Emoyeni Renewable Energy Farm (Pty) Ltd

PROPOSED EMOYENI RENEWABLE ENERGY FARM – GRID CONNECTION INFRASTRUCTURE INCLUDING A MAIN TRANSMISSION SUBSTATION, MPUMALANGA PROVINCE

LANDSCAPE & VISUAL IMPACT BASELINE REPORT

May 2022

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1 INTRODUCTION

1.1 GENERAL

This Landscape and Visual Impact Baseline Report forms part of the Feasibility / Site Planning and Basic Assessment process that is being undertaken for the proposed Grid Connection Infrastructure including a Main Transmission Substation component of the Ummbila Emoyeni Renewable Energy Wind and Solar PV Project. The process is being undertaken by Savannah Environmental on behalf of Emoyeni Renewable Energy Farm (Pty) Ltd.

1.2 PROJECT LOCATION

The proposed development Focus Area is located between Bethal and Morgenzon and to the east of the R35 in the Mpumalanga Province (Map 1: Locality Map).

The approximate geographic coordinates of the centre of the proposed Focus Area are;

South	26^0	36’	57.47”
East	29^0	35’	45.38”

The project site 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

No site alternatives are under consideration, however layout alternatives within the Focus Area are being considered.

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 determine the sensitivity of the affected landscape and review the possible nature of landscape and visual impacts that the proposed project could result in and specifically to;

- Characterise the affected landscape;
- Identify potential sensitive landscapes and receptors that may be impacted by the proposed facility and the types of impacts that are most likely to occur; and
- Provide sensitivity mapping identifying 'No-Go' areas, and areas for development that will minimise landscape and visual impacts.

Work has been undertaken in accordance with the following guideline documents;

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

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

Refer to **Appendix II** for the Western Cape Guideline.
The required specialist reports will be undertaken in accordance with Appendix 6 of the EIA Regulations, as amended (GN No. 326 of 7 April 2017).

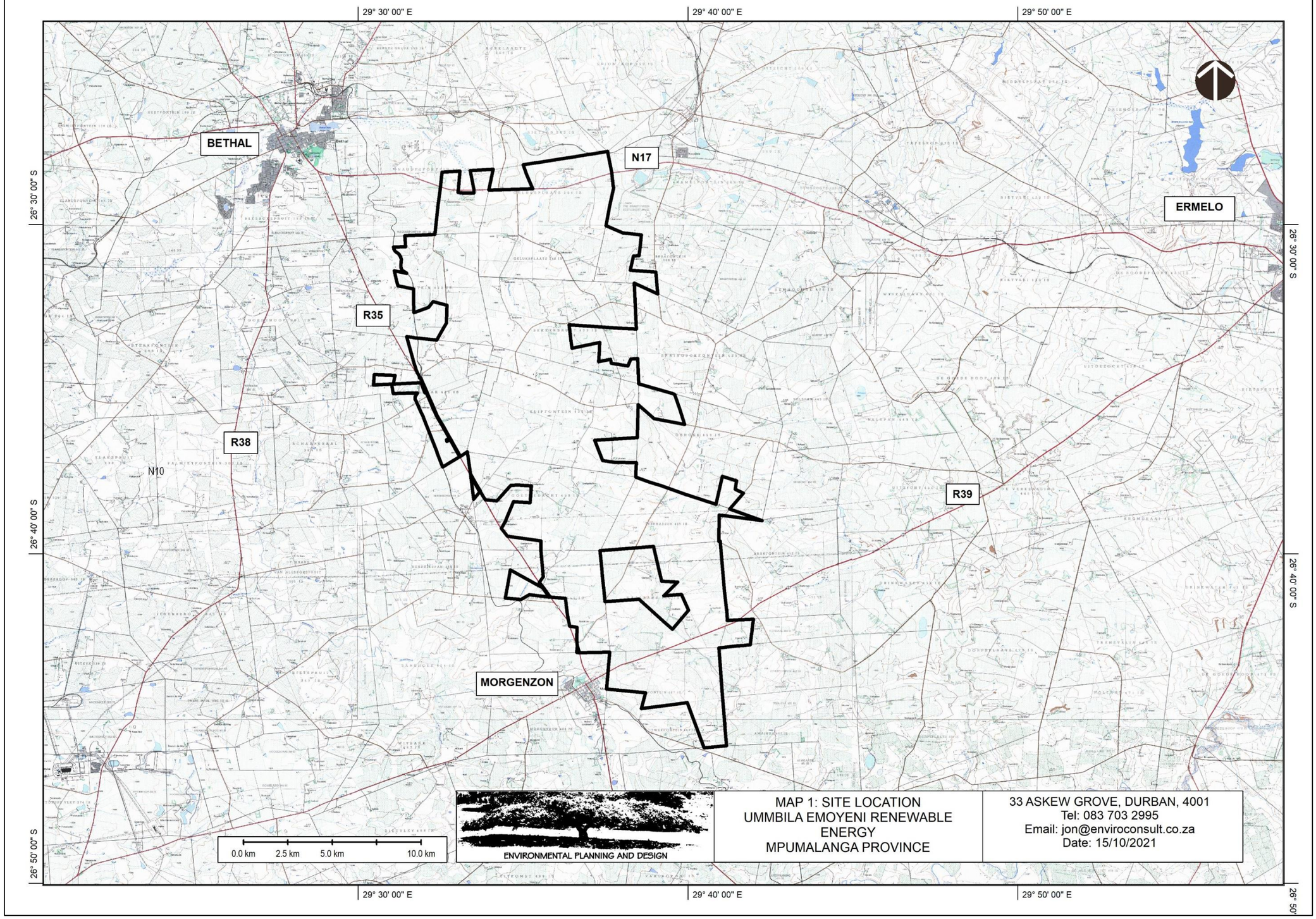
1.5 LIMITATIONS AND ASSUMPTIONS

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

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
Free State 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

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.

This initial assessment has been undertaken using GIS data sets, on-line mapping and the authors experience of the area within which the proposed project is proposed particularly work on proposed renewable energy development at the Tutuka Power Station.


29° 30' 00" E
29° 40' 00" E
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26° 30' 00" S
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26° 50' 00" S
BETHAL
N17
ERMELO
R35
R38
N10
R39
MORGENZON
0.0 km
2.5 km
5.0 km
10.0 km
ENVIRONMENTAL PLANNING AND DESIGN
MAP 1: SITE LOCATION
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Date: 15/10/2021

2 PROJECT DESCRIPTION

2.1 GENERAL

A preferred project focus area with an extent of 27 819ha has been identified by Emoyeni Renewable Energy Farm (Pty) Ltd as a technically suitable area for the development of the Ummbilla Emoyeni Renewable Energy Farm with a contracted capacity of up to 666MW of wind energy and 150MW of solar energy. This layout, and project capacity, will reduce as the EIA and scoping process identifies environmental constraints that exclude areas for development.

2.2 OVERVIEW OF THE GRID CONNECTION

The grid connection solution entails establishing a 400/132 kV MTS, between Camden and SOL Substations, which will be looped in and out of the existing Camden-Sol 400 kV line[1]. The location of the MTS will be refined through an ongoing process of communication with Eskom Planning but will be within close proximity to the 400kV line in order to cut into this line.

The main elements therefore include the proposed MTS and overhead power line links from the renewable energy project on-site substations to the proposed MTS.

2.2.1 MTS

A step-up transmission substation receives electric power from a nearby generating facility and uses a large power transformer to increase the voltage for transmission to distant locations. A transmission bus is used to distribute electric power to one or more transmission lines. There can also be a tap on the incoming power feed from the generation plant to provide electric power to operate equipment in the generation plant.

A substation can have circuit breakers that are used to switch generation and transmission circuits in and out of service as needed or for emergencies requiring shut-down of power to a circuit or redirection of power.

The specific voltages leaving a step-up transmission substation are determined by the customer needs of the utility supplying power and to the requirements of any connections to regional grids.

The proposed transmission substation will therefore step up power generated from a delivery level probably of 132kV from the proposed renewable energy facilities to a transmission level of 400kV.

The main elements of an MTS with visual implications include:

- The incoming power line which in this case will be a 132kV power line which is likely to be in the order of 30m high.
- A security fence line which typically will be a steel palisade or mesh fence approximately 3m high;

[1] The LILO corridor will intersect with either the Camden-Zeus 1 400kV, Camden-Zeus 2 400kV or Camden-Tutuka 400kV power line

- Bus bars to which the incoming power lined will be connected which will be lower than the incoming power line. These are likely to be comprised of a steel lative structure. For the sake of the initial assessment it is assumed that these will be in the order of 15m high.
- Transformers that will be used to step the power up from 132kV TO 400kV.These are likely to be large solid structures in the order of 10m high.
- Buildings to house control and switching infrastructure, stores, restrooms and staff facilities. These are likely to be single storey buildings up to approximately 6m high.
- Security lighting which is likely to be mounted on masts surrounding the MTS. These are likely to be in the order of 10-15m high.
- Bus bars that will support the outgoing power transmission lines in order that they can link to the outgoing High Voltage. These are likely to be comprised of a steel lattice structure in the order of half the height of the outgoing High Voltage transmission line which are likely to be in the order of 40m high[2]. This means that outgoing bus bars could be in the order of 20m high.
- Lightning protection rods that could be as high as the incoming power lines. These will be comprised of slim steel structures.

The various elements can therefore be divided into:

- Lower transparent and opaque elements up to approximately 10m high including the security fence, buildings, and transformers; and
- Taller relatively transparent elements up to approximately 20m high including bus bars, and lighting towers.

Because of their visual mass, the lower elements are likely to be highly visible whereas taller more transparent elements are not likely to be as visible over a distance.

It is noted that the lightning rods are significantly taller, however, these are relatively slim and are only likely to be visible from areas immediately surrounding the MTS.

Plate 1, Transmission lines leaving an MTS.
Bus Bars to the left of picture and High Voltage Transmission Line to the right.

[2] Technical Tender Returnables and Overhead Line Specifications, Eskom, 2012

Plate 2, Existing 765/400kV Eskom Kappa MTS
Note: This facility was constructed to link a number of renewable energy projects to the transmission grid. It is therefore likely to be similar on nature to the proposed MTS.

2.2.2 Loop In Loop Out

Loop in loop out describes the way in which the power will be transmitted from the proposed new MTS to the existing 400kV overhead power line.

It is done by providing double circuit towers on the proposed tapping line or by providing Single circuit towers separately for Loop-In and separately for LILO line should terminate on towers designed for dead end conditions at both ends.

Subject to the location of the new MTS relative to the 400kV power line that it will connect with, a new overhead 400kV power line will be required linking from the MTS. If the MTS is adjacent to the existing overhead power line, a minimum of one new tower support will be required to enable the connection. If it is some distance from the existing line then a number of new 400kV power line towers will be required. The greater the distance, the greater the number of new towers that will be required.

2.2.3 132kV Power Line

From the renewable energy on-site substations, the power produced will be distributed to the MTS via an overhead power line. This is likely to be via a 132kV overhead line.

The construction of the 132kV overhead power line is likely to follow the following sequence:

- Excavation and concrete work for tower bases. Due to the dispersed nature of the bases, it is unlikely for concrete to be batched on site. It is likely that concrete will be ready mixed and brought in by concrete trucks as and when required.
- Erection of towers in a progressive manner. It is common for materials for a number of towers to be delivered to site at the same time. Erection requires the use of a mobile crane to hold prefabricated elements in position. This process is relatively rapid as each tower is prefabricated off site.
- Stringing of cables which also requires the use of cranes and mobile hoists to enable workers to fix insulators and attachments and to pull cables between towers.

The above process is relatively clean, rapid and only affects the area immediately surrounding each tower location.

An operating servitude will have to be registered in favour of Eskom to protect the alignment. The servitude will prevent development and any other use that could compromise the overhead line. It will not prevent current agricultural uses or access beneath the line.

The following typical dimensions are likely to apply to the project;

- Tower height: up to 32m subject to tower selection.
- Tower spacing: 225-250m subject to terrain.
- Operating servitude: 31m (15.5m x 2).

Plate 3, Typical 30m high 132kV self-sustaining steel monopole tower

3 AFFECTED LANDSCAPE

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 dictated by height and visual mass of the proposed development, surrounding landscape and built features such as vegetation, ridgelines and buildings as well as the curvature of the earth.

As the terrain is relatively flat, the vegetation relatively low and built elements few and far between, the height of the highest proposed elements and the earth's curvature have been used to set the initial study area.

Whilst hard layout information was not available at the time of reporting, from experience of similar projects, the highest elements of the proposed development are likely to be the buss bars associated with collector substations. These are likely to be in the order of 10m high. These elements are only proposed to be associated with the onsite substation. The PV solar panels, small operational buildings and the BESS are likely to be substantially lower.

A mathematical calculation has been used to indicate the Approximate Visual Horizon due to the earth's curvature as seen from the highest point of the proposed development. The formula used is a universally accepted formula that is used widely for navigation and is indicated in **Appendix III**. This indicates that in a flat landscape the tallest elements noted above are likely to be visible from the distances indicated below:

DEVELOPMENT ELEMENT	APPROXIMATE LIMIT OF VISIBILITY (ALV)
Upper, relatively transparent sections of the MTS including Bus Bars (approximately 20m high)	16.0km
Lower, relatively opaque sections of the MTS including buildings and transformers (approximately 10m high)	11.3km
132kV overhead power line (approximately 30m high)	19.6km
400kV Loop In Loop Out overhead power line (approximately 40m high)	22.6km

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

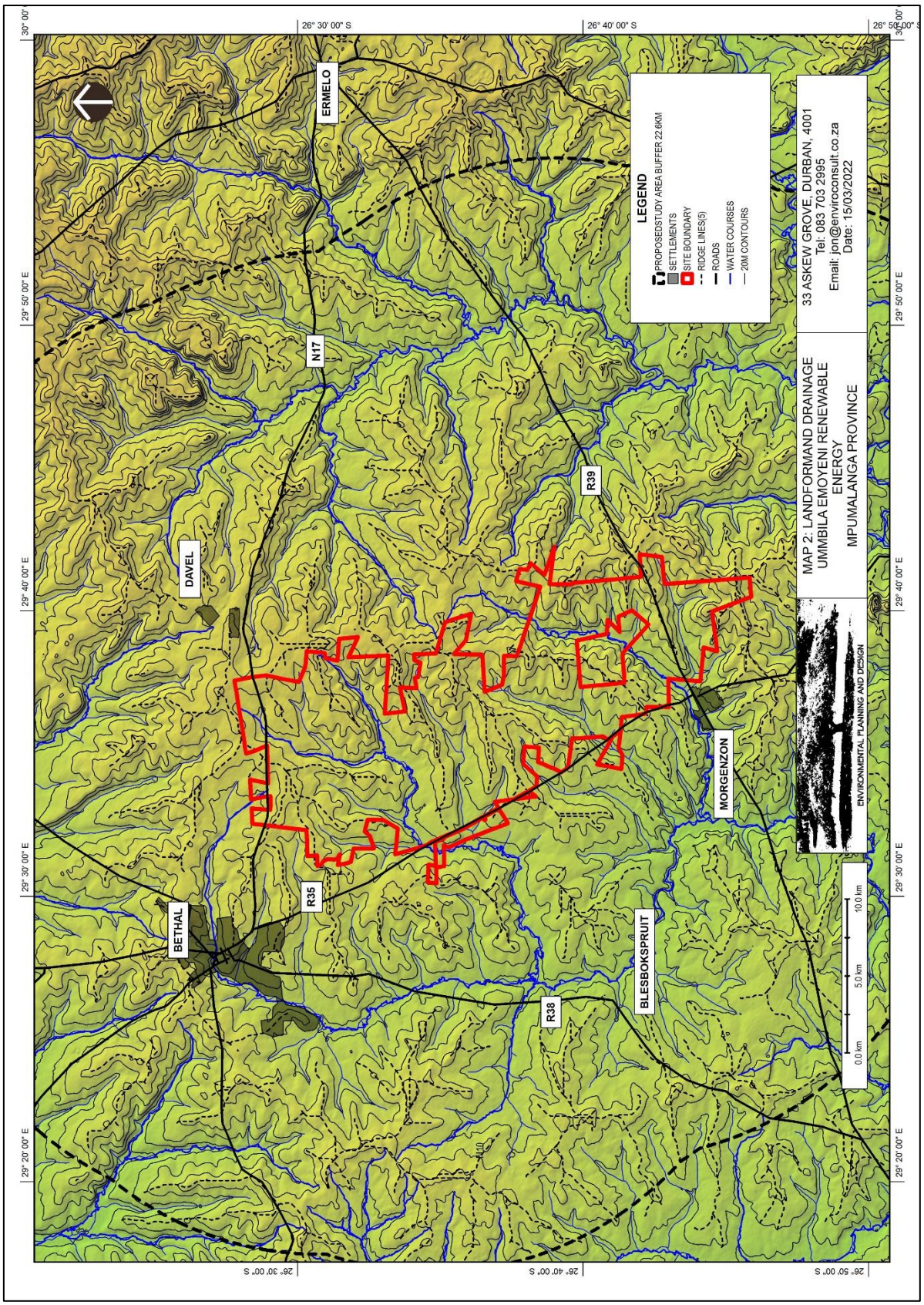
The general landform is undulating and is comprised of a series of similar size rounded ridgelines that extend approximately 20-30m above broad valley lines.

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 Blebokspruit 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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29° 40' 00" E
29° 30' 00" E
29° 20' 00" E
ERMELO
N17
R39
DAVEL
BETHAL
R35
R38
BLESBOKSPRUIT
MORGENZON
LEGEND
PROPOSEDSTUDY AREA BUFFER 22.8KM
SETTLEMENTS
SITE BOUNDARY
RIDGE LINES(5)
ROADS
WATER COURSES
20M CONTOURS
0.0 km
5.0 km
10.0 km
MAP 2: LANDFORMAND DRAINAGE
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3.2.2 NATURE OF DEVELOPMENT AND LANDCOVER

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

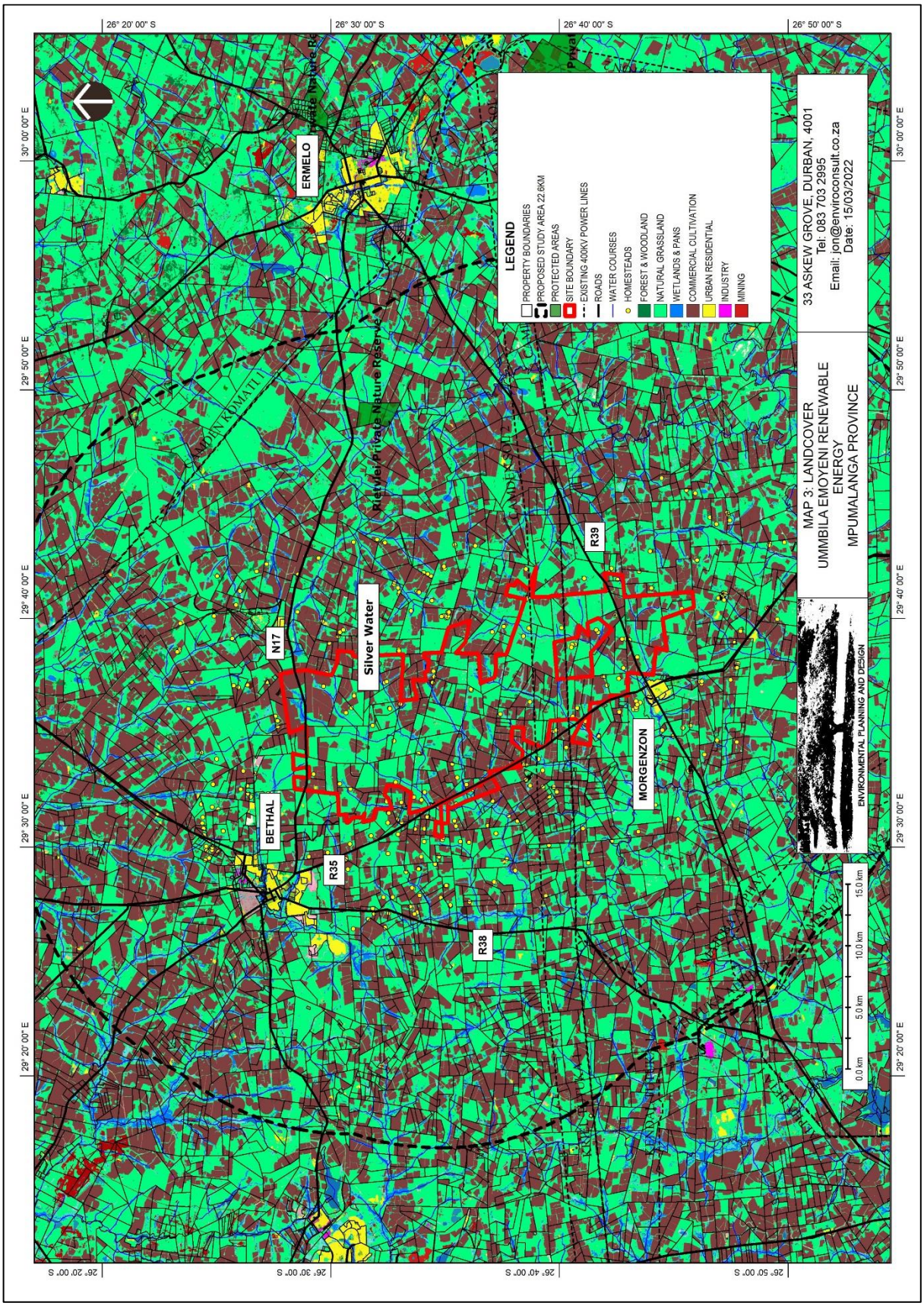
- Natural Grassland which is interspersed with areas of cultivation but is largely uninterrupted by cultivation;
- Arable agriculture / cultivation which in interspersed within the natural grassland matrix. Main crop types include sunflower seed production, sorghum, rye and potatoes;
- Settlement that 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 appears to be 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 N11 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 and medium voltage lines in close proximity to roads.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29° 20' 00" E
ERMELO
Private Nature Re
Private
MPUMALANGA
KWAZULU-NATAL
Rietvlei Private Nature Reserve
Silver Water
N17
R39
R35
R38
BETHAL
MORGENZON
LEGEND
PROPERTY BOUNDARIES
PROPOSED STUDY AREA 22.6KM
PROTECTED AREAS
SITE BOUNDARY
EXISTING 400KV POWER LINES
ROADS
WATER COURSES
HOMESTEADS
FOREST & WOODLAND
NATURAL GRASSLAND
WETLANDS & PANS
COMMERCIAL CULTIVATION
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MAP 3: LANDCOVER
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0.0 km
5.0 km
10.0 km
15.0 km

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 focus area including:

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

There is one protected area, the Rietvlei Private Nature Reserve, that is located approximately 15.7km to the east of the proposed site. This protected area is highly unlikely to be affected by the proposed PVSEF.

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[3] indicate that the predominant vegetation types within the vicinity of the proposed site include:

- 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.

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

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.

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.

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 Solar Energy Facility or the MTS.

Plate 4, Rural Landscape Character Zone
This landscape is typified by low rolling hills and a matrix of natural grassland and arable crop production.

Plate 5, Industrial Landscape Character Zone
Large scale industry (Tutuka Power Station) is located some distance from the proposed site and is unlikely to be visible.

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 maintenance of an outlook for successfully attracting guests and users. Residential areas could depend on outlook for the enjoyment of the area by residents and for maintaining property values. A route that is particularly important for tourism may also be dependent on outlook for the maintenance of a suitable experience for users.

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, Ermelo and Morgenzon;**
    - The **Silver Water Reserve**; and
    - The Protected Area of **Rietvlei Nature Reserve**.

- Point Receptors that include;
    - There are a number of **Local Farmsteads and Homesteads** located both within the focus 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 that run through the study area.** All of these are used mainly by local people with little tourism / recreational importance.

Plate 6, Local Farmstead

Plate 7, Local Roads

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:	Viewers' attention may be focused on landscape. These include: • **Homesteads; and** • **Users of main and local roads.**

SIGNIFICANCE	LCA	RECEPTORS
	• **The Natural Grassland LCA.**	
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 protected area of the Rietvlei Reserve; and** • **Visitors to the Silver Stream Nature Reserve.**

4 THE NATURE OF POTENTIAL VISUAL IMPACTS

4.1 THE NATURE OF LIKELY IMPACTS

4.1.1 General

Landscape and Visual Impacts could include general degradation of the Landscape Character Areas due to the development that may detract from the existing character 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. 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. This effect is known as **Visual Absorption Capacity (VAC).**

b. Change in specific views within the affected area from 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 can be 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, it is proposed that 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 are expected to relate largely to intrusion.

4.1.2 Effects of Distance, Vegetation, Other Development, Topography and Weather

Whilst the initial study area might be set at a distance of 22.6km from the proposed site boundary as this is the theoretical limit of the area that might be affected, it should be noted that the majority of elements associated with the proposed development are highly unlikely to be visible to visually obvious to their 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 reduce. 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.

The 132kV Overhead Power Line

Plate 8 indicates a view along the line of a 132kV overhead power line. The views are 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 19.6km in reality and in the majority of conditions it is unlikely to be obvious at distances greater than 2-3km.

It is possible that either lattice or mono pole towers could be used for the development. Due to the fact that from close views lattice towers tend to read as a more solid structure and the cross section of pole used for a monopole is significantly smaller than the cross section of a lattice tower, monopoles tend to be less imposing from close up. From a distance, however, lattice towers are more visually permeable and the more solid monopole structure is generally more obvious. Despite the observations above, the potential visibility of monopole and lattice towers is likely to be similar.

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.

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

Plate 8, A view along the line of a 132kV overhead power line with monopole towers

Plate 9, A view along the line of an existing similar overhead power line with steel lattice towers

400kV Overhead Power Line

Plates 10 to 12 inclusive are photographs of existing overhead 400kV power lines, indicating the types of impact that might be expected when the system is in operation. 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.

Plate 10 - Existing 400kV overhead transmission lines, obvious in the landscape at a distance of 1km to approximately 3-4km. Set against the dark landscape backdrop the towers are more obvious than when set against a lighter coloured sky

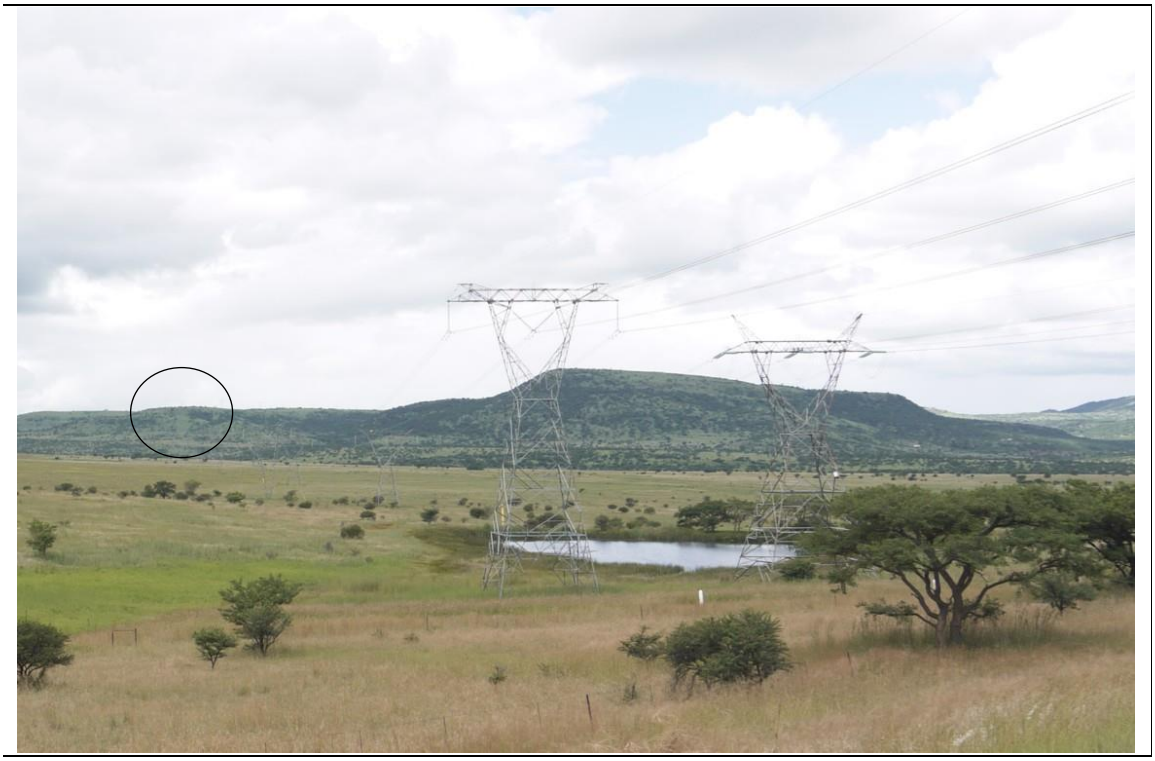


Plate 11 - Existing 400kV overhead transmission lines. Clearance of the servitude is the most obvious landscape change at a distance (approximately 5-7km)

Plate 12, Existing 400kV double overhead transmission lines are highly obvious as they cross ridgelines from short distance (approximately 1km).

Main Transmission Substation

Plate 13 indicates a view of the existing Hector 400/132kV Sub-Station in KwaZulu-Natal. This is similar in scale to the proposed MTS

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. The more opaque lower elements combine visually with the fence line making an obvious horizontal element at ground level emphasising the compound area.

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

Plate 13, Distance view (1.5-2.0km) of the existing Hector 400kV Sub Station near Hammersdale.
Note: the 400kV towers entering the site are the tallest most obvious elements from this distance.

5 LANDSCAPE AND VISUAL SENSITIVITY

5.1 GENERAL

Even though the ALV of larger elements extends further than existing protected areas, considering the slim nature of these elements and the likely visual effects of distance, it is highly unlikely that the proposed project will be visible.

The affected landscape is also similar in nature to much of the region, Therefore there are no rate landscapes that deserve protection.

It appears therefore that the key issue is to ensure that impacts on receptors are minimised.

The most sensitive receptors are likely to include:

a) The Rietvlei Protected Area;
b) The Silver Stream Reserve;
c) The N17;
d) The R35:
e) The R38;
f) The R39;
g) The urban area of Bethal;
h) The urban area of Morgenzon; and
i) Local homesteads.

This section highlights the areas of the site that should be focused on in order to minimise impacts on these receptors.

5.2 DEVELOPMENT GUIDELINES

The elements associated with the proposed grid connection are to a degree subject to the locations of the proposed renewable energy projects. At this early stage it is not possible to define these areas. Because of this it is only possible to provide general guidelines.

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:

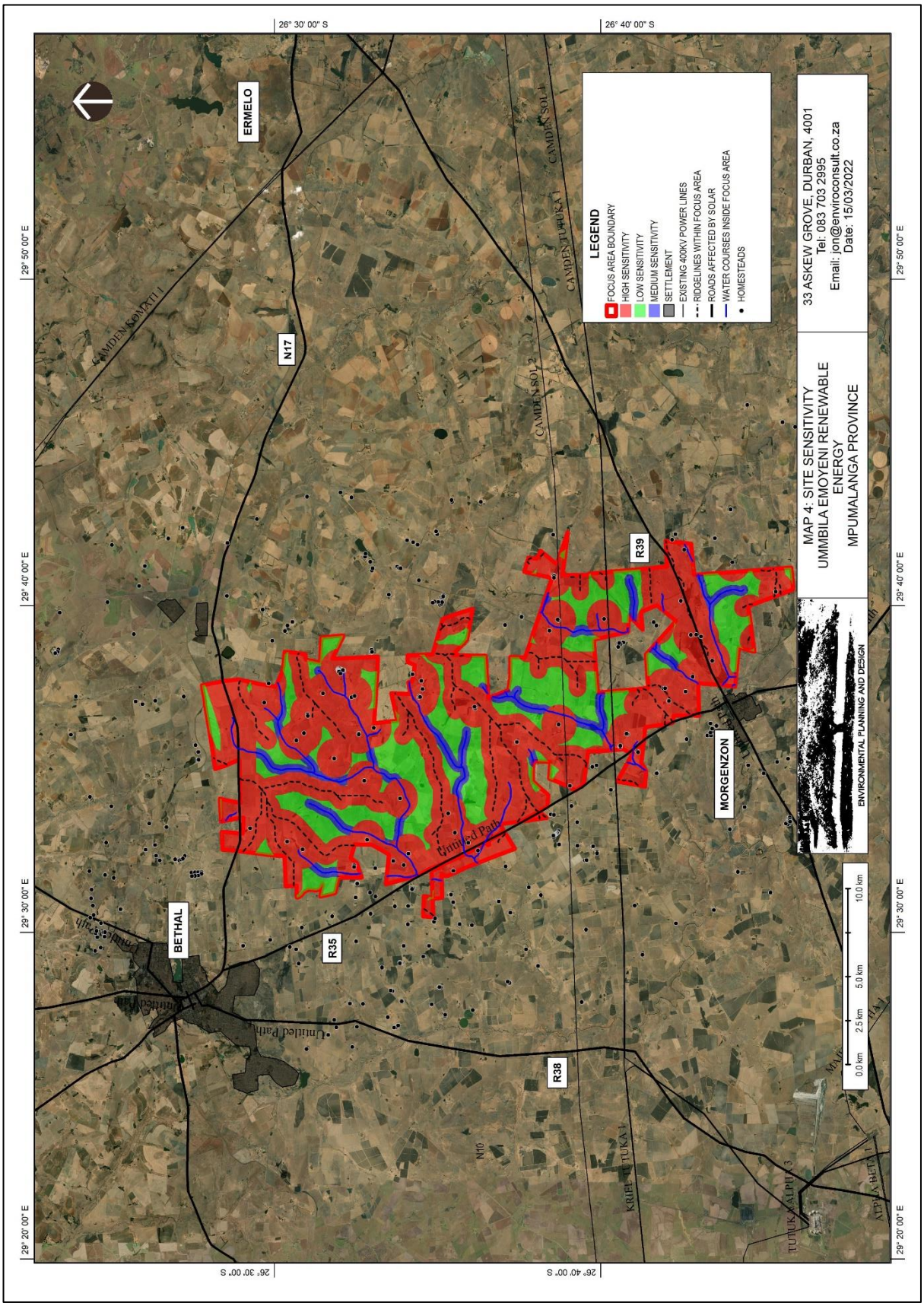
- Areas immediately surrounding settlement and homesteads development of which is likely to significantly change the character of views for residents. A 1000m buffer is proposed which should be sufficient to ensure that development does not totally dominate views. It is possible that receptors (owners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


26° 30' 00" S
26° 40' 00" S
29° 50' 00" E
29° 40' 00" E
29° 30' 00" E
29° 20' 00" E
ERMELO
N17
R39
R35
R38
BETHAL
MORGENZON
N10
CAMDEN SOL 1
CAMDEN SOL 2
CAMDEN SOL 3
TUTUKA 1
TUTUKA ALPHA 3
ATPLA BETA 1
Untitled Path
LEGEND
FOCUS AREA BOUNDARY
HIGH SENSITIVITY
LOW SENSITIVITY
MEDIUM SENSITIVITY
SETTLEMENT
EXISTING 400KV POWER LINES
RIDGELINES WITHIN FOCUS AREA
ROADS AFFECTED BY SOLAR
WATER COURSES INSIDE FOCUS AREA
HOMESTEADS
0.0 km
2.5 km
5.0 km
10.0 km
MAP 4: SITE SENSITIVITY
UMMBILA EMOYENI RENEWABLE ENERGY
MPUMALANGA PROVINCE
ENVIRONMENTAL PLANNING AND DESIGN
33 ASKEW GROVE, DURBAN, 4001
Tel: 083 703 2995
Email: jon@enviroconsult.co.za
Date: 15/03/2022

6 IDENTIFICATION AND INITIAL ASSESSMENT OF ISSUES

6.1 IMPACTS TO BE CONSIDERED

Possible impacts 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;
f) Potential lighting impacts; and

Subject to the proposed layout and the visibility of the proposed project, these issues will be considered in the context of possible degradation of Landscape Character Areas, visual effects identified and possible cumulative influence of other possible projects that exist or are planned in the vicinity.

At this stage of the project there is no indication of the proposed development location or layout. Possible impacts can therefore only be discussed at a generic level.

6.2 SIGNIFICANCE OF ISSUES

Sensitivity mapping provides an indication of the likelihood of significant issues, however, without an indication of the possible location and layout of the project it is not possible to be confident regarding possible significance of impacts.

6.3 INITIAL ASSESSMENT OF ISSUES

6.3.1 Landscape Change

Potential Impact			
Issue	**Nature of Impact**	**Extent of Impact**	**No-Go Areas**
Potential change to the rural landscape	Direct impacts: **Loss of rural landscape**. The landscape is not protected. The character is also relatively common within the region. Indirect impacts: No indirect impacts	Local	None identified at this stage
Description of expected significance of impact Without an indication of the possible location and layout of the project it is not possible to be confident regarding possible significance of impacts. The industrialisation of the landscape could be in keeping with surrounding development patterns in that it typically consists of contiguous areas with rural character within which relatively large scale industrial elements are located.			

The proposed development will however result in a reduction of rural landscape.
Gaps in knowledge & recommendations for further study The proposed development layout. **Recommendations with regards to general field surveys** Assessing the extent of change that will be obvious.

6.3.2 Silver Stream Reserve

Potential Impact			
Issue	**Nature of Impact**	**Extent of Impact**	**No-Go Areas**
Potential visual impact experienced by visitors to Silver Stream Reserve	**Direct impacts:** Loss of visitor experience of rural landscape that is no doubt enhanced by view over the water body. The view could be industrialised by the proposed development. **Indirect impacts**: Reduction in visitor numbers	Local	None identified at this stage
Description of expected significance of impact The industrialisation of views of the landscape within the reserve. Without an indication of the possible location and layout of the project it is not possible to be confident regarding possible significance of impacts. It has to be assumed that people visit the reserve for its tranquil rural nature. If the proposed development should change this situation, it could be a significant issue.			
Gaps in knowledge & recommendations for further study The proposed development layout. **Recommendations with regards to general field surveys** Assessing the extent of the proposed development that is likely to be visible from within the reserve.			

6.3.3 Local Roads

Potential Impact			
Issue	**Nature of Impact**	**Extent of Impact**	**No-Go Areas**
Potential visual impacts as experienced by users of adjacent local roads particularly users of the N17, the	Direct impacts: **Industrialisation of views from roads**. Indirect impacts: **No indirect impacts**	Local	None identified at this stage

R35, the R38 and the R39			

Description of expected significance of impact
The landscape is neither protected or of a particularly high quality. The landscape character is also relatively common in the region.

Views over large scale industrial development is common from local roads.

Without an indication of the proposed location and layout of the project it is not possible to be confident regarding possible significance of impacts. However, as long as the proposed development does not dominate views from roads, the change in view is unlikely to have a high significance.

Gaps in knowledge & recommendations for further study
The proposed development layout.

Recommendations with regards to general field surveys
Assessing the extent of change that will be obvious.

6.3.4 Homesteads

Potential Impact			
Issue	**Nature of Impact**	**Extent of Impact**	**No-Go Areas**
Potential visual impacts as experienced by residents of homesteads	Direct impacts: **Industrialisation of views from homesteads**. Indirect impacts: **Possible loss of income from homesteads that have a tourism related use.**	Local	None identified at this stage

Description of expected significance of impact
It is possible that residents of homesteads that have a purely agricultural use may not be concerned regarding possible change in view due to the proposed development. However, for residents of homesteads with a tourism related use, subject to the proximity and extent of the proposed development that is visible, this could be an important issue.

Without an indication of the possible location and layout of the project it is not possible to be confident regarding possible significance of impacts.

Gaps in knowledge & recommendations for further study
The proposed development layout.

Recommendations with regards to general field surveys
Assessing the extent of change that will be obvious.

Potential Impact			
Issue	**Nature of Impact**	**Extent of Impact**	**No-Go Areas**
Potential visual impacts as experienced by residents of local settlements.	Direct impacts: **Industrialisation of views from residential areas**. Indirect impacts: **Possible loss of property value due to change in outlook.**	Local	None identified at this stage
Description of expected significance of impact Without an indication of the possible location and layout of the project it is not possible to be confident regarding possible significance of impacts. However, views of the proposed development are likely to be largely screened by vegetation and structures from the majority of settlement areas. Views could be possible from a limited number of dwellings on settlement edges, however, it is likely that these will be seen at a distance. It is unlikely therefore that views of the proposed development as seen from residential areas will be a significant issue.			
Gaps in knowledge & recommendations for further study The proposed development layout. **Recommendations with regards to general field surveys** Assessing the extent of change that will be obvious.			

6.3.5 Lighting

Potential Impact			
Issue	**Nature of Impact**	**Extent of Impact**	**No-Go Areas**
Lighting Impacts.	Direct impacts: **Light pollution affecting areas that would otherwise be dark at night**. Indirect impacts: **No indirect impact.**	Local	None identified at this stage
Description of expected significance of impact Lighting is likely to be required for security, maintenance and the safety / convenience of workers. There are other large scale industrial operations including a power station and mines, that create islands of light in the night time sky. There are also numerous homesteads that create low levels of light. It is possible to mitigate lighting impacts to a large degree through design, the use of motion sensors for security lighting and ensuring that lighting is only used in areas where workers are located / working.			

Without an indication of the possible location and layout of the project it is not possible to be confident regarding possible significance of impacts. However, if suitable mitigation measures are used, it is unlikely that lighting impacts will be significant.

Gaps in knowledge & recommendations for further study
The proposed layout and the nature of proposed lighting.

Recommendations with regards to general field surveys
Assess existing levels of impact.

7 RECOMMENDED ASSESSMENT METHODOLOGY

7.1 REQUIREMENTS IN ACCORDANCE WITH THE WESTERN CAPE GUIDELINES

The criterion recommended by the Western Cape Guidelines for justification of level of input for a VIA is the expected level of visual impact. This categorisation is derived from the following matrix;

Type of environment	Type of development (see Box 3) Low to high intensity				
	Category 1 development	Category 2 development	Category 3 development	Category 4 development	Category 5 development
Protected/wild areas of international, national, or regional significance	Moderate visual impact expected	High visual impact expected	High visual impact expected	Very high visual impact expected	Very high visual impact expected
Areas or routes of high scenic, cultural, historical significance	Minimal visual impact expected	Moderate visual impact expected	High visual impact expected	High visual impact expected	Very high visual impact expected
Areas or routes of medium scenic, cultural or historical significance	Little or no visual impact expected	Minimal visual impact expected	Moderate visual impact expected	High visual impact expected	High visual impact expected
Areas or routes of low scenic, cultural, historical significance / disturbed	Little or no visual impact expected. Possible benefits	Little or no visual impact expected	Minimal visual impact expected	Moderate visual impact expected	High visual impact expected
Disturbed or degraded sites / run-down urban areas / wasteland	Little or no visual impact expected. Possible benefits	Little or no visual impact expected. Possible benefits	Little or no visual impact expected	Minimal visual impact expected	Moderate visual impact expected

Category 1 development:
e.g. nature reserves, nature-related recreation, camping, picnicking, trails and minimal visitor facilities.

Category 2 development:
e.g. low-key recreation / resort / residential type development, small-scale agriculture / nurseries, narrow roads and small-scale infrastructure.

Category 3 development:
e.g. low density resort / residential type development, golf or polo estates, low to medium-scale infrastructure.

Category 4 development:
e.g. medium density residential development, sports facilities, small-scale commercial facilities / office parks, one-stop petrol stations, light industry, medium-scale infrastructure.

Category 5 development:
e.g. high density township / residential development, retail and office complexes, industrial facilities, refineries, treatment plants, power stations, wind energy farms, power lines, freeways, toll roads, large-scale infrastructure generally. Large-scale development of agricultural land and commercial tree plantations. Quarrying and mining activities with related processing plants.

From reference to the categorisation of development included in the Western Cape Guidelines as indicated in the table above, the proposed development if standing on its own should be considered as a Category 5 development.

Based on the predicted visual impacts described in this report, and on the basis that the proposed new facility, it seems that the proposed development could have significant local impacts. Because of this it is proposed that a Level 4 Assessment is undertaken in accordance with the Western Cape Guidelines.

In accordance with the Western Cape Guidelines, a Level 4 Assessment requires the following input:

- Verification of issues raised in scoping phase, and site visit;
- Description of the receiving environment and the proposed project;
- Establishment of view catchment area and receptors;
- Indication of potential visual impacts using established criteria;
- Inclusion of potential lighting impacts at night;
- Description of alternatives, mitigation measures and monitoring programmes;
- Complete 3D modeling and simulations, with and without mitigation; and
- Review by independent, experienced visual specialist (if required).

If the proposed development is located and designed in such a manner that it has minimal impact on identified visual receptors, it is possible that a Level 3 Assessment might be motivated. A Level 3 Assessment requires the same input as Level 4 but without ***complete 3D modeling and simulations, with and without mitigation.***

7.2 DETAILED METHODOLOGY

As indicated above, confirmation of the following is required in order to investigate and finalise the issues and impacts highlighted by this initial LVIA scoping exercise:

a) Confirmation of the layout of the facility; and
b) Undertake a site visit to assess the proposed development.

The following methodology will be used in preparation of the LVIA report.

7.2.1 Identification of issues raised in scoping phase, and site visit

Likely issues have already been identified in this scoping analysis. These issues will be verified from a site visit as well as responses from stakeholders to the scoping documentation.

It is possible that additional impacts might be identified form the site visit and from comments by stakeholders.

7.2.2 Description of the receiving environment and the proposed project

The receiving environment has been described and categorised. This will be verified from a site visit.

7.2.3 Establishment of view catchment area, view corridors, viewpoints and

receptors

Zones of theoretical visibility will be prepared and visual receptors have been established from GIS analysis. These will be verified from a site visit. Existing large scale industrial development should help to provide a useful guide as to likely visibility of the proposed development.

Viewpoints will be identified from a site visit to represent views of visual receptors.

7.2.4 Indication of Potential Visual Impacts using Established Criteria

Given that the existing landscape character is a relatively cohesive rural landscape, it will be assumed that affected receptors are likely to prefer views of a rural landscape rather than an industrial landscape

Criteria will include:

- The extent of likely industrialisation as seen by each receptor; and
- The sensitivity of each receptor to change.

Impacts will be assessed using a numerical assessment system that has been adopted by Savannah Environmental for the overall EIA assessment.

7.2.5 Inclusion of Potential Lighting Impacts at night

This will be assessed through comparison of the likely change in night time lighting patters due to the proposed development.

7.2.6 Description of Alternatives, Mitigation Measures and Monitoring Programme

This will be compiled from experience of similar projects and through discussion with the applicant.

7.2.7 Complete 3D Modelling and Simulations With and Without Mitigation

Key development elements will be modelled using CAD. Views of the model will be superimposed onto photographs from key viewpoints.

Modelling will be undertaken in sufficient detail to illustrate the location and visual mass of development rather than detailed finishes.

REFERENCES

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

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

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

Best Management Practices for Reducing Visual Impacts of Renewable Energy Facilities on BLM Administered Lands *United States Department of the Interior, Bureau of Land Management*, 2013.

Appendix 6, EIA Regulations (2014) as amended, promulgated under section 24 of the National Environmental Management Act, 107 of 1998. Department of Forestry Fisheries and the Environment.

APPENDIX I

ASSESSOR'S CURRICULUM VITAE

ENVIRONMENTAL PLANNING AND DESIGN

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 in Environmental Assessment 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, and numerous solar plant projects.

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

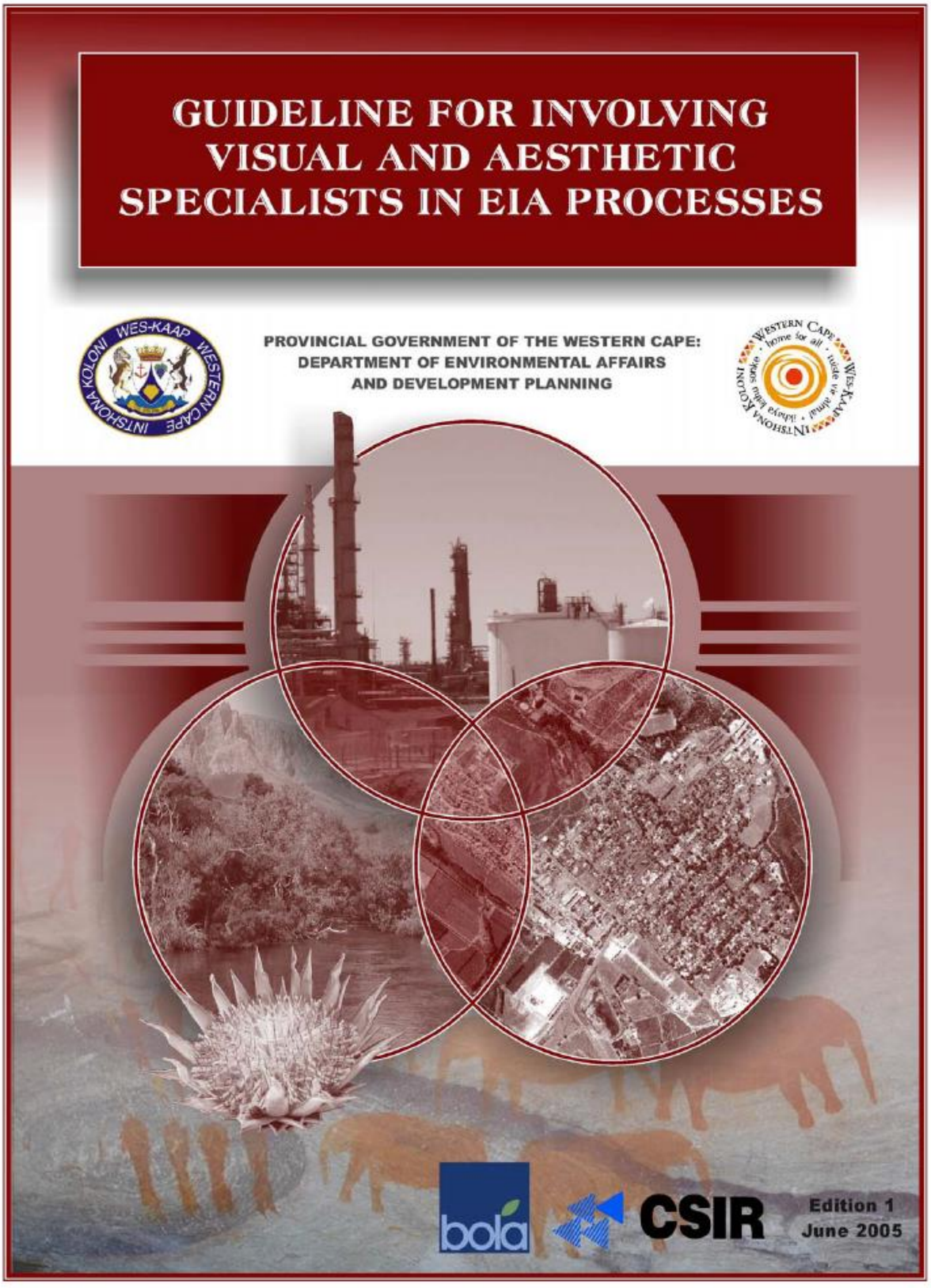
Impact Assessment for Umgeni Water.

- **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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Stakeholders engaged in the guideline development process:

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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.