTRUCTURE
MPUMALANGA PROVINCE

33 ASKEW GROVE, DURBAN, 4001
Tel: 083 703 2995
Email: jon@enviroconsult.co.za
Date: 15/03/2022

29° 20' 00" E

29° 40' 00" E

30° 00'


29° 20' 00" E
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26° 40' 00" S
BETHAL
DAVEL
N17
ERMELO
Rietvlei Private Nature Reserve
R35
R38
R39
MORGENZON
LEGEND
ALV OF MTS 11.3KM
LVE OF MTS 3KM
PROPERTY BOUNDARIES
PROPOSED MTS
PROTECTED AREAS
SITE BOUNDARY
ZTV MTS 10M
ROADS
HOMESTEADS WITHIN SITE AND 9KM OF SITE
0.0 km
5.0 km
10.0 km
ENVIRONMENTAL PLANNING AND DESIGN
MAP 6: ZTV MTS
UMMBILA EMOYENI GRID CONNECTION INFRASTRUCTURE
MPUMALANGA PROVINCE
33 ASKEW GROVE, DURBAN, 4001
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Email: jon@enviroconsult.co.za
Date: 15/03/2022

29° 20' 00" E

29° 40' 00" E

30° 00'

26° 40' 00" S

BETHAL

DAVEL

ERMELO

N17

R35

R38

R39

CAMDEN KOMATI 1

CAMDEN SOL 2

CAMDEN TUTUKA 1

CAMDEN SOL 1

KRIEL TUTUKA 1

KENDAL TUTUKA 1

TUTUKA ALPHA 1

KUSUBA ALPHA 1

ALPHA BETA 1

Silver Water Lodge

Rietvlei Private Nature Reserve

MORGENZON

VP6

0.0 km 5.0 km 10.0 km

LEGEND

- ALV LILO 22.6KM
- LVE LILO 7KM
- PROPERTY BOUNDARIES
- PROPOSED MTS
- PROTECTED AREAS
- SITE BOUNDARY
- ZTV LILO AND UPPER SECTIONS OF MTS.shp
- EXISTING ESKOM POWERLINES
- LILO 400KV
- ROADS
- HOMESTEADS WITHIN SITE AND 9KM OF SITE

ENVIRONMENTAL PLANNING AND DESIGN

MAP 7: ZTV LILO & UPPER MTS
UMMBILA EMOYENI GRID CONNECTION INFRASTRUCTURE
MPUMALANGA PROVINCE

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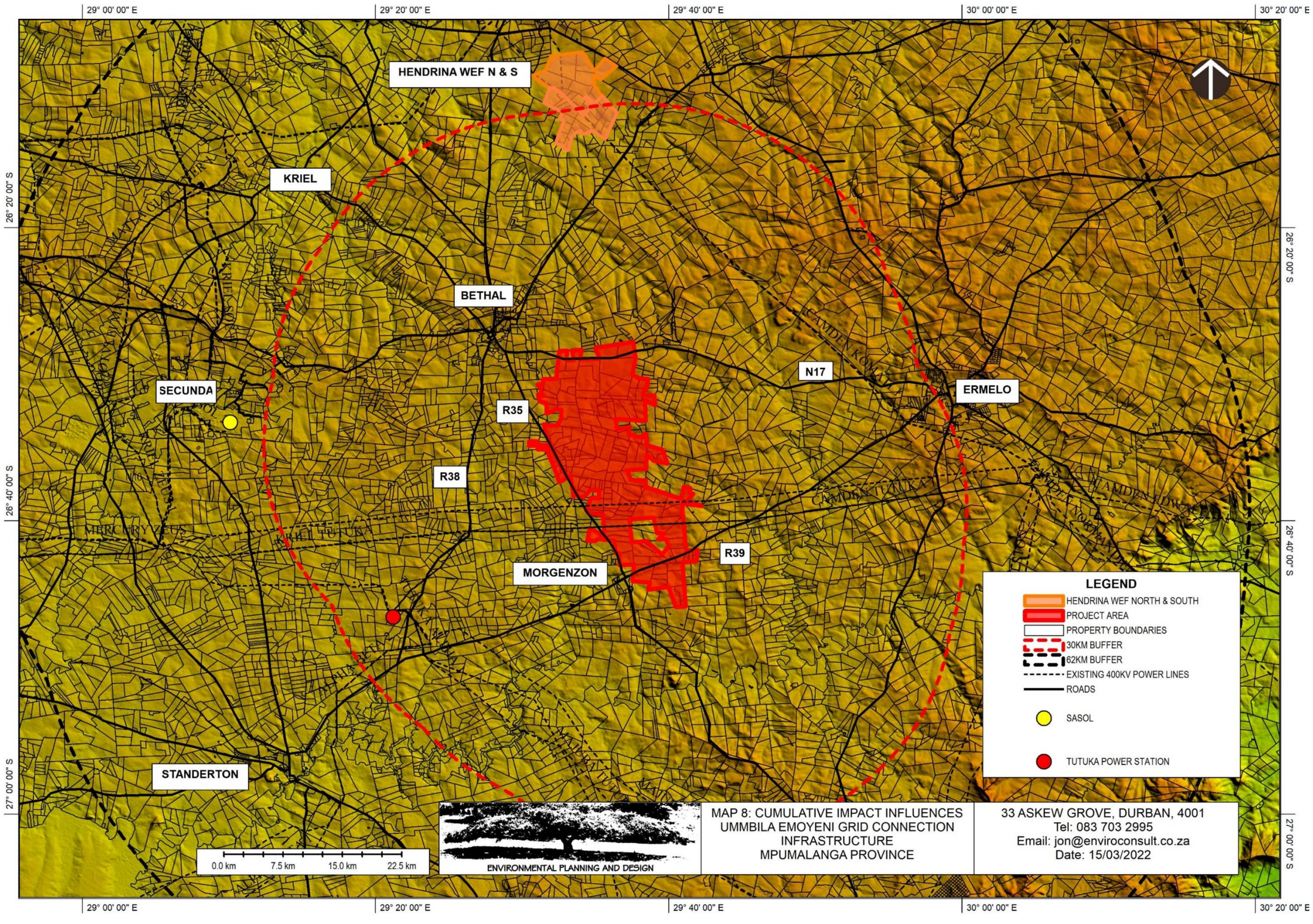
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29° 40' 00" E
30° 00' 00" E
30° 20' 00" E
26° 20' 00" S
26° 40' 00" S
27° 00' 00" S
HENDRINA WEF N & S
KRIEL
BETHAL
SECUNDA
R35
N17
ERMELO
R38
R39
MORGENZON
STANDERTON
LEGEND
HENDRINA WEF NORTH & SOUTH
PROJECT AREA
PROPERTY BOUNDARIES
30KM BUFFER
62KM BUFFER
EXISTING 400KV POWER LINES
ROADS
SASOL
TUTUKA POWER STATION
0.0 km
7.5 km
15.0 km
22.5 km
ENVIRONMENTAL PLANNING AND DESIGN
MAP 8: CUMULATIVE IMPACT INFLUENCES
UMMBILA EMOYENI GRID CONNECTION
INFRASTRUCTURE
MPUMALANGA PROVINCE
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7 VISUAL IMPACT ASSESSMENT

The previous section of the report identified specific areas where visual impacts may occur as well as their likely nature. This section will attempt to quantify these potential visual impacts in their respective geographical locations and in terms of the identified issues.

7.1 ISSUES TO BE ADDRESSED

Landscape and visual issues identified include:

a) Potential change to the rural landscape;
b) Potential visual impacts as experienced by visitors to the Silver Stream Reserve;
c) Potential visual impacts as experienced by users of adjacent local roads particularly users of the N17, the R35, the R38 and the R39;
d) Potential visual impacts as experienced by residents of homesteads in close proximity;
e) Potential visual impacts as experienced by residents of local settlements particularly residents on the south-eastern edge of Bethal and the north western edge of Morgenzon; and
f) Potential lighting impacts;

7.2 ASSESSMENT METHODOLOGY

The methodology for the assessment of potential visual impacts includes:

- The **nature**, which shall include a description of what causes the effect, what will be affected and how it will be affected.
- The **extent**, wherein it will be indicated whether the impact will be local (limited to the immediate area or site of development) or regional:
    - local extending only as far as the development site area – assigned a score of 1;
    - limited to the site and its immediate surroundings (up to 10 km) – assigned a score of 2;
    - will have an impact on the region – assigned a score of 3;
    - will have an impact on a national scale – assigned a score of 4; or
    - will have an impact across international borders – assigned a score of 5.
- The **duration**, wherein it will be indicated whether:
    - the lifetime of the impact will be of a very short duration (0–1 years) – assigned a score of 1;
    - the lifetime of the impact will be of a short duration (2-5 years) - assigned a score of 2;
    - medium-term (5–15 years) – assigned a score of 3;
    - long term (> 15 years) - assigned a score of 4; or
    - permanent - assigned a score of 5.
- The **magnitude**, quantified on a scale from 0-10, where a score is assigned:
    - 0 is small and will have no effect on the environment;
    - 2 is minor and will not result in an impact on processes;
    - 4 is low and will cause a slight impact on processes;

    - 6 is moderate and will result in processes continuing but in a modified way;
    - 8 is high (processes are altered to the extent that they temporarily cease); and
    - 10 is very high and results in complete destruction of patterns and permanent cessation of processes.
- The **probability** *of occurrence*, which shall describe the likelihood of the impact actually occurring. Probability will be estimated on a scale, and a score assigned:
    - Assigned a score of 1–5, where 1 is very improbable (probably will not happen);
    - Assigned a score of 2 is improbable (some possibility, but low likelihood);
    - Assigned a score of 3 is probable (distinct possibility);
    - Assigned a score of 4 is highly probable (most likely); and
    - Assigned a score of 5 is definite (impact will occur regardless of any prevention measures).
- The **significance**, which shall be determined through a synthesis of the characteristics described above (refer formula below) and can be assessed as low, medium or high.
- The **status**, which will be described as either positive, negative or neutral.
- The degree to which the impact can be reversed.
- The degree to which the impact may cause irreplaceable loss of resources.
- The *degree* to which the impact can be *mitigated.*
- The **significance** is determined by combining the criteria in the following formula:
    - S=(E+D+M)P; where S = Significance weighting, E = Extent, D = Duration, M = Magnitude, P = Probability

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

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

7.3 LANDSCAPE & VISUAL IMPACT ASSESSMENT

7.3.1 The proposed development could change the character and sense of place of the landscape setting (Landscape Change)

Nature of impact:
The proposed project is located within a landscape area with an overriding rural character.

The character of the affected area is relatively typical within the region.

Other large scale industrial operations including mining operations and power stations are relatively obvious in the region.

Whilst the proposed renewable energy farm including the grid connection infrastructure project will create a new large scale industrial node within the agricultural landscape, this is not entirely out of character with the broader region. It will however be a significant local character change.

Grid connection infrastructure is unlikely to be obvious from outside the site and so should not affect perceptions of landscape character change for the majority of people.

In terms of mitigating the impact of infrastructure, this has largely been undertaken by minimising the extent of the bulkier and taller 400kV powerlines through the location of the MTS in close proximity to the connection point to existing Eskom 400kV overhead powerlines.

The difference made by mitigation is that degradation due to erosion is less likely to draw attention to the infrastructure.

	Without mitigation	**With mitigation**
Extent	Site and immediate surroundings, **(2)**	Local, **(2)**
Duration	Long term, **(4)**	Long term, **(4)**
Magnitude	Minor to Low, **(3)**	Minor to Low, **(3)**
Probability	Probable, **(3)**	Improbable, **(2)**
Significance	Low, **(27)**	Low, **(18)**
Status	The proposed infrastructure is likely to be more obvious to people living on homesteads or travelling within the site area. Because of this they may consider the landscape change to be a negative impact. People who are located outside the site are unlikely to notice the new infrastructure. They are therefore unlikely to consider the landscape change to be a negative impact. **Neutral to Negative**	**Neutral to Negative**
Reversibility	High	High
Irreplaceable loss	The proposed development can be dismantled and removed at the end of the operational phase. There will therefore be **no irreplaceable loss**. However, given the likely long term nature of the project, it is likely that a proportion of stakeholders will view the loss of view as irreplaceable.	**No irreplaceable loss**

Can impacts be mitigated?	**Yes**	**N/A**

Mitigation / Management:
Planning:
- Plan to undertake rehabilitation and erosion control.

Operations:
- Minimise disturbance.
- Undertake rehabilitation and erosion control.

Decommissioning:
- Remove infrastructure not required for the post-decommissioning use of the site;
- Rehabilitate and monitor areas for vegetation cover post-decommissioning and implement remedial actions.

Cumulative Impacts:
The proposed project was assessed as likely to have a cumulative impact contribution of low significance to an overall cumulative impact of high significance.

See appendix IV.

Residual Impacts:

The residual risk relates to loss of natural vegetation cover being obvious on decommissioning of the proposed project. It is therefore critical that effective rehabilitation is undertaken.

7.3.2 The proposed development could change the character of the landscape as seen from Silver Water Private Nature Reserve

Nature of impact:
The Silver Water Nature Reserve which is a private facility and is primarily a local tourism facility offering accommodation in tranquil surroundings around a large dam.

The ZTV analysis indicates that only the 132kV overhead powerline could be visible from Silver Water. However, because it is located outside the LVE and because there are mature trees between the lodge and the power line. It is highly unlikely that views of infrastructure will be visible from Silver Water.

	Without mitigation	**With mitigation**
Extent	Local, **(1)**	NA
Duration	Long term, **(4)**	NA
Magnitude	Small, **(0)**	NA
Probability	Very improbable, **(1)**	NA
Significance	Low, **(5)**	NA
Status	The infrastructure will not be seen. **Neutral**	NA
Reversibility	High	NA
Irreplaceable loss	**No irreplaceable loss**	

Can impacts be mitigated?
NA

Mitigation / Management:
NA

Cumulative Impacts:

The proposed project was assessed as likely to have a cumulative contribution of low significance to an overall cumulative impact of low significance.

See appendix IV.

7.3.3 The proposed development could change the character of the landscape as seen from local main roads

Nature of impact:

Only a short section of the R35 is likely to be affected.

- The 132kV powerline may be obvious over approximately 3km of the road;
- The lower bulk of the MTS may be obvious over approximately 2.6km of the road; and
- The 400kV loop in / loop out power line and the upper sections of the MTS could be visible from approximately 11km of the road.

The difference made by mitigation is that degradation due to erosion is less likely to draw attention to the infrastructure.

	Without mitigation	**With mitigation**
Extent	Site and immediate surroundings, **(2)**	Site and immediate surroundings, **(2)**
Duration	Long term, **(4)**	Long term, **(4)**
Magnitude	Minor to Low, **(3)**	Minor, **(2)**
Probability	Probable, **(3)**	Improbable, **(2)**
Significance	Low, **(27)**	Low, **(16)**
Status	If landscape degradation due to lack of management occurs, attention is likely to be drawn to the infrastructure. **Negative**	If no landscape degradation occurs, motorists are unlikely to give the infrastructure a second look. **Neutral**
Reversibility	High	NA
Irreplaceable loss	**No irreplaceable loss**	**No irreplaceable loss**
Can impacts be mitigated?	**Yes**	NA

Mitigation / Management:

Planning:

- Plan to undertake rehabilitation and erosion control.

Operations:

- Minimise disturbance.
- Undertake rehabilitation and erosion control.

Decommissioning:

- Remove infrastructure not required for the post-decommissioning use of the site;
- Rehabilitate and monitor areas for vegetation cover post-decommissioning and implement remedial actions.

Cumulative Impacts:

The proposed project was assessed as likely to have a cumulative contribution of low significance to an overall cumulative impact of medium significance.

See appendix IV.
Residual Impacts: The residual risk relates to loss of natural vegetation cover being obvious on decommissioning of the proposed project. It is therefore critical that effective rehabilitation is undertaken.

7.3.4 The proposed development could change the character of the landscape as seen from local minor unsurfaced roads.

Nature of impact:
There are several unsurfaced roads that run through the proposed site and close to the proposed infrastructure.

Whilst some sections of roads are important for local recreation and tourism, the majority of road users are likely to be more interested in agricultural productivity rather than aesthetics.

The relatively low numbers of vehicles that use these roads is also likely to make the visual impacts less significant.

The infrastructure is unlikely to be obvious from outside the site.

	Without mitigation	**With mitigation**
Extent	Local, **(2)**	Local, **(2)**
Duration	Long term, **(4)**	Long term, **(4)**
Magnitude	Low, **(4)**	Minor to Low, **(3)**
Probability	Probable, **(3)**	Improbable, **(2)**
Significance	Medium, **(30)**	Low, **(18)**
Status	The proposed infrastructure is likely to be obvious to people travelling within the site area. Because of this they may consider the landscape change to be a negative impact. This is particularly likely to be the case if poor management results in degradation / erosion. **Negative**	If management of construction guards against degradation / erosion some road users are unlikely to be concerned about the new infrastructure. **Negative / Neutral**
Reversibility	High	High
Irreplaceable loss	The proposed development can be dismantled and removed at the end of the operational phase. There will therefore be **no irreplaceable loss**. However, given the likely long term nature of the	**No irreplaceable loss.**

	project, it is likely that a proportion of stakeholders will view the loss of view as irreplaceable.	
Can impacts be mitigated?	**Yes**	
Mitigation / Management: Planning: • Plan to undertake rehabilitation and erosion control. Operations: • Minimise disturbance. • Undertake rehabilitation and erosion control. Decommissioning: • Remove infrastructure not required for the post-decommissioning use of the site; • Rehabilitate and monitor areas for vegetation cover post-decommissioning and implement remedial actions.		
Cumulative Impacts: The project was assessed as likely to result in a low-level contribution to an overall cumulative impact of medium significance. **See appendix IV.**		
Residual Impacts: The residual risk relates to loss of natural vegetation cover being obvious on decommissioning of the proposed project. It is therefore critical that effective rehabilitation is undertaken.		

7.3.5 The proposed development could change the character of the landscape as seen from local settlements including Morgenzon and Bethal.

Nature of impact: It is highly unlikely that the proposed infrastructure will be visible from either of these settlements. Therefore, there will be no visual impact and no contribution to cumulative impacts.

7.3.6 The proposed development could change the character of the landscape as seen from homesteads.

Nature of impact: There are a large number of homesteads within the proposed development area and the surrounding rural landscape. These are largely comprised of farmsteads and agricultural workers houses. Four of these homesteads are within 100m of the proposed 132kV powerline. The closest homestead is approximately 1.3km from the proposed MTS Most farmsteads are also set amongst large trees which will help to screen views of infrastructure. Impacts are also likely to be mitigated by the fact that landowners are likely to benefit financially from the proposed project and the majority of residents are likely to be more interested in productivity of the land rather than aesthetics.

	Without mitigation	With mitigation
Extent	Local, **(2)**	Local, **(2)**
Duration	Long term, **(4)**	Long term, **(4)**
Magnitude	Low, **(4)**	Minor to Low, **(3)**
Probability	Probable, **(3)**	Improbable, **(2)**
Significance	Medium, **(30)**	Low, **(18)**
Status	The proposed infrastructure is likely to be obvious to some people living within the site area. Because of this they may consider the landscape change to be a negative impact. This is particularly likely to be the case if poor management results in degradation / erosion. **Negative**	If management of construction guards against degradation / erosion some road users are unlikely to be concerned about the new infrastructure. **Negative / Neutral**
Reversibility	High	High
Irreplaceable loss	The proposed development can be dismantled and removed at the end of the operational phase. There will therefore be **no irreplaceable loss**. However, given the likely long term nature of the project, it is likely that a proportion of stakeholders will view the loss of view as irreplaceable.	**No irreplaceable loss.**
Can impacts be mitigated?	**Yes**	

Mitigation / Management:

Planning:

- Plan to undertake rehabilitation and erosion control.

Operations:

- Minimise disturbance.
- Undertake rehabilitation and erosion control.

Decommissioning:

- Remove infrastructure not required for the post-decommissioning use of the site;
- Rehabilitate and monitor areas for vegetation cover post-decommissioning and implement remedial actions.

Cumulative Impacts:

The project was assessed as likely to result in a low-level contribution to an overall cumulative impact of high significance.

See appendix IV.

Residual Impacts:

The residual risk relates to loss of natural vegetation cover being obvious on decommissioning of the proposed project. It is therefore critical that effective rehabilitation is undertaken.

7.3.7 The potential visual impact of operational, safety and security lighting of the facility at night.

Nature of impact:
The only section of the infrastructure that is likely to require lighting is the MTS. From observation, most large substations appear to be floodlit. It is assumed that this is in order to address security issues as well as occasional necessary night time maintenance.

Lighting within the area is generally comprised of low level lighting of individual homesteads.

The closest receptor (homestead) that could be affected is approximately 1.3km from the MTS.

	Without mitigation	**With mitigation**
Extent	Local, **(2)**	Local, **(2)**
Duration	Long term, **(4)**	Long term, **(4)**
Magnitude	Minor to Small, **(1)**	Small, **(0)**
Probability	Probable, **(3)**	Improbable, **(2)**
Significance	Low, **(21)**	Low, **(12)**
Status	Only the closest receptors may see lighting as a negative impact. **Negative / Neutral**	With mitigation, under normal conditions, lighting is likely to be similar in character to the existing situation. **Neutral**
Reversibility	High	High
Irreplaceable loss	No irreplaceable loss	No irreplaceable loss
Can impacts be mitigated?	**Yes**	

Mitigation / Management:
Planning:

- Careful design of security and operational lighting;
- Ensure that operational lighting is only activated when necessary, the splitting of circuits and use of movement sensors should be considered.
- Ensure that security lighting is only activated when necessary, the use of movement sensors and / or infra-red systems should be considered;
- No high mast lighting should be used.

Operation:

- Ensure that the intention of the original lighting design is maintained throughout the operational phase.

Decommissioning:

- Ensure that all lighting facilities are removed.

Cumulative Impacts:

The project was assessed as likely to have a low contribution to an overall cumulative impact or high significance. **See appendix IV.**
Residual Impacts: There are no residual risks

8 IMPACT STATEMENT

8.1 VISIBILITY

Assessment of the likely visibility of the proposed 132kV powerlines shows that whilst the power lines may be physically visible as far as the ALV to the west of the site, they are highly unlikely to be visually obvious outside the site area.

Assessment of the likely visibility of the proposed lower section (10m) of the MTS shows that whilst it appears that the substation looks like its located on a ridgeline, it is in fact located in a shallow valley adjacent to a ridgeline. The visual effect of this is that the bulk of the substation is only visible intermittently. Apart from approximately 3km of the R39, the substation is likely to be mainly visible from inside the site area.

Assessment of the likely visibility of the proposed 400kV loop in / loop out power line that connects to the existing Eskom 400kV power line as well as the higher lattice elements within the MTS shows that, because these elements are located close to a ridgeline, they are likely to be visible throughout the majority of the LVE. The analysis also shows that these elements are likely to be most visible to the west.

8.2 LANDSCAPE CHARACTER AREAS AND VISUAL ABSORPTION CAPACITY

The affected landscape can generally be divided into the following LCAs that are largely defined by topography.

The landform divides the landscape into three discrete areas including:

Rural Landscape Areas. This is the type of landscape that dominates the affected landscape. It is typified by relatively uniform rolling topography that is covered by a matrix of arable agriculture set in a framework natural grassland.

Due to the relatively low topography, and generally low vegetation, it is an open landscape over which long views are possible particularly when the viewer is located on the summit of a ridgeline.

Within this general pattern homesteads are located that are made obvious due to their associated alien and ornamental vegetation.

There are also stands of alien trees many of which are Eucalyptus that are largely located along property boundaries and unused agricultural land.

The rolling topography generally provides a large degree of VAC particularly for relatively low development.

Urban Landscape Areas those are generally densely developed residential areas with small commercial areas. There are also small areas of industry also associated with urban areas. VAC is generally high, with views of the surrounding landscape generally only possible from urban edges.

Industrial Landscape Areas Mpumalanga is known for its mining industry as well as other heavy industrial operations. These industries generally create their own visual presence that can over-ride surrounding characteristics. The closest large scale mining / industrial operation is Tutuka Power Station which has the New Denmark Coat Mine immediately to the north of it from which is fed coal by conveyor belt. This facility is approximately 28km from the proposed site.

Due to distance, these activities have no apparent influence on landscape character in the vicinity of the proposed site. They may however influence people's perception of landscape character. However, they are unlikely to have any influence on the Grid Connection Infrastructure.

Within the Study Limit, the landscape character is comprised mainly of Rural Landscape Character Areas. The only exceptions to this are the settlements of Bethal and Morgonzon that are Urban Landscape Character Areas.

8.3 SENSITIVE RECEPTORS

Identified visual receptors include:

- Area Receptors may include;
  - The towns of **Bethal and Morgenzon;** and
  - The **Silver Water Reserve**.
- Point Receptors that include;
  - There are a number of **Local Farmsteads and Homesteads** located both within the site area and the surrounding landscape.
- Linear Receptors or routes through the area that include;
  - **The N17, the R35, the R38 and the R39 as well as the unsurfaced local roads that run through the study area.** All of these are used mainly by local people with little tourism / recreational importance.

8.4 LANDSCAPE AND VISUAL IMPACTS

8.4.1 Landscape Impacts

The proposed project is located within a landscape area with an overriding rural character.

The character of the affected area is relatively typical within the region.

Other large scale industrial operations including mining operations and power stations are relatively obvious in the region.

Whilst the proposed renewable energy farm including the grid connection infrastructure project will create a new large scale industrial node within the agricultural landscape, this is not entirely out of character with the broader region. It will however be a significant local character change.

Grid connection infrastructure is unlikely to be obvious from outside the site and so should not affect perceptions of landscape character change for the majority of people.

In terms of mitigating the impact of infrastructure, this has largely been undertaken by minimising the extent of the bulkier and taller 400kV powerlines through the location of the MTS in close proximity to the connection point to existing Eskom 400kV overhead powerlines.

The difference made by mitigation is that degradation due to erosion is less likely to draw attention to the infrastructure

With mitigation, The impact was assessed as having a local impact of low significance.

8.4.2 Views from Silver Water

The ZTV analysis indicates that only the 132kV overhead powerline could be visible from Silver Water. However, because it is located outside the LVE and because there are mature trees between the lodge and the power line. It is highly unlikely that views of infrastructure will be visible from Silver Water. .

The impact was assessed as being very improbable and as having a low significance.

8.4.3 Views from Local Main Roads

Only a short section of the R35 is likely to be affected.

- The 132kV powerline may be obvious over approximately 3km of the road;
- The lower bulk of the MTS may be obvious over approximately 2.6km of the road; and
- The 400kV loop in / loop out power line and the upper sections of the MTS could be visible from approximately 11km of the road.

With mitigation, The impact was assessed as having a minor significance.

8.4.4 Views from Local Unsurfaced Minor Roads

There are several unsurfaced roads that run through the proposed site and close to the proposed infrastructure.

Whilst some sections of roads are important for local recreation and tourism, the majority of road users are likely to be more interested in agricultural productivity rather than aesthetics.

The relatively low numbers of vehicles that use these roads is also likely to make the visual impacts less significant.

The infrastructure is unlikely to be obvious from outside the site.

With mitigation, the impact was assessed as having a low significance.

8.4.5 Views from settlements including Morgenzon and Bethal

It is highly unlikely that the proposed infrastructure will be visible from either of these settlements. Therefore, there will be no visual impact.

8.4.6 Views from Local Homesteads

There are a large number of homesteads within the proposed development area and the surrounding rural landscape.

These are largely comprised of farmsteads and agricultural workers houses.

Four of these homesteads are within 100m of the proposed 132kV powerline. The closest homestead is approximately 1.3km from the proposed MTS

Most farmsteads are also set amongst large trees which will help to screen views of infrastructure.

Impacts are also likely to be mitigated by the fact that landowners are likely to benefit financially from the proposed project and the majority of residents are likely to be more interested in productivity of the land rather than aesthetics.

With mitigation, the impact was assessed as having a Low Significance.

8.4.7 Lighting Impacts

The only section of the infrastructure that is likely to require lighting is the MTS.
From observation, most large substations appear to be floodlit. It is assumed that this is in order to address security issues as well as occasional necessary night time maintenance.

Lighting within the area is generally comprised of low level lighting of individual homesteads.

The closest receptor (homestead) that could be affected is approximately 1.3km from the MTS.

With mitigation, the impact was assessed as having a low significance.

8.5 CUMULATIVE IMPACT

The cumulative contribution to the impact of electrical infrastructure in the region was assessed as low.

8.6 CONCLUSION

The proposed project will generally result in a relatively limited level of visual impact within an area that is likely to be impacted by the proposed renewable energy projects.

In general terms therefore the proposed project is in keeping with its surroundings and will not impact significantly on receptors that are likely to be sensitive to landscape change associated with the project.

From a Landscape and Visual Impact perspective, there is no reason why the proposed project cannot be authorised.

REFERENCES

Landscape Institute and Institute of Environmental Management Assessment. 2013. *Guidelines for landscape and visual impact assessment*. Oxon, UK:

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

United States Department of Interior. 2013. *Best management practices for reducing visual impacts of renewable energy facilities on BLM-administered lands*. Wyoming, United Stated of America: Bureau of Land Management.

Low, A.B. & Rebelo, A.G. (eds), 1996, *Vegetation of South Africa, Lesotho and Swaziland*. Department of Environmental Affairs & Tourism, Pretoria.

Mucina, L. & Rutherford, M.C. (eds.), 2006, *The vegetation of South Africa, Lesotho and Swaziland*, South African National Biodiversity Institute, Pretoria (Strelitzia series; no. 19).

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	English - 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 Mo0rreesburg 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 Wetlend 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 Karoshoek 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 Karoshoek 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.
- **Moorreeesburg Wind Energy Facility** – Visual Impact Assessment for a proposed WEF near Moorreeesburg 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.
- **Rheeboksfontein 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.

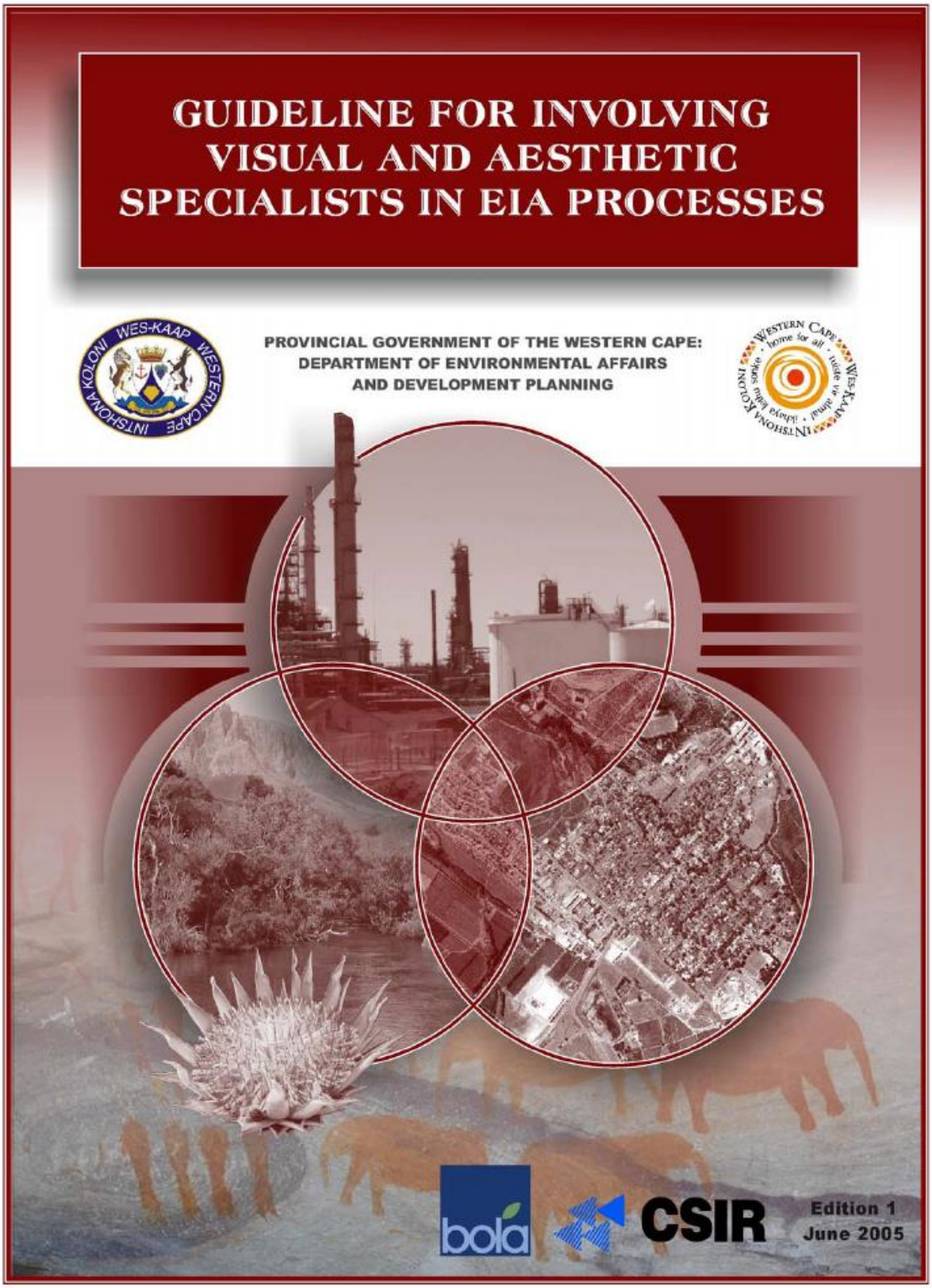
- **Kouroussa Gold Mine (Guinea)** – Visual impact assessment for a proposed new mine in Guinea working with SGS as part of their EIA team.
- **Mampon Gold Mine (Ghana)** - Visual impact assessment for a proposed new mine in Ghana working with SGS as part of their EIA team.
- **Telkom Towers** – Visual 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 AECI.

- **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 Illchester 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
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GUIDELINE FOR INVOLVING VISUAL AND AESTHETIC SPECIALISTS IN EIA PROCESSES

Edition 1

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PREFACE

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

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

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

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

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

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

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

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

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

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

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

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

Who is the target audience for these guidelines?

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

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

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

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

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

What will these guidelines not do?

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

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

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

How are these guidelines structured?

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

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

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

SUMMARY

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

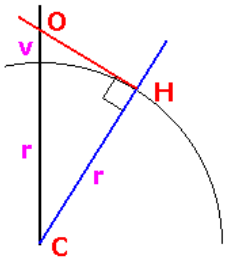
CONTENTS

APPENDIX III

FORMULA FOR DERIVING THE APPROXIMATE VISUAL HORIZON

The Mathematics behind this Calculation

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



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

APPENDIX IV

CUMULATIVE IMPACT ASSESSMENT

CUMULATIVE IMPACTS

Cumulative visual impacts have considered the current impacts of electrical infrastructure as well as the future proposed development of other renewable energy projects and planned infrastructure development.

Proposed mitigation measures relate to mitigation necessary to minimise the cumulative contribution of the project under consideration only.

Note: where alternative alignments / substation locations result in differing levels of impact, the worst case is indicated.

1) General cumulative change *the in the character and sense of place of the landscape setting (Landscape Change)*.

Nature:
Although there are several low voltage power lines supported by wooden poles, the site area is relatively free of power lines and other electrical infrastructure.

The exception to this is the area where the Camden / Sol 2 400kV and the Camden / Tutuka 1 400kV power lines cross the site. However, due to the topography these powerlines are largely hidden from surrounding areas. They only become highly obvious as they cross ridgelines.

The proposed MTS and 400kV loop in / loop out power lines will exacerbate the impact of HV power lines in the area. However, as they are so close to the existing lines, they are unlikely to extend the existing area of impact.

The introduction of the new 132kV power lines will add to the sight of electrical infrastructure in the landscape however, this will only affect the site area. Given the possible development of renewable energy projects within the site, this is likely to be seen as in keeping with the overall development.

In the vicinity of the existing 400kV powerlines, the proposed on-site substations and 400kV loop in / loop out overhead power lines will impact an area that is currently impacted by major electrical infrastructure.

These facilities will therefore not extend the visual influence of industry, but will intensify if within a relatively small area.

The proposed 132kV power lines will however extend the influence of electrical infrastructure within the proposed site area. However this will only affect areas that are likely to be influenced by renewable energy infrastructure.

There is also another WEF project (Hendrina) that is proposed approximately 25km to the north of the Ummbila WEF. At the time of reporting it is understood that application documents have just been submitted to the Competent Authority for this project.

In terms of cumulative effects, this project will result in additional new grid connection infrastructure being developed.

In addition to the Hendrina project, large scale electrical infrastructure is likely to be obvious in and around the other major industrial projects in the region including Tutuka Power Station. Therefore, the proposed project could increase regional

perceptions, however, because impacts are largely limited to the site area, this effect is also likely to be minimal.

	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Site and immediate surrounding area, **(2)**	Region, **(3)**
Duration	Long term, **(4)**	Long term, **(4)**
Magnitude	Minor to Low, **(3)**	Low to Moderate, **(8)**
Probability	Improbable, **(2)**	Definite **(5)**
Significance	Low, **(18)**	High, **(75)**
Status (positive or negative)	**Neutral to Negative**	**Negative**
Reversibility	Medium	Low
Irreplaceable loss of resources?	No	No

2) The cumulative impact on views from Silver Water Private Nature Reserve.

Nature:
The proposed grid connection infrastructure is unlikely to be visible from Silver Water. Other major regional electrical infrastructure is also not visible.

The project is therefore unlikely to influence cumulative impacts on Silver Water.

	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Local, **(1)**	Site and immediate surroundings, **(2)**
Duration	Long term, **(4)**	Long term, **(4)**
Magnitude	Small, **(0)**	Small, **(0)**
Probability	Very improbable, **(1)**	Very improbable, **(1)**
Significance	Low, **(5)**	Low, **(6)**
Status (positive or negative)	Neutral	Neutral
Reversibility	High	Low
Irreplaceable loss of resources?	No irreplaceable loss.	No irreplaceable loss.

3) The cumulative impact on views from Main Roads.

Nature:
The proposed grid connection infrastructure is unlikely to be obvious from major roads.
Whilst the majority of the region is not affected, major electrical infrastructure associated with other large projects in the region particularly the Tutuka Power Station is likely to be significantly more obvious.
The proposed infrastructure is therefore likely to have a low contribution to a Medium level cumulative regional impact.

	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**

Extent	Site and immediate surroundings, **(2)**	Region, **(3)**
Duration	Long term, **(4)**	Long term, **(4)**
Magnitude	Minor, **(2)**	Low, **(4)**
Probability	Improbable, **(2)**	Probable, **(3)**
Significance	Low, **(16)**	Medium, **(33)**
Status (positive or negative)	Neutral	Negative
Reversibility	High	Low
Irreplaceable loss of resources?	No irreplaceable loss.	No irreplaceable loss.

4) The cumulative impact on views from Minor Roads.

Nature:
The proposed grid connection infrastructure will affect minor roads within the site area. However, their sensitivity is relatively low.
Whilst the majority of the region is not affected, major electrical infrastructure associated with other large projects in the region particularly the Tutuka Power Station is also likely to affect views from other minor roads in the region.
The proposed infrastructure is therefore likely to have a low contribution to a Medium level cumulative regional impact.

	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Local, **(2)**	Region, **(3)**
Duration	Long term, **(4)**	Long term, **(4)**
Magnitude	Minor to Low, **(3)**	Low, **(4)**
Probability	Improbable, **(2)**	Probable, **(3)**
Significance	Low, **(18)**	Medium, **(33)**
Status (positive or negative)	Negative	Negative
Reversibility	High	Low
Irreplaceable loss of resources?	No irreplaceable loss.	No irreplaceable loss.

5) The cumulative impact on views from settlement areas including Morgenzon and Bethal.

Nature:
The proposed grid connection infrastructure will not be visible from either of these settlements.
Therefore, there will be no contribution to cumulative visual impacts on settlement areas.

6 Cumulative impact on local homesteads

Nature:
Visual impacts of the proposed infrastructure on homesteads were assessed as having a low significance. The proposed project is therefore unlikely to contribute significantly to cumulative visual impacts on homesteads.

Because views of major electrical infrastructure are likely to be obvious from all homesteads in the area the impact is assessed as high.		
	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Local, **(2)**	Region **(3)**
Duration	Long term, **(4)**	Long term **(4)**
Magnitude	Minor to Low, **(3)**	Moderate **(6)**
Probability	Improbable, **(2)**	Definite **(5)**
Significance	Low, **(18)**	High **(65)**
Status (positive or negative)	**Negative / Neutral**	negative
Reversibility	**High**	Low
Irreplaceable loss of resources?	No irreplaceable loss	No irreplaceable loss

7 Cumulative impact of Lighting

Nature:
Lighting patterns currently include:

- Relatively brightly lit urban areas;
- Low level lighting within rural areas; and
- Brightly lit areas of industrial activity.

With mitigation the renewable energy project associated with the proposed infrastructure should, under normal circumstances, result in a low level of lighting similar to surrounding rural areas as should the infrastructure project.

The proposed infrastructure project should therefore not exacerbate the extent of brightly lit sections of the landscape. It will therefore result in a small contribution to a general high cumulative impact.

	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Local, **(2)**	Region **(3)**
Duration	Long term, **(4)**	Long term **(4)**
Magnitude	Small, **(0)**	Moderate to High **(7)**
Probability	Improbable, **(2)**	Definite **(5)**
Significance	Low, **(12)**	High **(70)**
Status (positive or negative)	neutral	negative
Reversibility	High	Low

Irreplaceable loss of resources?	No irreplaceable loss	No irreplaceable loss

APPENDIX V

ENVIRONMENTAL MANAGEMENT PLAN

Project component/s	Grid Connection Infrastructure for the Ummbila Emoyeni Renewable Energy Farm - Construction, Operation and Decommissioning		
Potential Impact	Change in Landscape Character Visual Impact affecting local & main roads Visual Impact affecting Agricultural Homesteads Visual Impact affecting Private Nature Reserves		
Activity/risk source	Vegetation clearance and rehabilitation during construction and decommissioning resulting in degradation / erosion and further loss of character. Unnecessary impacts due to extended construction period Unnecessary impacts due to poor waste management Residual risk of un-necessary impact should infrastructure not be removed on decommissioning.		
Mitigation: Target/Objective	Minimise and reinstate vegetation loss. Minimise the construction period. Ensure that appropriate waste management is undertaken. Remove structures and rehabilitate site on decommissioning.		
Mitigation: Action/control		**Responsibility** Contractor (C) Environmental (EO) Environmental Liaison Officer (ELO)	**Timeframe** Construction Phase (C) Operational Phase (O) Decommissioning Phase (D)
Plan construction to minimise impact period on identified receptors. Minimise disturbance and maintain existing vegetation as far as is possible both within and surrounding the development area. Reinstate any areas of vegetation that have been disturbed during construction.		(C) C, ECO, ELO C, ECO, ELO	(C) C C

Rehabilitate areas to their natural state on decommissioning.	C, ECO, ELO	C, D
Monitor rehabilitated areas post-construction and post-decommissioning and implement remedial actions.	C, ECO, ELO	C, D
Remove all temporary works.	C, ECO, ELO	C, D
Remove infrastructure not required for the post-decommissioning use of the site.	C, ECO, ELO	C, D
Performance Indicators	Construction of specific sections of the infrastructure exceeding programme. Vegetation presence and density. Presence of unnecessary infrastructure. Location of structures closer to sensitive receivers than is necessary	
Monitoring	Regular review of the programme. Evaluate vegetation before, during and after construction. Check to ensure that all structures are removed and rehabilitation is undertaken during decommissioning. Responsibility: ECO and ELO. Prepare regular reports.	