Ummbila Emoyeni Renewable Energy Farm (Pty) Ltd

PROPOSED UMMBILA EMOYENI RENEWABLE ENERGY FARM – WIND ENERGY FACILITY, MPUMALANGA PROVINCE

LANDSCAPE & VISUAL IMPACT ASSESSMENT REPORT

August 2022

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1 INTRODUCTION

1.1 GENERAL

This Landscape and Visual Impact Assessment Report forms part of the Environmental Impact Assessment process that is being undertaken for the proposed Wind Energy Facility that forms part of the Ummbila Emoyeni Renewable Energy 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 Wind Energy Facility associated with the Renewable Energy Project are;

South	26^0	32'	23.42"
East	29^0	33'	48.47"

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, 24, 25
Farm 454 – Oshoek	4, 13, 18
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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

The proposed Wind Energy Facility is located throughout these properties.

No site alternatives are under consideration.

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).

From reference to the Western Cape Guideline, a Level 4 Assessment should be considered 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;
7. 3D modelling and simulations with and without mitigation; and
8. Review by independent, experienced visual specialist (if required).

From the site visit, the proposed solar component of the project is likely to be relatively visible to surrounding receptors. A Level 4 Assessment has therefore been undertaken.

1.5 LIMITATIONS AND ASSUMPTIONS

The following limitations and assumptions should be noted:
A site visit was undertaken over a two day period (1st and 2nd October 2021).

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
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

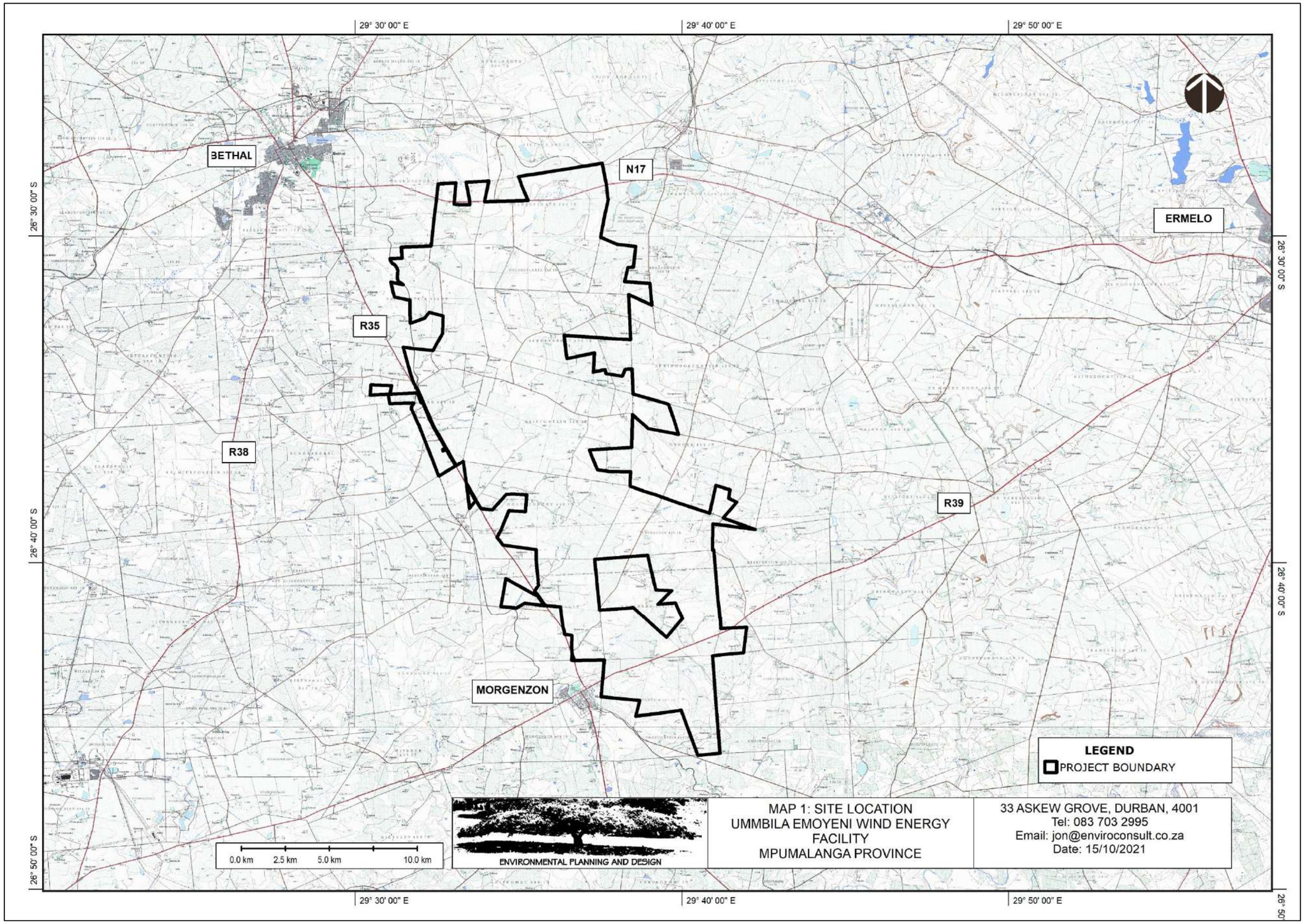
Visibility of the proposed facilities has been assessed using the Global Mapper Viewshed tool.

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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ERMELO
R35
R38
R39
MORGENZON
LEGEND
PROJECT BOUNDARY
0.0 km 2.5 km 5.0 km 10.0 km
ENVIRONMENTAL PLANNING AND DESIGN
MAP 1: SITE LOCATION
UMMBILA EMOYENI WIND ENERGY FACILITY
MPUMALANGA PROVINCE
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Email: jon@enviroconsult.co.za
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.

2.2 PROJECT COMPONENTS

The Wind Energy Facility is proposed to accommodate the following infrastructure:

Infrastructure	Footprint and dimensions
Number of turbines	Up to 111 turbines
Hub Height	Up to 200m
Tip Height	Up to 300m
Contracted Capacity	Up to 666MW (individual turbines between 6MW and 15MW in capacity each)
Tower Type	Steel or concrete towers can be utilised at the site. Alternatively, the towers can be of a hybrid nature, comprising concrete towers with top steel sections.
Area occupied by the on-site collector substations	3 x on-site collector substations (IPP Portion) of 5ha each
Capacity of on-site collector substations	33kV/132kV
Cabling between the turbines	Cabling will be installed underground where feasible at a depth of up to 1.5m to connect the turbines to the on-site facility substation. Where not technically feasible to place cabling underground, this will be installed above-ground. The cabling will have a capacity of up to 33kV.
Laydown and Operations and Maintenance (O&M) hub	~ 300m x 300m, comprising: * Batching plant of up to 4ha to 7ha * Construction compound (temporary) of approximately 6 ha. * O&M office of approximately 1.5ha.
Access and internal roads	Wherever possible, existing access roads will be utilised to access the project site and development area. It is unlikely that access roads will need to be upgraded as part of the proposed development. Internal roads of up to 12-13m in width will be required to access each turbine and the on-site substation.
Laydown and crane hardstand areas (at each turbine position)	~75m x 120m
Turbine foundation	To be determined
Grid connection	The grid connection infrastructure will include a 400/132kV Main Transmission Substation (MTS), to be located between the Camden and SOL Substations, which will be looped in and out of the existing Camden-Sol 400kV transmission line; on-site switching stations (132kV in capacity) at each renewable energy facility (Eskom Portion); and 132kV power lines from the switching stations at each renewable energy facility to the new 400/132kV MTS. The grid connection infrastructure will be assessed as part of a separate Environmental Impact Assessment process in support of an application for Environmental Authorisation.
Temporary infrastructure	Temporary infrastructure, including laydown areas, hardstand 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.

2.3 WIND ENERGY TECHNOLOGY

A Wind Energy Facility (WEF) is a group or groupings of wind turbine and ancillary equipment that use the wind to generate electricity.

A wind turbine consists of three rotation blades and a nacelle mounted at the tip of a tapered tower. Refer to **Figure 1** for an illustration of the main components of a wind turbine. The mechanical power generated by the rotation of the blades is transmitted to the generator housed within the nacelle, via a gearbox and drive train.

A turbine is designed to operate continuously, unattended and with low maintenance for more than 20 years. Once operating, a WEF can be monitored and controlled remotely with a mobile team for maintenance, when required.

The Client proposes a maximum of 111 turbines. The proposed maximum individual turbine size is 6 - 15MW.

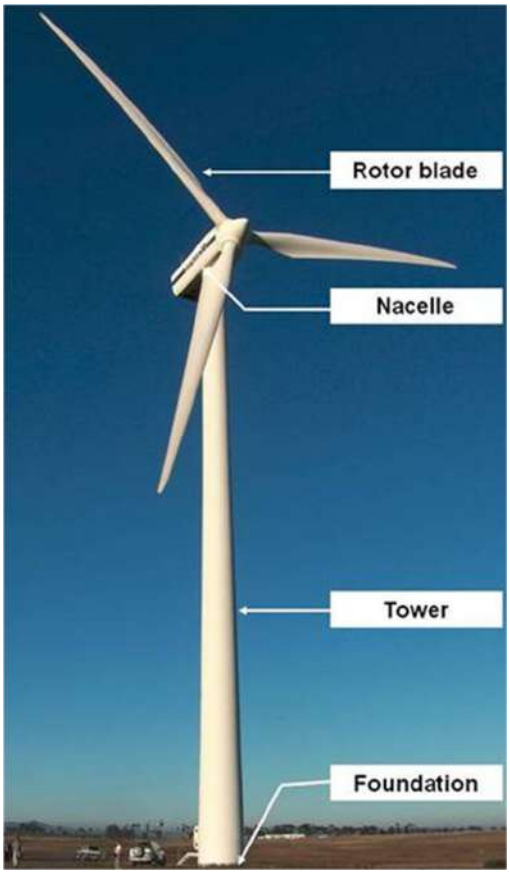


Figure 1: Image of a typical wind turbine.

2.4 33KV / 132KV ON-SITE SUBSTATION

The client needs to build three on-site substation facilities in order to increase the voltage fed from turbine clusters from 33kv to 132kV to connect to the Main Transmission Substation.

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 main elements of the On-Site Substation include:

- The incoming 33kV power line which is likely to be underground.
- A security fence line which typically will be a steel palisade or mesh fence approximately 3m high;
- Transformers that will be used to step the power up from 33kV to 132kV.These are likely to be large solid structures in the order of 5m high.
- Buildings to house control and switching infrastructure, stores, restrooms and staff facilities. These are likely to be single storey buildings up to approximately 5-6m high.
- Security lighting which is likely to be mounted on masts surrounding the substations. These are likely to be in the order of 10m high.
- Bus bars that will support the outgoing power transmission lines. These are likely to be comprised of a steel lattice structure in the order of 10m high.

Each on-site substation will be split into two elements. The developer will be responsible for the section of each substation that steps up the power to 132kV. The developer's section of the on-site substation will be connected to a switching section of each substation that will be the responsibility of Eskom. The Eskom section of the on-site substations will be subject to a separate assessment.

Figure 2, Typical On-Site Substation
Note: Bus bars are the highest substation elements in picture

2.5 POWER LINE CONNECTION FROM THE ON SITE SUBSTATION TO THE MAIN TRANSMISSION SUBSTATION

From the on-site substations, the power produced will be distributed to the Collector Substations via overhead power lines with a capacity up to 132kV.

Three power lines will be required to connect the 3 x on-site substations to the Main Transmission Substation.

These overhead power lines will be subject to a separate assessment.

Plate 1, Eskom 40m high type 517A tower

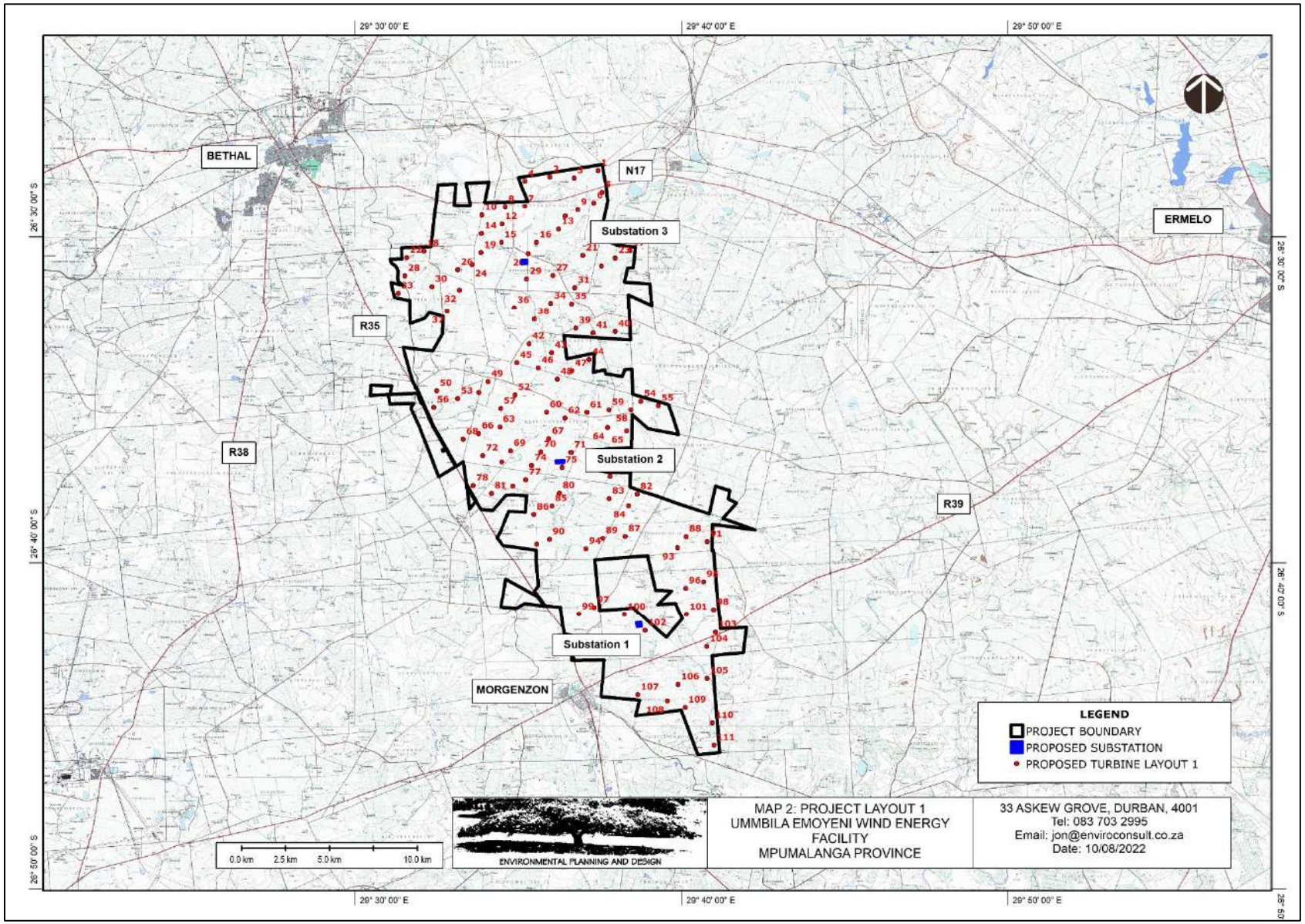
2.6 ALTERNATIVE PROJECT LAYOUTS

While no specific alternatives are proposed for this project, an optimised layout that is informed by the sensitivities identified through the Impact Assessment process has been developed:

- Layout 1 is the initial layout that was considered by the assessment team. Layout 1 includes 111 turbines;

- Layout 2 was prepared due to fact that a number of turbines are located within highly ecologically sensitive areas. Layout 2 therefore attempts to adjust the layout maintaining the required number of turbines whilst minimising ecological impacts. Layout 2 includes 111 wind turbines.

The location of on-site substations is the same for each turbine layout.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BETHAL
ERMELO
MORGENZON
N17
R35
R38
R39
Substation 3
Substation 2
Substation 1
LEGEND
PROJECT BOUNDARY
PROPOSED SUBSTATION
PROPOSED TURBINE LAYOUT 1
0.0 km 2.5 km 5.0 km 10.0 km
ENVIRONMENTAL PLANNING AND DESIGN
MAP 2: PROJECT LAYOUT 1
UMMBILA EMOYENI WIND ENERGY FACILITY
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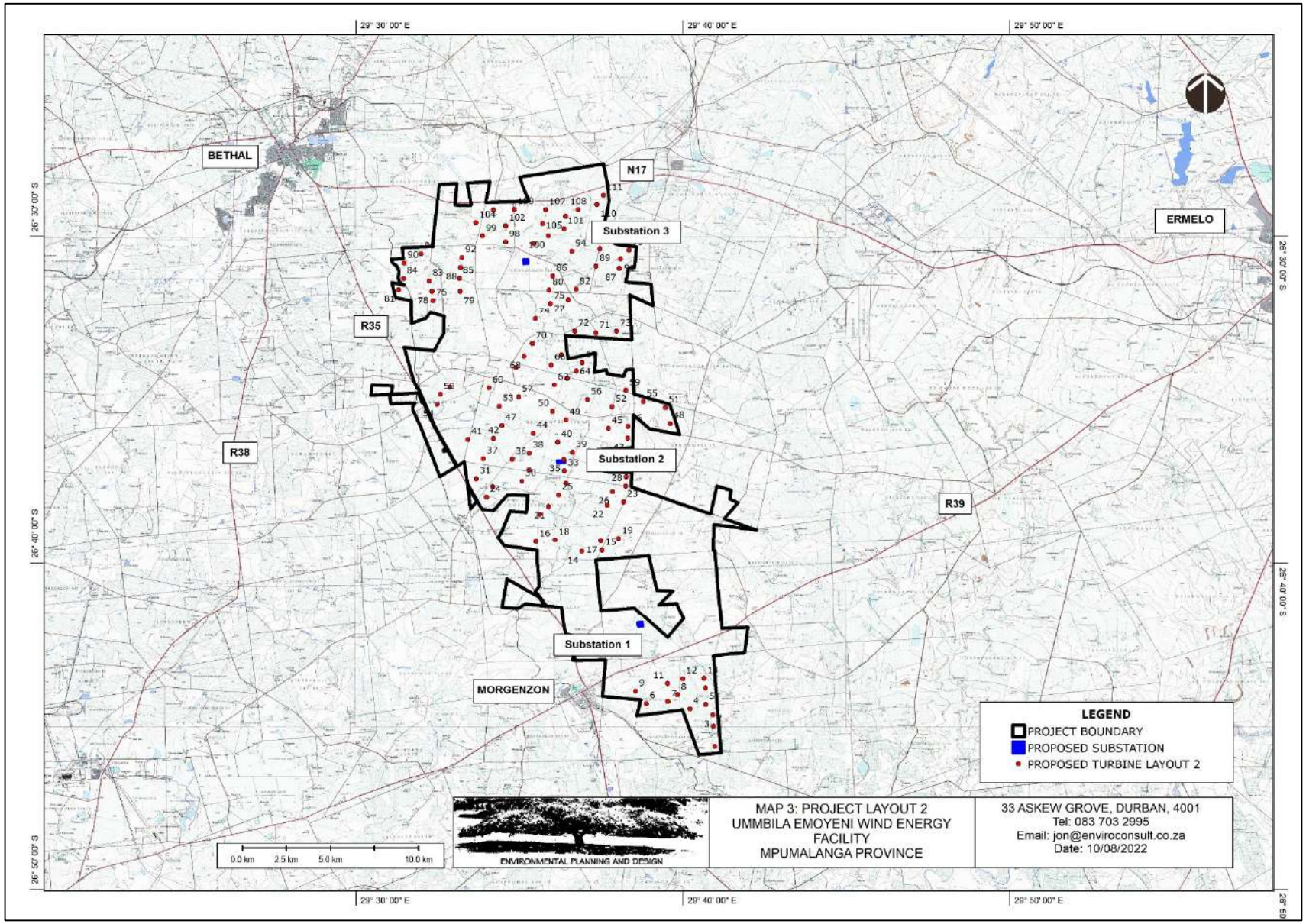
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BETHAL
N17
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R35
R38
R39
Substation 3
Substation 2
Substation 1
MORGENZON
LEGEND
PROJECT BOUNDARY
PROPOSED SUBSTATION
PROPOSED TURBINE LAYOUT 2
0.0 km 2.5 km 5.0 km 10.0 km
ENVIRONMENTAL PLANNING AND DESIGN
MAP 3: PROJECT LAYOUT 2
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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 bulkiest elements, the tower and the nacelle associated with each turbine are likely to be the most obvious element particularly when viewed from a distance. The proposed WEF may have a tower / nacelle height in the order of 200m and a blade diameter up to 200m. This could result in an overall maximum height of 300m. A structure of this height may be visible for up to 61.9km. 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

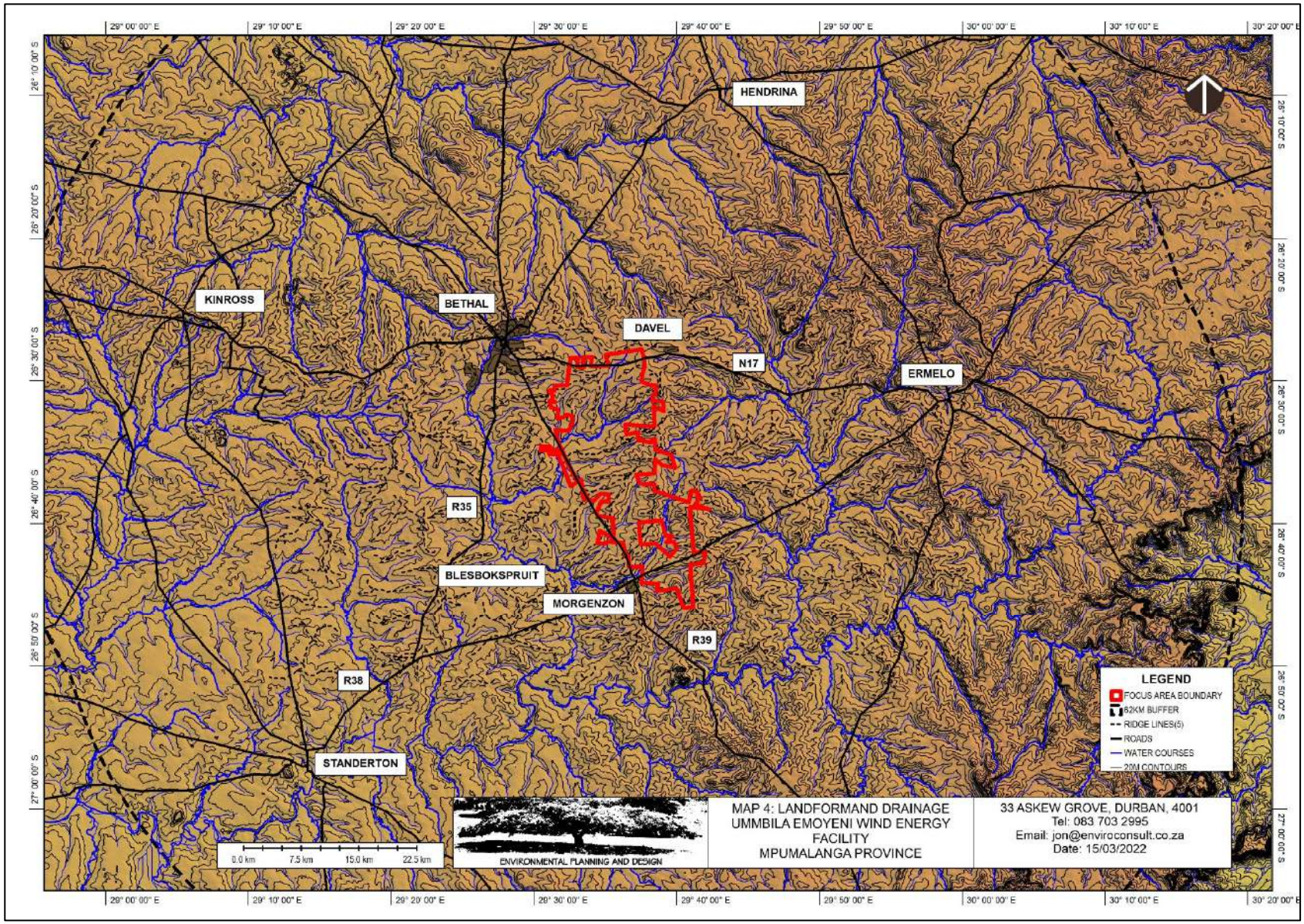
The general landform is undulating and is comprised of a series of similar size rounded ridgelines that extend approximately 20-30m above broad valley lines.

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 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.


HENDRINA
KINROSS
BETHAL
DAVEL
N17
ERMELO
R35
BLESBOKSPRUIT
MORGENZON
R39
R38
STANDERTON
LEGEND
FOCUS AREA BOUNDARY
52KM BUFFER
RIDGE LINES(S)
ROADS
WATER COURSES
20M CONTOURS
0.0 km
7.5 km
15.0 km
22.5 km
ENVIRONMENTAL PLANNING AND DESIGN
MAP 4: LANDFORMAND DRAINAGE
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3.2.2 Nature of Development and Land Cover

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

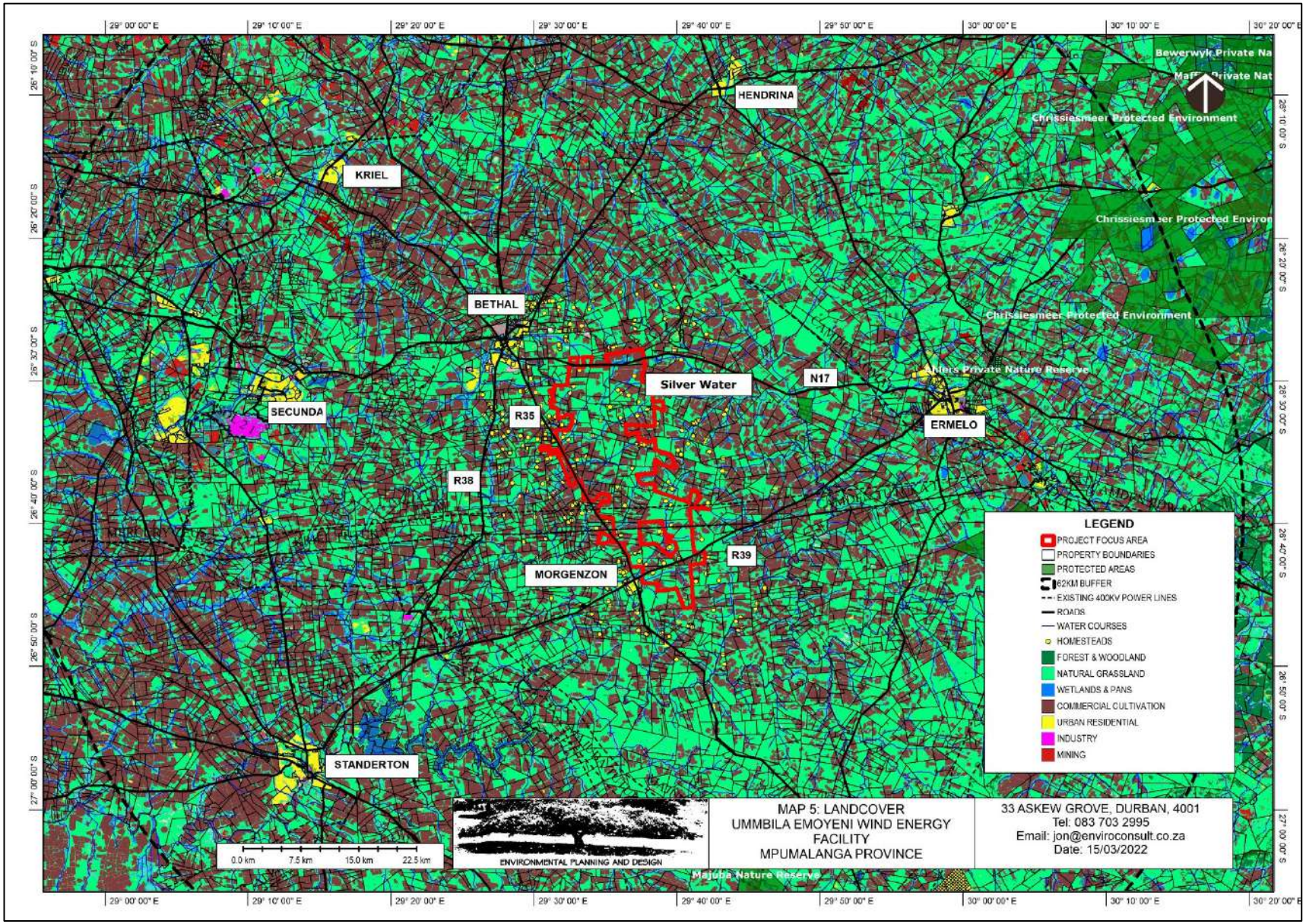
- Natural Grassland which is interspersed with areas of cultivation but is largely uninterrupted by cultivation;
- Arable agriculture / cultivation which in interspersed within the natural grassland matrix. Main crop types include sunflower seed production, sorghum, rye and potatoes;
- Settlement that 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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Chrissiesmeer Protected Environment
Ahlers Private Nature Reserve
Majuba Nature Reserve
LEGEND
PROJECT FOCUS AREA
PROPERTY BOUNDARIES
PROTECTED AREAS
62KM BUFFER
EXISTING 400KV POWER LINES
ROADS
WATER COURSES
HOMESTEADS
FOREST & WOODLAND
NATURAL GRASSLAND
WETLANDS & PANS
COMMERCIAL CULTIVATION
URBAN RESIDENTIAL
INDUSTRY
MINING
0.0 km
7.5 km
15.0 km
22.5 km
ENVIRONMENTAL PLANNING AND DESIGN
MAP 5: LANDCOVER
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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 array.

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 WEF. Whilst it is unlikely that the power station will be visible from the WEF site, it is likely that both the WEF and the power station could be visible from viewpoints between the two facilities.

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.

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 2, 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 3, 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 4, 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 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, Morgenzon and Ermelo;**

- The **Silver Water Reserve**; and
- The **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 run through the study area.** All of these are used mainly by local people with little tourism / recreational importance.

Plate 5, Local Agricultural Homestead

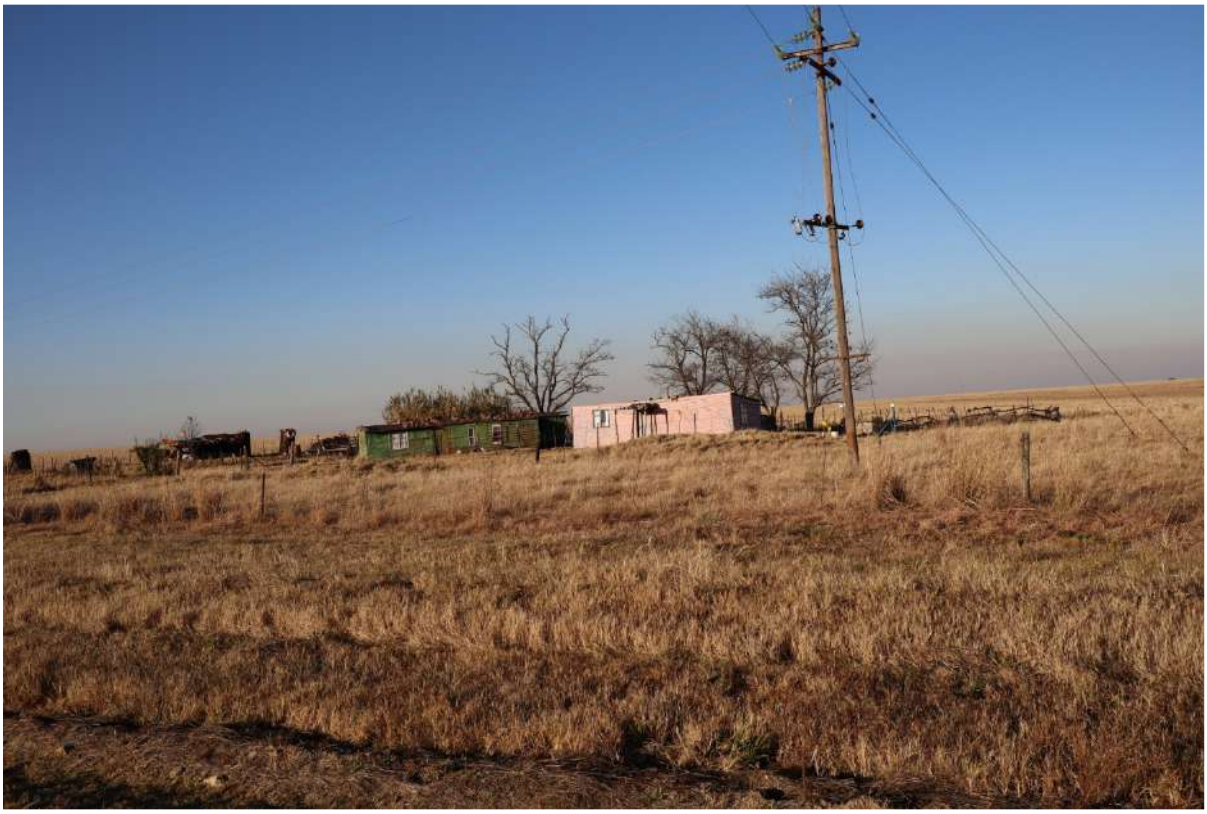


Plate 6, Local Farm Workers Homestead

Plate 7, Silver Water Private Nature Reserve

Plate 8, Urban Edge of Bethal looking towards the proposed site

Plate 9, Local Roads including main roads such as the N17

Plate 10, 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 protected area of the Rietvlei Reserve; and** • **Visitors to the Silver Water Nature Reserve.** • **Visitors to other protected areas.**

4 THE NATURE OF POTENTIAL VISUAL IMPACTS

4.1 TYPES OF IMPACT

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 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.
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 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 are expected to relate largely to intrusion.

4.2 THE LIKELY NATURE OF VIEWS OF THE DEVELOPMENT

The proposed project is broadly composed of the wind turbines that will generate power and power lines and ancillary equipment that will enable the generated power to be transmitted to the National Grid.

4.2.1 Visibility of Turbines

The turbines associated with the proposed development are by far the largest structures and are therefore likely to be the most obvious elements that are visible for the greatest distance.

Two existing windfarm projects in the Western Cape (South Africa) were visited during 2017 in order that visual effects could be noted for a similar project.

One facility is close to Gouda at the foot of the Cederberg mountain range and the other is located at Hopefield which is close to the West Coast National Park.

The Gouda wind farm is located at the base of the Cederberg and from the majority of viewpoints is seen against the backdrop of the mountain range.

The Hopefield facility, is located on a ridgeline and is seen against the skyline from most areas. It therefore is perhaps most relevant to views of the proposed WEF.

Observations of these existing wind farms during the site visit include;

- Both existing wind farms could be seen from a distance greater than 30km.
- With the sun behind the turbines and the face of structures facing the viewer in shadow, both facilities were not obvious and tended to merge with their background. The Gouda facility with a permanent backdrop that was also in shadow tended to merge with its background under all weather conditions, whereas the Hopefield facility tended to merge best when the sky was darker and was slightly more obvious with a lighter sky.
- From close quarters, estimated at less than 2 - 4km, the WEF turbines dominated the view, the scale and detail of individual structures was obvious. Due to this as well as the extent of the facilities, the wind farms dominated the local character.
- From medium distance, estimated at up to 8 – 15km the WEF structures provided an obvious focal point in the landscape that is difficult to ignore. The exception to this is where the wind farm structures are seen in shadow against the back drop of land form. In these circumstances the wind farm tends to blend with the backdrop and can be difficult to make out. When viewed from above at this range, the underlying vegetation and agricultural pattern is legible running through and around the wind farm.
- At a distance in excess of 15 – 20km the WEF structures can be easy to miss in the landscape particularly if they are in shadow and cast against the landform. They become more easily visible if seen in profile above the skyline and if they are seen with the sun reflecting off the visible face.
- If there is line of sight, at 30km WEF turbines are still likely to be visible, however they are not obvious as their apparent scale is such that they become difficult to see.

Lighting conditions and particularly reflection from spinning rotors can exacerbate the effects noted.

In addition to the broader visual effects, it was obvious from the site visit that the structures associated with the Gouda facility were constructed of concrete, whereas the structures associated with the Hopefield facility were constructed of steel that was painted bright white. Whilst it was obvious that the concrete structures did reflect light, from comparing the reflection of the turbine housing at the head of the structure with the degree of reflection from the structure itself, it was obvious that the reflection from the concrete structures was noticeably less than the painted steel turbine housing.

At Gouda, the facility was still under construction and the following was obvious;

- A crane was in the process of lifting blades into position for fixing.
- The contractor's camp, lay down area and workshop were in operation close to the site access.
- Various contractors were evident in the process of commissioning the turbines.

Whilst these operations were obvious, the works were generally small isolated operations with no major visual impact. It is accepted that this facility was nearing completion and it is likely that initially, site clearing, storage and concrete works were possibly more obvious from close quarters.

Internationally research has been undertaken by planning authorities to help guide the development of Wind Energy Facilities (WEFs). In Scotland, which is a country that has extensive natural upland areas that have been subject to large scale WEF development, the Scottish Executive, Development Department have published numerous Planning Advisory Notes (PANs) to help guide this type of development. Their PAN 45, describes public perceptions towards WEFs based on distance. These perceptions are indicated in the table below:

General Perception of a Wind Farm in an Open Landscape

Distance	**Visual Perception of Turbines**
Up to 4 km (Short Distance)	Likely to be a prominent feature
4-10 km (Mid Distance)	Relatively prominent
10-20 km (Long Distance)	Only prominent in clear visibility – seen as part of the wider landscape
20-30+ km	Only seen in very clear visibility – a minor element in the landscape

(**Extract from Scottish Executive PAN 45**)

PAN 45 clearly indicates that whilst a WEF may be visible over an extensive area, it is only mid to short distance views (up to 10km) over which they are generally prominent.

Observations of the Gouda and Hopefield WEFs strongly support these conclusions.

Refer to plates 11 to 16 inclusive for views of the existing WEFs (Hopefield and Gouda) illustrating the visual effects indicated above.

4.2.2 Shadow Flicker

Shadow flicker occurs when wind turbine blades cast a shadow on the surrounding area when the blades pass in front of the sun. The location and occurrence of the shadow effect depends on the time of year, time of day and the position of the sun in the sky. The shadow effects' main disturbance area is any unshaded windows of buildings, especially residential areas where people would be most likely to experience these effects.

Shadow flicker effects will only occur under certain conditions:

- During daylight hours.
- When the sun is shining, no overcast or foggy conditions.
- When wind turbine is in operation or spinning.
- In areas that are affected by the shadow of the turbines.

Various sources indicate that a discernible shadow flicker effect may be reported to occur on properties within ten turbine rotor diameters from the wind turbine.

In terms of the proposal under consideration with a rotor diameter in the order of 200m, this would mean that shadow flicker may be possible within 2,000m of the turbines.

Shadow flicker is primarily a nuisance related impact which has the potential to last as long as shadow is cast on the subject. It is also possible that in some people suffering from epilepsy a seizure may be triggered by light flickers (photosensitive epilepsy).

In a 1984 paper ***Shadow Hindrance by Wind Turbines***, Verkuijlen and Westra conclude that the greatest shadow flicker impact can be expected inside a property where the change in light intensity is most noticeable and when turbines are rotating at between 5 and 14 Hz (below 2.5 Hz and above 40 Hz will cause "hardly any nuisance". Whilst this information was obtained from an old document, it does highlight the fact that even when there are perfect conditions for shadow flicker to occur, the level of nuisance is likely to be subject to the speed of rotation of the turbines.

Several mitigation measures are indicated as being possible including sensitive site design, installation of blinds, and wind turbine shut-down strategies.

Plate 11, Hopefield Wind Farm from approximately 9km. Turbines are obvious above the skyline.

Plate 12, Gouda Wind Farm from approximately 30km. Turbines just visible but are in shadow and viewed against the landform and so are not obvious.

Plate 13, Hopefield Wind Farm from its immediate vicinity. The turbines dominate views.

Plate 14, Gouda Wind Farm from its immediate vicinity. The turbines dominate views.

Plate 15, Gouda Wind Farm laydown area.

Plate 16, Gouda Wind Farm, turbines being erected with the use of a crane.

4.2.3 On Site Substations

The various elements associated with the on-site substations can be divided into:

- Lower elements up to approximately 5-6m high include relatively transparent elements such as the security fence as well as elements with a larger visual mass such as buildings, and transformers;
- Taller relatively finer / relatively transparent elements up to approximately 10m high including bus bars, and lighting towers that whilst they may be theoretically visible over a greater distance, the nature of these structures is such that it is highly unlikely to be visible to the naked eye to anywhere close to the ALV.

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. Because of this the ALV has been utilised for the lower structures and, as the bus bars are a similar structure as the overhead power lines, the LVE that would be adopted for power lines (7km) has been adopted for these elements.

The following distances will therefore be used as an indication of the necessary limit of this section of the assessment. A distance of 8km has been adopted ;

Security fence, buildings, and transformers (5m)	ALV 8km
Bus Bars and Lighting and Communications Masts	LVE 7km

4.2.4 Site Access Road

The proposed access road alignment is likely to cause relatively low levels of visual impact. Existing roads will be used as far as possible.

In a flat landscape, road construction is likely to only have an impact on the area immediately surrounding it. Whilst a busy road might be visible from a distance due to vehicles being obvious, for much of the time a road that is lightly used where disturbance of surrounding vegetation has been minimised is unlikely to be obvious past 100m from the road edge.

The main issue issues relate to proximity to homesteads which could result in traffic being obvious to residents as well as the loss of vegetation which could have negative influence in terms of character change.

5 SITE SENSITIVITY

The elements associated with the proposed WEF will be visible to varying degrees with the proposed turbines visible over an extensive area.

It is unlikely to be possible to hide the proposed turbines, however, whilst they are likely to be visible, the existing landscape pattern will still be obvious beneath them for all but the closest views when the turbines themselves are likely to dominate.

The approach therefore is to set back elements sufficiently from receptors so that the existing landscape pattern remains obvious and various ground level ancillary elements are not obvious.

A key consideration is the potential for shadow flicker. Using internationally adopted guidelines will see the turbines set back approximately 2km (10x rotor diameter) from homesteads. This shadow flicker risk area is indicated on sensitivity mapping. If it is necessary to develop within these areas, it is recommended that a Shadow Flicker Study is undertaken.

Normally, it would be recommended to keep development off ridgelines as this can make it more obvious over a distance. When dealing with wind turbines however, the height of the turbine can be critical in terms of performance and any potential visual benefit is marginal due to the height of turbine structures. Maintaining ridgelines free of ancillary infrastructure is however recommended.

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; and
- Corridors beside the main roads that could be affected including the N17, the R35, 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 500m corridor should be sufficient to ensure that development does not totally dominate views.

Note: The difference in the proposed buffer width reflects the relatively high importance of permanent views for residents from homesteads relative to transient views of travellers from roads.

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.

Map 6 and 7 (Site Sensitivity) indicate site sensitivity mapping over which the Original Turbine Layout (1) and the Optimised Turbine Layout (2) respectively have been overlaid.

Map 4 indicates that within the original Turbine Layout:

- Three turbines are located within the high sensitivity area beside the N17
- Two turbines are located within the high sensitivity area beside the R35;
- Two turbines are located in the high sensitivity area beside the R39;
- Approximately 95 turbines are located within the Shadow Flicker Risk Area; and
- Fourteen turbines are located within or on the edge of the 1000m homestead buffer.

Map 5 indicates that within the Optimised Turbine Layout:

- Four turbines are located within the high sensitivity area beside the N17
- Two turbines are located within the high sensitivity area beside the R35;
- Two turbines are located in the high sensitivity area beside the R39;
- Approximately 82 turbines are located within the Shadow Flicker Risk Area; and
- Fourteen turbines are located within or on the edge of the 1000m homestead buffer.

This comparison indicates that in order to help mitigate other environmental impacts, the Optimised Layout sees a greater number of turbines located within the highly sensitive visual buffer beside the N17 but fewer turbines located within the Shadow Flicker Risk Area.

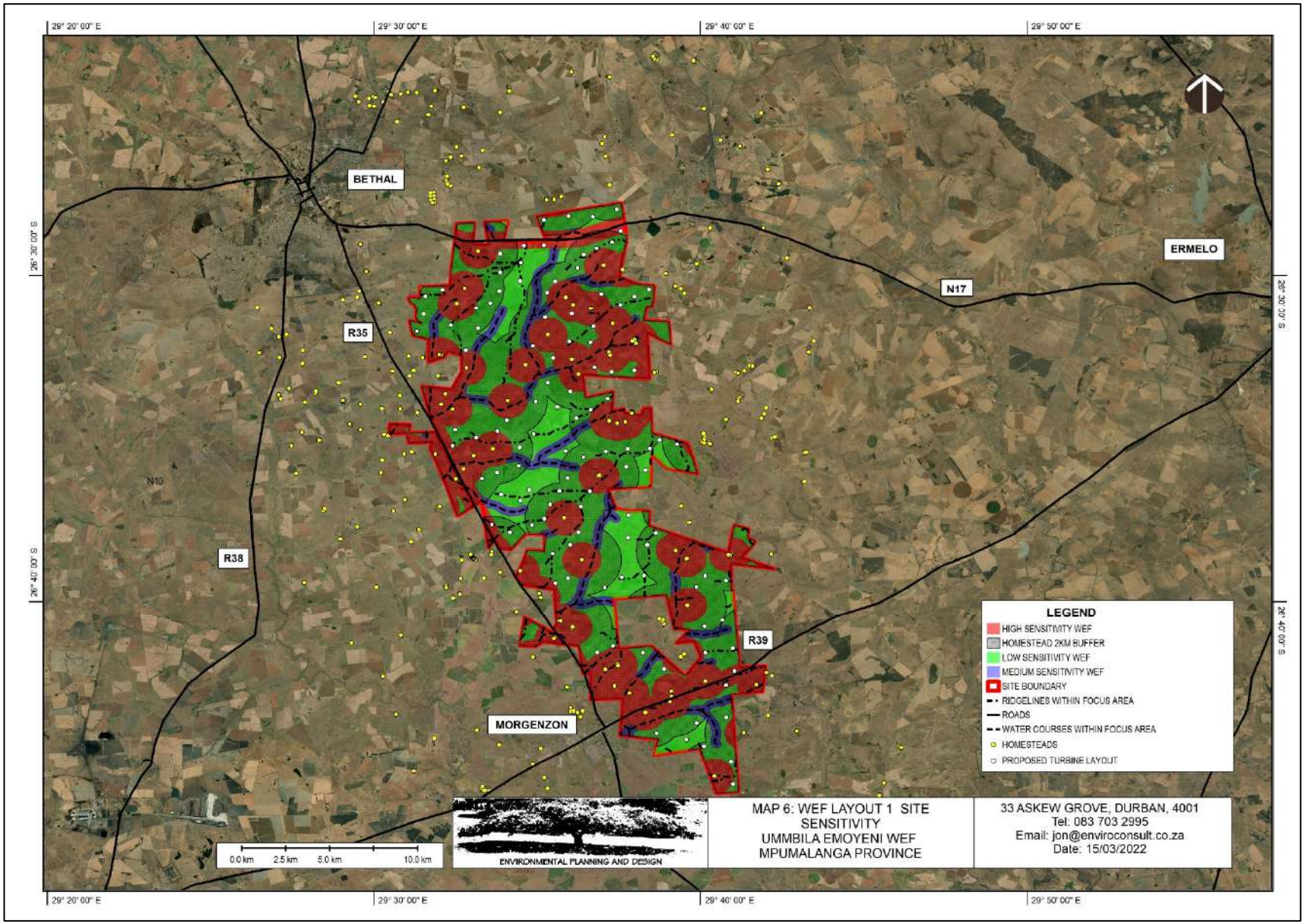
In terms of necessary mitigation the following should apply:

A shadow flicker study should be undertaken for all turbines within the Shadow Flicker Risk Area and appropriate mitigation measures adopted:

Whilst not un-attractive, the affected main roads are not scenic routes. They are also not important tourist routes. The more turbines that are located to close to these roads, however, the greater the view is dominated by the structures. It is also likely that moving turbines in a motorists view could be a distraction from the road. Therefore, the turbines within the high sensitivity zone cannot be omitted on aesthetic grounds, but it is suggested that the Roads Authority review the proposed locations.

As indicated views of wind turbines are enjoyed by a large proportion of the population who see them as elegant structures and an indication of progress towards clean energy. A proportion of the population also dislike views of wind turbines as they see them as spoiling views of rural areas. It is difficult to predict people's point of view. The sensitivity mapping is an indication of the areas within which wind turbines are likely to visually dominate. The

decision as to whether or not to be happy in having turbine structures close to a homestead is personal to the affected individuals. The author cannot disregard objections to wind energy infrastructure and cannot speculate as to the legitimacy thereof. It is however recommended that the developer investigate the receptor's willingness (and the viability) of screening of visual impacts at the receptor site prior to construction commencing.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BETHAL
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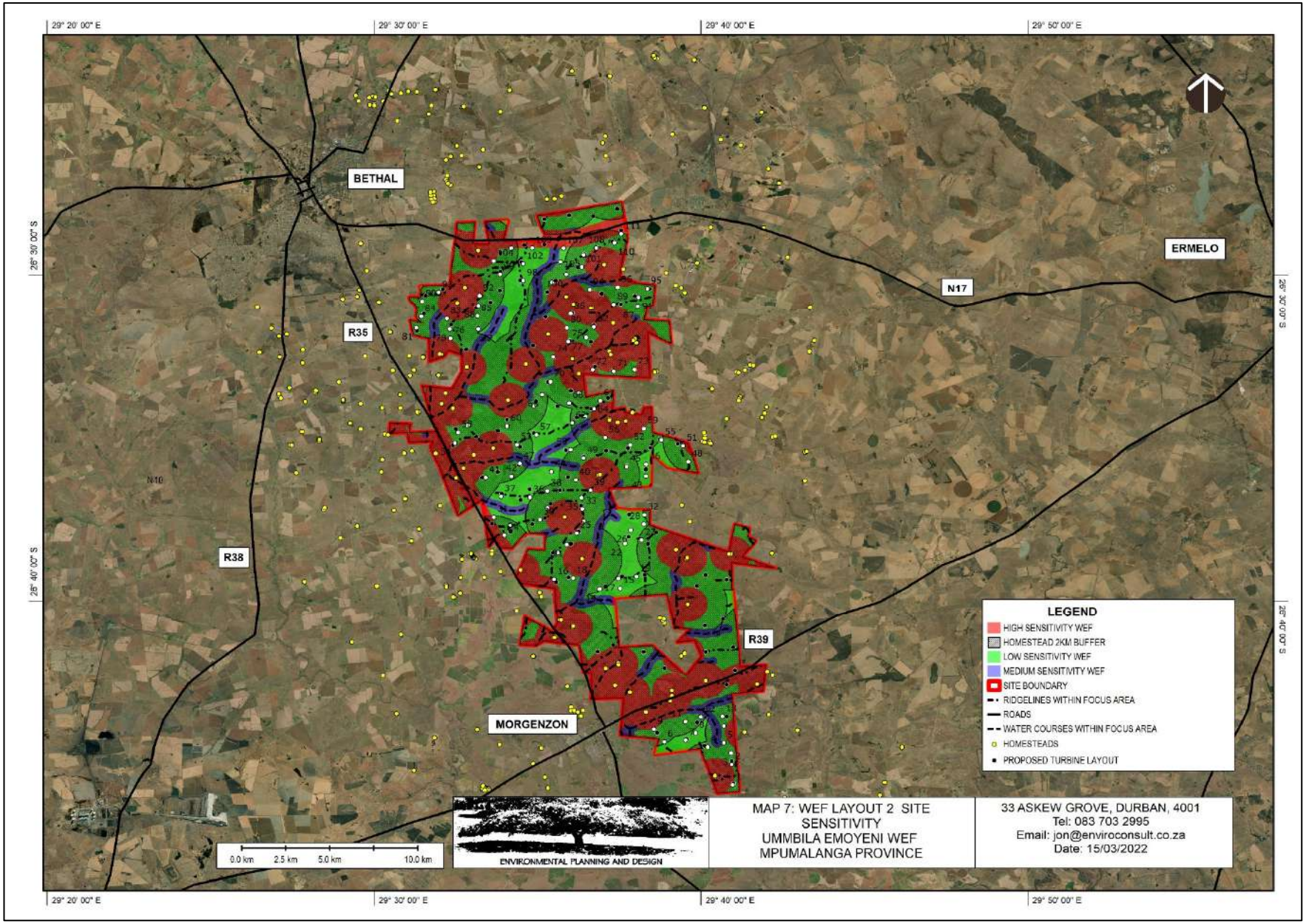
R35
N10
R38
R39
MORGENZON
LEGEND
HIGH SENSITIVITY WEF
HOMESTEAD 2KM BUFFER
LOW SENSITIVITY WEF
MEDIUM SENSITIVITY WEF
SITE BOUNDARY
RIDGELINES WITHIN FOCUS AREA
ROADS
WATER COURSES WITHIN FOCUS AREA
HOMESTEADS
PROPOSED TURBINE LAYOUT
0.0 km 2.5 km 5.0 km 10.0 km
ENVIRONMENTAL PLANNING AND DESIGN
MAP 6: WEF LAYOUT 1 SITE SENSITIVITY
UMMBILA EMOYENI WEF
MPUMALANGA PROVINCE
33 ASKEW GROVE, DURBAN, 4001
Tel: 083 703 2995
Email: jon@enviroconsult.co.za
Date: 15/03/2022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MAP 7: WEF LAYOUT 2 SITE SENSITIVITY
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6 VISIBILITY AND THE LIKELY NATURE OF VIEWS 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"[2].

ZVTs of the proposed development have been assessed using Global Mapper GIS.

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

Existing vegetation could have a modifying effect but this is likely to be limited to places where trees are located in close proximity to possible receptors such as occurs around some homesteads.

The ZTV analysis is indicated on the following maps:

- **Map 8** indicates the ZTV for proposed turbine layout (1);
- **Map 9** indicates the ZTV of the optimised turbine layout (2); and
- **Map 10** indicates the ZTV of the proposed on-site substations.

6.2 SIMULATIONS AND DIFFERENCES IN LIKELY VIEWS OF THE ORIGINAL TURBINE LAYOUT (1) AND THE OPTIMISED TURBINE LAYOUT(2)

Figures 3 to 9 inclusive provides illustrations for likely views of the proposed turbines from various viewpoints within the ZTV.

The main differences between the two layouts are that the optimised layout includes a break between the northern and southern clusters of turbines. This break is dictated by the location of wetlands and turbine locations have been adjusted to avoid these.

The proposed turbines to the north of the N17 have been removed

The need for the break between the northern and southern turbine clusters has resulted in compaction of the turbine grouping in other areas.

In terms of the sensitivity analysis, this somehow has resulted in a reduction in the numbers of turbines located in the shadow flicker risk area, the same number of turbines in the highly sensitive areas beside the R35 and R39 and an increase of turbines from 3 to 6 in the high sensitivity zone beside the N17.

For the most part the optimisation of the turbine layout is unlikely to be significant in terms of likely visual impacts experienced by receptors. For instance turbine locations in the vicinity of Silver Waters is the same in both possible layouts.

[2] UK Guidelines

The one area where differences could be obvious is for travellers on the N17 is the fact that the optimised layout sees turbine locations to the north of the N17 that were proposed in the original layout removed. It also sees a greater number of turbines, four as opposed to three, to the south of the N17 within the 500m wide high sensitivity buffer.

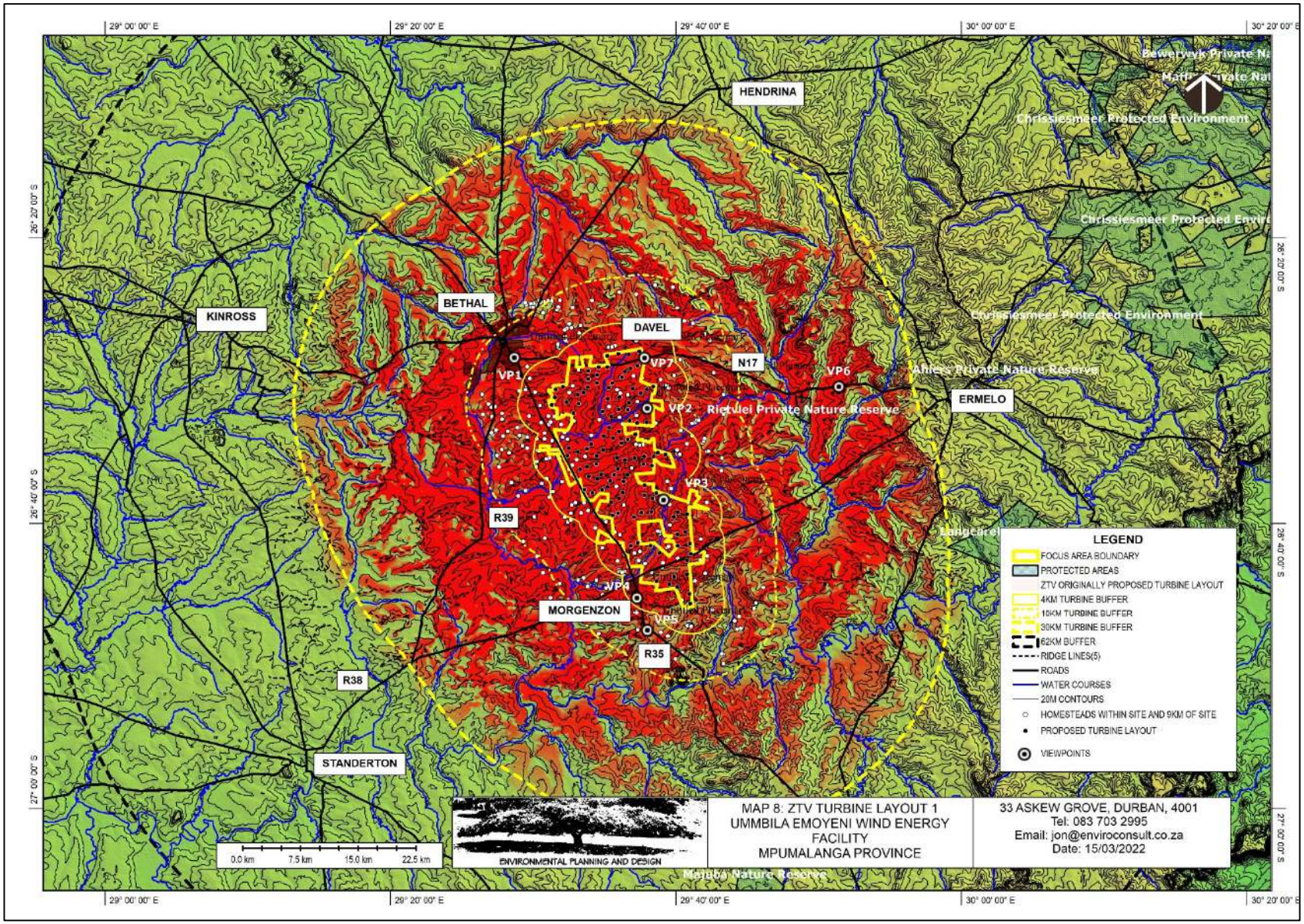
This buffer is proposed for two reasons:

- To prevent turbine structures dominating views from the road and to allow space for existing agricultural patterns to be obvious, i.e. the turbines are viewed within a landscape setting rather than being the main focus of the view; and
- To help prevent turbine rotor movement from creating a visual distraction for motorists.

From the majority of viewpoints there is little difference in the massing of turbines. Figures 3 to 8 (Viewpoints 1 to 6) inclusive therefore only illustrate views of the original layout.

Figure 9 (Viewpoint 7) focuses on views of the original layout and optimised layout from the N17. This analysis highlights the following:

1. The relocation of the three turbine structures to the north of the road that would be visible from this viewpoint in the original layout helps to reduce the extent of the landscape that is dominated by these structures; and
2. Whilst there may be a greater number of turbines that are located in the 500m buffer within the optimised layout (2) they are in fact all set back further from the road and located on the edge of the 500m buffer when compared to the fewer (3) turbines that are located closer (approximately 270m) from the road in the original layout (1).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KINROSS
BETHAL
DAVEL
ERMELO
MORGENZON
STANDERTON
N17
R39
R35
R38
VP1
VP2
VP3
VP4
VP5
VP6
VP7
Chrissiesmeer Protected Environment
Ahlers Private Nature Reserve
Rietvlei Private Nature Reserve
Majuba Nature Reserve
LEGEND
FOCUS AREA BOUNDARY
PROTECTED AREAS
ZTV ORIGINALLY PROPOSED TURBINE LAYOUT
4KM TURBINE BUFFER
15KM TURBINE BUFFER
30KM TURBINE BUFFER
62KM BUFFER
RIDGE LINES(5)
ROADS
WATER COURSES
20M CONTOURS
HOMESTEADS WITHIN SITE AND 9KM OF SITE
PROPOSED TURBINE LAYOUT
VIEWPOINTS
0.0 km
7.5 km
15.0 km
22.5 km
ENVIRONMENTAL PLANNING AND DESIGN
MAP 8: ZTV TURBINE LAYOUT 1
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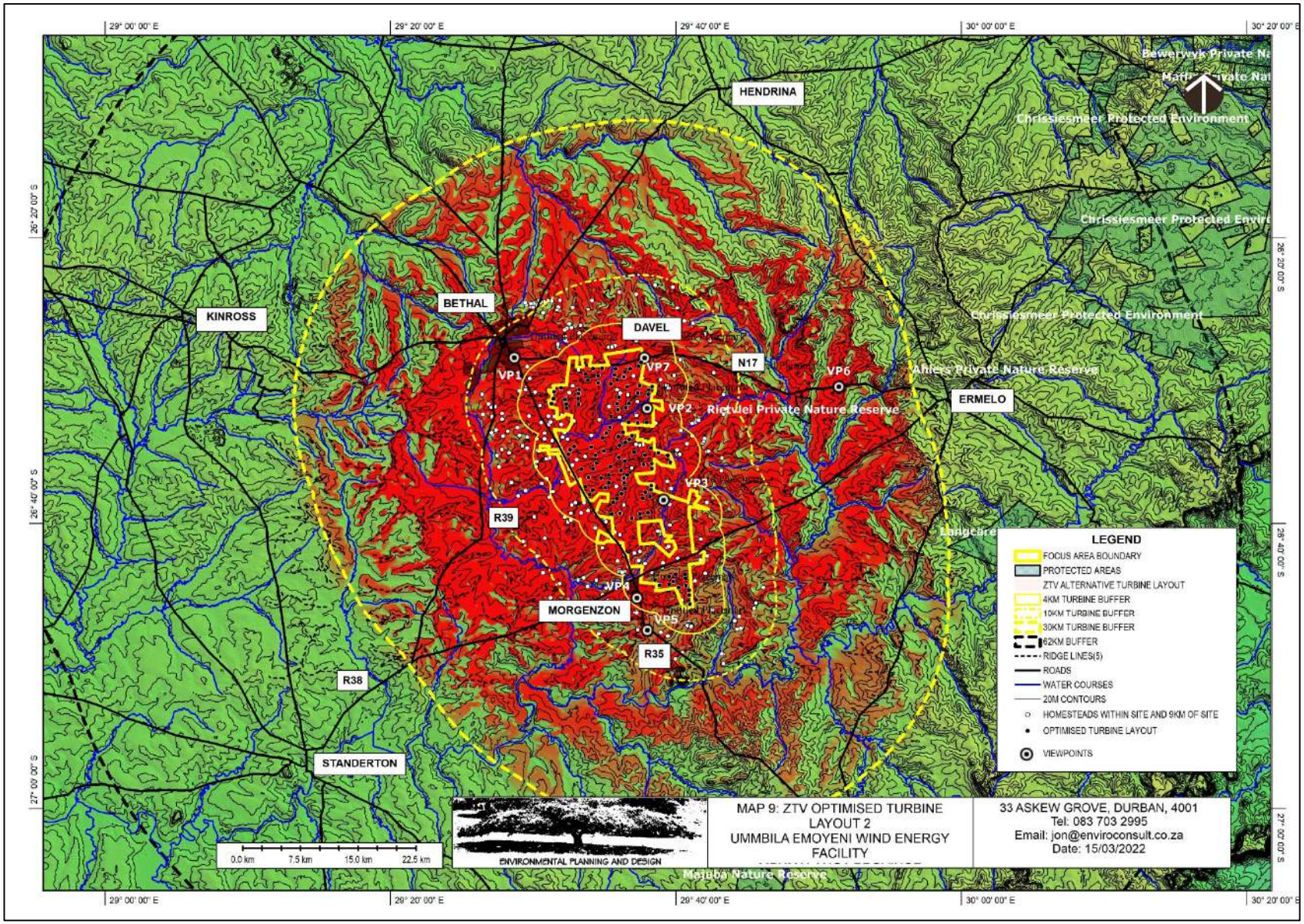
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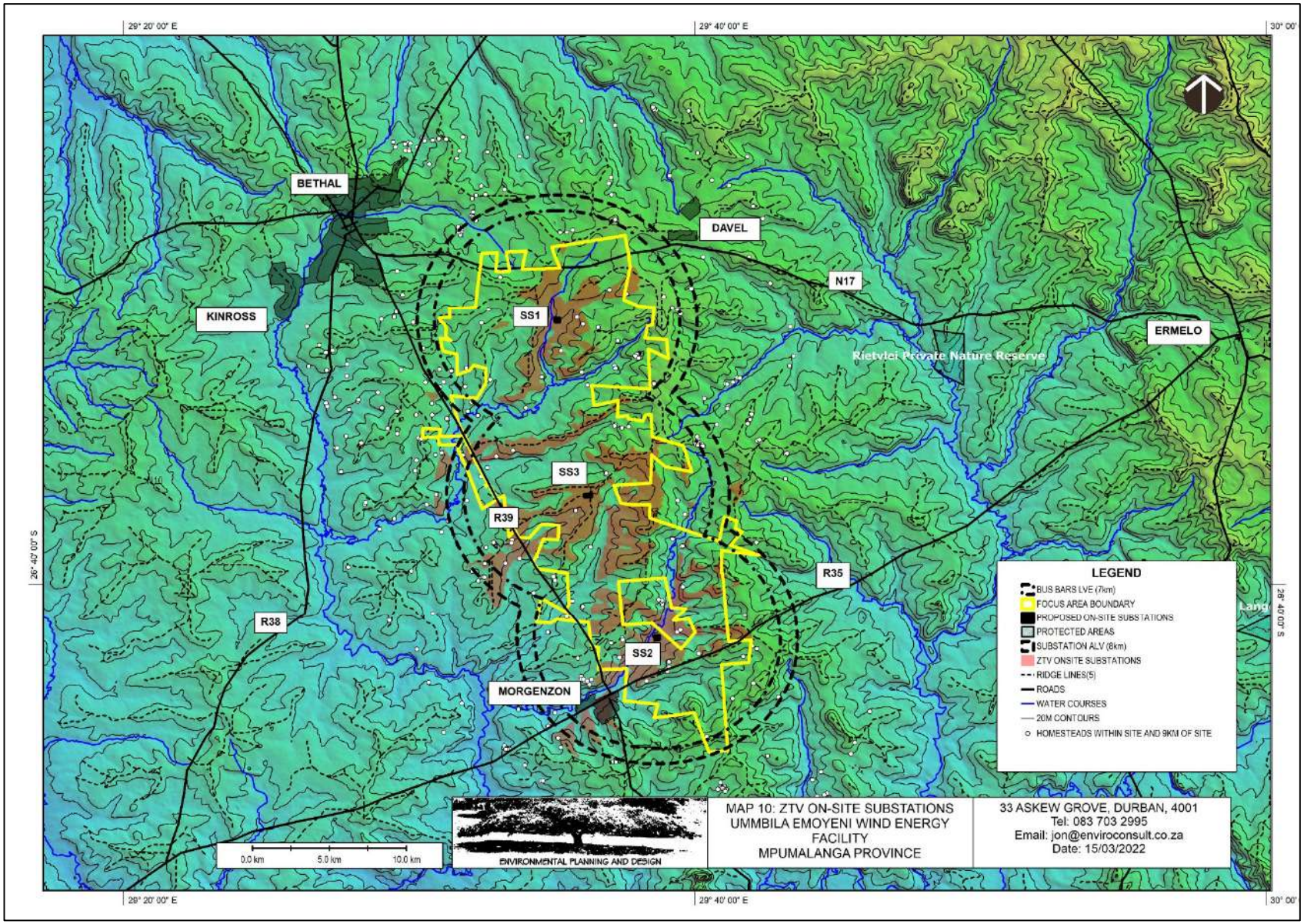
27° 00' 00" S
HENDRINA
KINROSS
BETHAL
DAVEL
ERMELO
MORGENZON
STANDERTON
N17
R39
R38
R35
VP1
VP2
VP3
VP4
VP5
VP6
VP7
Chrissiesmeer Protected Environment
Ahlers Private Nature Reserve
Rietvlei Private Nature Reserve
Majuba Nature Reserve
LEGEND
FOCUS AREA BOUNDARY
PROTECTED AREAS
ZTV ALTERNATIVE TURBINE LAYOUT
4KM TURBINE BUFFER
10KM TURBINE BUFFER
30KM TURBINE BUFFER
62KM BUFFER
RIDGE LINES(5)
ROADS
WATER COURSES
20M CONTOURS
HOMESTEADS WITHIN SITE AND 9KM OF SITE
OPTIMISED TURBINE LAYOUT
VIEWPOINTS
0.0 km
7.5 km
15.0 km
22.5 km
ENVIRONMENTAL PLANNING AND DESIGN
MAP 9: ZTV OPTIMISED TURBINE LAYOUT 2
UMMBILA EMOYENI WIND ENERGY FACILITY
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'
26° 40' 00" S
26° 49' 07" S
BETHAL
DAVEL
N17
KINROSS
SS1
ERMELO
Rietvlei Private Nature Reserve
SS3
R39
R35
R38
SS2
MORGENZON
LEGEND
BUS BARS LVE (7km)
FOCUS AREA BOUNDARY
PROPOSED ON-SITE SUBSTATIONS
PROTECTED AREAS
SUBSTATION ALV (8km)
ZTV ONSITE SUBSTATIONS
RIDGE LINES(5)
ROADS
WATER COURSES
20M CONTOURS
HOMESTEADS WITHIN SITE AND 9KM OF SITE
0,0 km
5,0 km
10,0 km
ENVIRONMENTAL PLANNING AND DESIGN
MAP 10: ZTV ON-SITE SUBSTATIONS
UMMBILA EMOYENI WIND ENERGY FACILITY
MPUMALANGA PROVINCE
33 ASKEW GROVE, DURBAN, 4001
Tel: 083 703 2995
Email: jon@enviroconsult.co.za
Date: 15/03/2022

6.2.1 Visibility

a) The Turbine Layout ZTV assessment indicates the following:

i. The ZTV analysis for the Originally Proposed Turbine Layout (1) and the Optimised Turbine Layout (2) are very similar.

ii. The proposed turbine field is likely to be visible over the majority of the 4km buffer (short distance) within which turbines are likely to be seen as prominent features;

iii. The proposed turbine field is likely to be visible over the majority of the 10km buffer (mid distance) within which turbines are likely to be seen as relatively prominent features;

iv. The proposed turbine field is only likely to be visible over higher sections of the landscape that are mainly comprised of minor ridgelines within the 30km buffer (long distance). Within this distance turbines will only be prominent in clear visibility and when visible will be seen as part of the wider landscape;

v. Outside the 30km buffer, turbines are unlikely to be seen as being prominent in the landscape in any conditions;

vi. There are a large number of homesteads and local unsurfaced roads within the 10km buffer from which turbines could be prominent. This may be locally mitigated by stands of trees particularly in the vicinity of farmsteads;

vii. There are three settlements within the 10km buffer including:

- Bethal which is approximately 7.5km from the project;
- Morgonzon which is within the 4km buffer; and
- Davel which is also just within the 4km buffer.

It is likely that the turbine field will be prominent within views from the edges of the settlements facing the project;

vii. The turbine field is likely to be prominent from the Silver Waters Private Nature Reserve;

viii. The turbine field may be visible under clear conditions from sections of the Rietvlei Private Nature Reserve but it will be seen is as part of the wider landscape.

As indicated previously, the ZTV analysis is based on landform only. Visibility is likely to be modified by vegetation.

From the ZTV it is apparent that the screening provided by the ridgelines is only effective in excess of 10km from the project. Up to that distance from the project, it is likely that partial screening of the turbines will be provided by landform but screening of the entire project is highly unlikely.

b) The On-Site Substation Layout ZTV assessment indicates the following:

i. None of the proposed on-site substations are likely to be highly visible;

ii. Each of the proposed substations will have a homestead located at approximately 1km from which the substation will be visible. In each case, existing vegetation should play a significant role in largely screening the substations from the homesteads;

iii. The proposed on-site substations may be visible intermittently to main roads, however, they are unlikely to be highly obvious.

FIGURE 3, VIEWPOINT 1 - View looking south-east from the southern edge of Bethal towards the proposed windfarm with the clsest turbin approximately 6.5km from the viewpoint

FIGURE 4, VIEWPOINT 2 - View looking to the south from within the Silver Waters Private Nature Reserve with the closest turbine approximately 1.9km from the viewpoint

FIGURE 5, VIEWPOINT 3 - View looking to the north-west from close to a farm homestead within the project area with the closest turbine approximately 1.2km from the viewpoint

FIGURE 6, VIEWPOINT 4 - View looking to the north from the R35 immidiately south of Morgonzon with the closest turbine in the view approximately 6.2km from the viewpoint

FIGURE 7, VIEWPOINT 5 - View looking to the north from the R35 south of Morgonzon with the closest turbine in the view approximately 6.0km from the viewpoint

FIGURE 8, VIEWPOINT 6 - View looking to the north from the N17 approximately 0.75km east of the Ermelo Toll Plaza with the closest turbine in view approximately immidiately south of Morgonzon with the closest turbine in the view approximately 21.8km from the viewpoint

FIGURE 9, VIEWPOINT 7 - View looking to the west from the N17 located adjacent to the eastern boundary of the oroject area

The Original Layout (1). Fewer turbines (3) within 500m but they are closer (approximately 270m) to the road. There are also turbines to the right (north) of the road.

The Optimised Layout (2). More turbines (4) within 500m but they are further from the road (approximately 500m). There are also turbines to the right (north) of the road.

6.3 CUMULATIVE VISUAL EFFECTS

As indicated previously, the landscape of the region can largely be described as a rural agricultural landscape within which there are large and relatively isolated industrial developments that are visible over a large area. The rural landscape generally extends to the

property boundary within which the industrial elements are located meaning that there is generally no transition.

Examples of these industrial developments within 30km of the proposed WEF include the Tutuka Power Station which is approximately 28km from the proposed WEF and large scale mining operations.

The SASOL refinery at Secunda is also located just outside 30km from the proposed WEF.

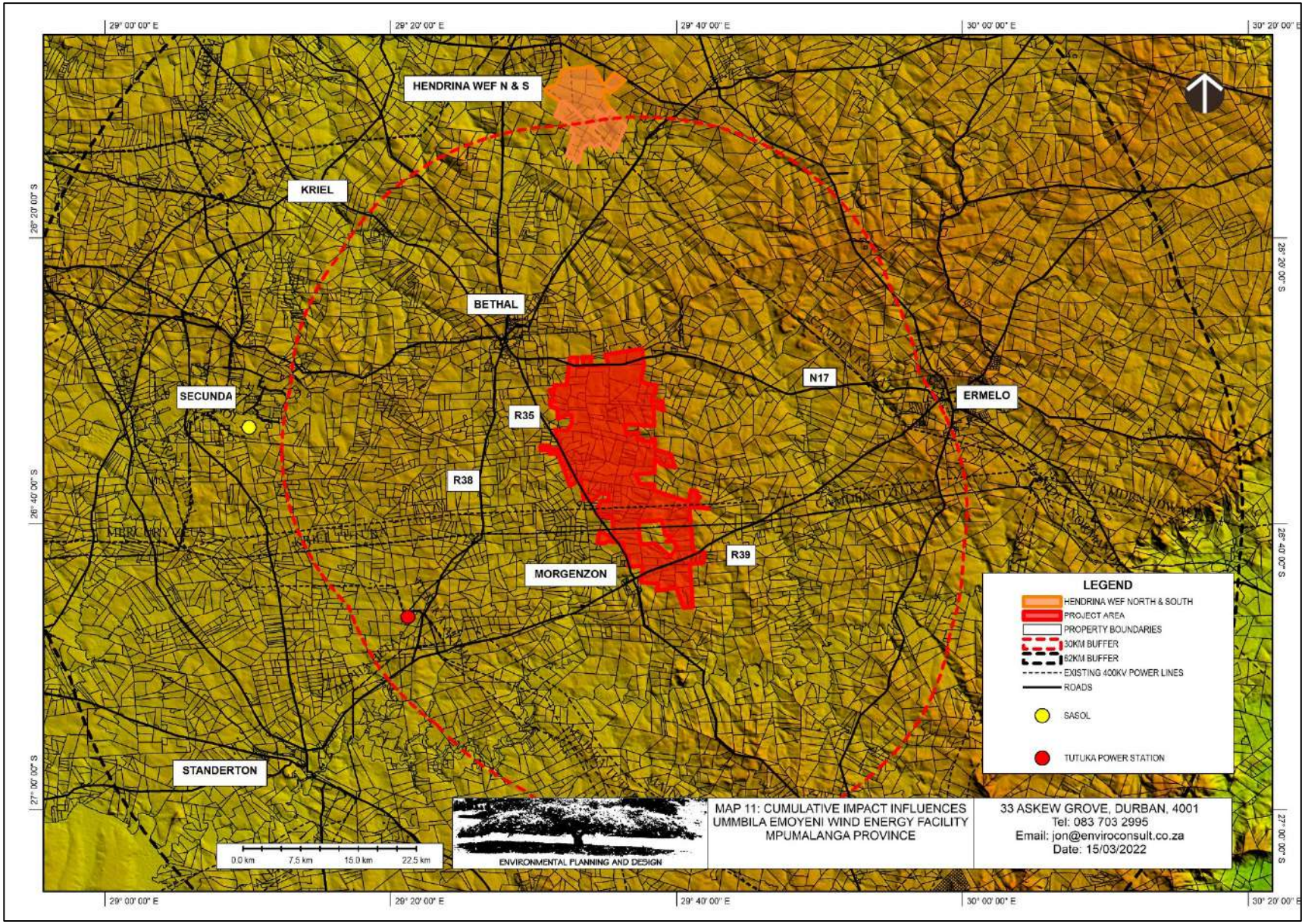
Due largely to their height it is likely that mining operations will not be visible at the same time as the proposed WEF. It is likely however that taller elements such as Tutuka Power Station and the SASOL plant could be visible from some viewpoints at the same time as the proposed WEF.

Plate 17, Tutuka Power Station is located approximately 28km from the proposed WEF

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. It is also likely that this project could be visible at the same time as the Ummbila WEF from areas between the two projects.

In terms of cumulative effects, these projects will reduce the distance between major industrial elements which whilst it will reinforce the current effect of large scale industrial operations within predominantly rural areas, it will shift the balance slightly between industry and agriculture.

It needs to be stressed that at the distances from which two or more projects may be visible, the WEF projects are unlikely to be highly obvious.


29° 00' 00" E
29° 20' 00" E
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
R38
N17
ERMELO
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 11: CUMULATIVE IMPACT INFLUENCES
UMMBILA EMOYENI WIND ENERGY FACILITY
MPUMALANGA PROVINCE
33 ASKEW GROVE, DURBAN, 4001
Tel: 083 703 2995
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Date: 15/03/2022

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

The following list of possible impacts have been identified;

a) The proposed development could change the character and sense of place of the landscape setting;
b) The proposed development could change the character of the landscape as seen from the local roads;
c) The proposed development could change the character of the landscape as seen from local agricultural homesteads;
d) The proposed development could change the character of the landscape as seen from private nature reserves;
e) Shadow Flicker impacts; and
f) Lighting impacts.

These impacts have to be addressed in terms of the proposed turbine layout.

It should be noted that the impacts identified will all gradually increase from the current situation to the impact level indicated during the construction phase, be consistent at the impact levels indicated during the operational phase and decrease again from the levels indicated to close to the current situation during the decommissioning phase.

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

Both the Original Layout (1) and the Optimised Layout (2) will have a similar influence on landscape character. Because the Optimised Layout will affect a slightly smaller area, the impact will be marginally lower. However, the difference in affected area is not sufficient to affect the assessed level of impact.

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 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.

In terms of mitigating the impact of turbines, this is obviously difficult due to their scale.

For local impacts the main mitigation could include:

- Relocation of turbines in critical character areas to less sensitive areas,
- Minimising the impact of ground level infrastructure; and / or
- Maintaining existing ground level agricultural activities to ensure that the original landscape pattern remains discernible.

For regional impacts the main mitigation measures could include:

- The use of matt finishes to minimise the potential for reflections to exacerbate impacts particularly from spinning rotor blades that under certain conditions can produce flashes of light as the blades spin.

	Without mitigation	**With mitigation**
Extent	Local, **(2)** Region, **(3)**	Local, **(2)** Region, **(3)**
Duration	Local and Regional Long term, **(4)**	Local and Regional Long term, **(4)**
Magnitude	Local High, **(8)** Region Minor **(2)**	Local Moderate, **(6)** Region Minor **(2)**
Probability	Local Definite, **(5)** Region Probable, **(4)**	Local Highly Probable, **(4)** Region Improbable, **(3)**
Significance	Local High, **(70)** Region Medium, **(36)**	Local Medium, **(48)** Region Low, **(27)**
Status	Local Impact Some people find the sight of turbines as visually interesting,	Due to the fact that the project is generally in keeping with regional landscape character it is unlikely

	others see the sight of turbines as a major benefit as it is evidence of much needed power generation. However some people particularly those who may be dependent on maintaining rural views for tourism are likely to see the change in a negative light. In terms of character change the turbines will detract from the rural character. **Negative** Regional Impact Due to the fact that the project is generally in keeping with regional landscape character it is unlikely to be seen as negative from within the region **Neutral**	to be seen as negative from within the region **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**	**N/A**
Mitigation / Management: Planning: • Minimise disturbance of the land beneath the turbine layout to ensure that associated infrastructure is sited in such a way that it minimises visual impact; • Ensure that non reflective finishes are used on turbines, particularly blades. Operations: • Maintain current agricultural land uses. 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 low 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 local main roads

Nature of impact:
The N17,the R35 and the R39 are the main roads that will be particularly impacted within 4km of the proposed turbines.

Because there will be no turbine structures to the north of the N17 and because turbines will be set back further from the N17, the rural landscape character is likely to be less affected by the Optimised Layout than the Original Layout. This will only affect the closest views.

All three of these roads pass through the turbine field and so some sections will have turbines located on both sides of the road.

All three roads will also have extensive views over the turbine field and will have numerous turbines within 4km which means that they will be prominent features.

All three roads also have turbines within 500m of the main carriageway. These are likely to be visually imposing.

All other affected roads generally fall in the long distance category (10-30km distance). The impact is likely to consist of occasional views of the facility for motorists as they travel over the undulating landform. Views will therefore be intermittent, only prominent in clear visibility and will be seen as part of the wider landscape.

For local impacts the main mitigation could include:

- Relocation of turbines in critical character areas to less sensitive areas,
- Minimising the impact of ground level infrastructure; and / or
- Maintaining existing ground level agricultural activities to ensure that the original landscape pattern remains discernible.

For regional impacts the main mitigation measures could include:

- The use of matt finishes to minimise the potential for reflections to exacerbate impacts particularly from spinning rotor blades that under certain conditions can produce flashes of light as the blades spin.

	Without mitigation	**With mitigation**
Extent	Main Roads within 4km Site and immediate surroundings, **(2)** Main Roads within 10km Site and immediate surroundings, **(2)** Main Roads within 30km Region, **(3)**	Main Roads within 4km Site and immediate surroundings, **(2)** Main Roads within 10km Site and immediate surroundings, **(2)** Main Roads within 30km Region, **(3)**

Duration	All Main Roads Long term, **(4)**	All Main Roads Long term, **(4)**
Magnitude	**Optimised Layout Main Roads within 4km** Moderate to High, **(7)** **Original Layout Main Roads within 4km** High, **(8)** Main Roads within 10km Low, **(4)** Main Roads within 30km Minor, **(2)**	**Optimised Layout Main Roads within 4km** Moderate, **(6)** **Original Layout Main Roads within 4km** Moderate to High, **(7)** Main Roads within 10km Minor to Low, **(3)** Main Roads within 30km Minor to Small, **(1)**
Probability	Main Roads within 4km Definite, **(5)** Main Roads within 10km Probable, **(3)** Main Roads within 30km Improbable, **(2)**	Main Roads within 4km Definite, **(5)** Main Roads within 10km Probable, **(3)** Other Main Roads Improbable, **(2)**
Significance	**Optimised Layout Main Roads within 4km** High, **(65)** **Original Layout Main Roads within 4km** High, **(70)** Main Roads within 10km Medium, **(30)** Main Roads within 30km Low, **(18)**	**Optimised Layout Main Roads within 4km** Medium, **(60)** **Original Layout Main Roads within 4km** High, **(65)** Main Roads within 10km Low, **(27)** Main Roads within 30km Low, **(16)**
Status	Some people find the sight of turbines as visually interesting, others see the sight of turbines as a major benefit as it is evidence of much needed power generation. However some people particularly those who may be dependent on maintaining rural views for tourism are likely to see the change in a negative light. **Positive - Negative**	**Positive - 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**	

Mitigation / Management:

Planning:

- Relocate turbines within 500m of main roads;
- Minimise disturbance of the land beneath the turbine layout to ensure that associated infrastructure is sited in such a way that it minimises visual impact;
- Ensure that non reflective finishes are used on turbines, particularly blades.

Operations:

- Maintain current agricultural land uses.

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.

7.3.3 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 close to and through the proposed turbine field. All of these roads are within 4km of the proposed turbines which means that the turbine structures are likely to be prominent features.

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.

For local impacts the main mitigation could include:

- Relocation of turbines in critical character areas,
- Minimising the impact of ground level infrastructure; and / or

- Maintaining existing ground level agricultural activities to ensure that the original landscape pattern remains discernible.

For regional impacts the main mitigation measures could include:

- The use of matt finishes to minimise the potential for reflections to exacerbate impacts particularly from spinning rotor blades that under certain conditions can produce flashes of light as the blades spin.

	Without mitigation	**With mitigation**
Extent	Roads within 4km Site and immediate surroundings, **(2)** Roads within 10km Site and immediate surroundings, **(2)** Roads within 30km Region, **(3)**	Roads within 4km Site and immediate surroundings, **(2)** Roads within 10km Site and immediate surroundings, **(2)** Roads within 30km Region, **(3)**
Duration	All Roads Long term, **(4)**	All Roads Long term, **(4)**
Magnitude	Roads within 4km Moderate to High, **(7)** Roads within 10km Low, **(4)** Roads within 30km Minor to Low, **(3)**	Roads within 4km Moderate **(6)** Roads within 10km Minor to Low, **(3)** Roads within 30km Minor to Small, **(1)**
Probability	Roads within 4km Definite, **(5)** Roads within 10km Probable, **(3)** Roads within 30km Improbable, **(2)**	Roads within 4km Definite, **(5)** Roads within 10km Probable, **(3)** Roads within 30km Improbable, **(2)**
Significance	Roads within 4km High, **(65)** Roads within 10km Medium, **(30)** Roads within 30km Low, **(20)**	Roads within 4km Medium, **(60)** Roads within 10km Medium, **(27)** Roads within 30km Low, **(16)**
Status	Some people find the sight of turbines as visually	**Positive - Negative**

	interesting, others see the sight of turbines as a major benefit as it is evidence of much needed power generation. However some people particularly those who may be dependent on maintaining rural views for tourism are likely to see the change in a negative light. **Positive - 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**	

Mitigation / Management:

Planning:

- Minimise disturbance of the land beneath the turbine layout to ensure that associated infrastructure is sited in such a way that it minimises visual impact;
- Ensure that non reflective finishes are used on turbines, particularly blades.

Operations:

- Maintain current agricultural land uses.

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.

7.3.4 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 within the surrounding rural landscape.

These are largely comprised of farmsteads and agricultural workers houses.

The applicant has allowed a buffer of 1km between any homestead and the closest turbine which should ensure that the view of turbines does not totally dominate views (VP 3).

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

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.

For local impacts the main mitigation could include:

- Relocation of turbines in critical character areas to less sensitive areas,
- Minimising the impact of ground level infrastructure; and / or
- Maintaining existing ground level agricultural activities to ensure that the original landscape pattern remains discernible.

For regional impacts the main mitigation measures could include:

- The use of matt finishes to minimise the potential for reflections to exacerbate impacts particularly from spinning rotor blades that under certain conditions can produce flashes of light as the blades spin.

	Without mitigation	**With mitigation**
Extent	Homesteads within 4km Site and immediate surroundings, **(2)** Roads within 10km Site and immediate surroundings, **(2)** Roads within 30km Region, **(3)**	Homesteads within 4km Site and immediate surroundings, **(2)** Roads within 10km Site and immediate surroundings, **(2)** Roads within 30km Region, **(3)**
Duration	All Homesteads Long term, **(4)**	All Homesteads Long term, **(4)**
Magnitude	Homesteads within 4km Moderate to High, **(7)** Homesteads within 10km Low, **(4)** Homesteads within 30km Minor to Low, **(3)**	Homesteads within 4km Moderate **(6)** Homesteads within 10km Minor to Low, **(3)** Homesteads within 30km Minor to Small, **(1)**
Probability	Homesteads within 4km Definite, **(5)** Homesteads within 10km Probable, **(3)**	Homesteads within 4km Definite, **(5)** Homesteads within 10km Probable, **(3)**

	Homesteads within 30km Improbable, **(2)**	Homesteads within 30km Improbable, **(2)**
Significance	Homesteads within 4km High, **(65)** Homesteads within 10km Medium, **(30)** Homesteads within 30km Low, **(20)**	Homesteads within 4km Medium, **(60)** Homesteads within 10km Low, **(27)** Homesteads within 30km Low, **(16)**
Status	Some people find the sight of turbines as visually interesting, others see the sight of turbines as a major benefit as it is evidence of much needed power generation. However some people particularly those who may be dependent on maintaining rural views for tourism are likely to see the change in a negative light. **Positive - Negative**	**Positive - 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**	

Mitigation / Management:

Planning:

- Minimise disturbance of the land beneath the turbine layout to ensure that associated infrastructure is sited in such a way that it minimises visual impact;
- Ensure that non reflective finishes are used on turbines, particularly blades.

Operations:

- Maintain current agricultural land uses.

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 Nature Reserves

There are two nature reserves that are most likely to be affected including:

- The Silver Waters Nature Reserve which is a private facility and is primarily a local tourism facility offering accommodation in tranquil surroundings around a large dam; and
- The Rietvlei Nature Reserve which is also a private nature reserve

Silver Waters is located within the proposed turbine field. The closest turbine is approximately 1.4km from the closest accommodation unit within the reserve.

Rietvlei is located approximately 15.7km from the closest turbine.

The analysis has indicated that whilst existing vegetation will screen the majority of the turbine field from Silver Waters, a number of turbines will be highly conspicuous from the reserve (VP 2).

The analysis has also indicated that whilst turbines are likely to be visible from sections of Rietvlei but only prominent in clear visibility (VP 6).

For local impacts the main mitigation could include:

- Relocation of turbines in critical character areas to less sensitive areas,
- Minimising the impact of ground level infrastructure; and / or
- Maintaining existing ground level agricultural activities to ensure that the original landscape pattern remains discernible.

For regional impacts the main mitigation measures could include:

- The use of matt finishes to minimise the potential for reflections to exacerbate impacts particularly from spinning rotor blades that under certain conditions can produce flashes of light as the blades spin.

	Without mitigation	**With mitigation**
Extent	Silver Waters Site and immediate surroundings, **(2)** Rietvlei Region, **(3)**	Silver Waters Site and immediate surroundings, **(2)** Rietvlei Region, **(3)**
Duration	Silver Waters and Rietvlei	Silver Waters and Rietvlei

	Long term, **(4)**	Long term, **(4)**
Magnitude	Silver Waters High, **(8)** Rietvlei Low to Minor, **(3)**	Silver Waters Moderate to Low, **(5)** Rietvlei Minor to Small, **(1)**
Probability	Silver Waters Definite, **(5)** Rietvlei Probable, **(3)**	Silver Waters Probable, **(3)** Rietvlei Improbable, **(2)**
Significance	Silver Waters High, **(70)** Rietvlei Medium, **(30)**	Silver Waters Medium, **(33)** Rietvlei Low, **(16)**
Status	Because the proposed development is unlikely to be visually obvious, it is unlikely to be seen as a negative impact. **Neutral**	**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**.	**No irreplaceable loss.**
Can impacts be mitigated?	**Yes**	

Mitigation / Management:

Planning

- Relocation of closest turbines to Silver Waters;
- Minimise disturbance of the land beneath the turbine layout to ensure that associated infrastructure is sited in such a way that it minimises visual impact;
- Ensure that non reflective finishes are used on turbines, particularly blades.

Operations:

- Maintain current agricultural land uses.

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 have no contribution to cumulative impacts.

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.

7.3.6 Shadow Flicker

Nature of impact:
The term "shadow flicker" refers to the flickering effect caused when rotating wind turbine blades periodically cast shadows over neighbouring properties as they turn, through constrained openings such as windows.

The analysis has shown that a number of farmsteads could be affected by shadow cast by the turbine structures.

If buildings are in shadow during clear weather when the turbine is turning then they are likely to be affected by shadow flicker.

The buildings that are at risk of this impact are indicated on Maps 5 and 6. This indicates that both assessed layouts have significant numbers of homesteads within the shadow flicker risk area.

Homesteads close to the edges of the defined areas are only likely to be subject to shadow for short periods of the year and so the risk of shadow flicker is low. Whereas farmsteads over which shadow is cast for long periods of the year are at greater risk of the impact.

There are several possible mitigation measures, including:

- Sensitive site design;
- Installation of blinds;
- Wind turbine shut-down strategies; and
- Relocation of turbines.

In order to determine the likely level of impact and appropriate mitigation, it is necessary to undertake a Shadow Flicker Study.

Without undertaking this study, it is not possible to be confident regarding the level of impact pre-mitigation. However, given the number of potentially affected homesteads it seems reasonably safe to assume that potentially the impact could have a high magnitude.

	Without mitigation	**With mitigation**
Extent	Site and immediate surroundings, **(2)**	Site and immediate surroundings, **(2)**
Duration	Long term, **(4)**	Long term, **(4)**
Magnitude	High, **(8)**	Small, **(0)**
Probability	Highly Probable, **(4)**	Very Improbable, **(1)**
Significance	Medium, **(56)**	Low, **(6)**
Status	**Negative**	**Negative**
Reversibility	High	High
Irreplaceable loss	**no irreplaceable loss**.	**No irreplaceable loss.**

Can impacts be mitigated?	Yes

Mitigation / Management:
Planning:

- Undertake shadow flicker study and plan appropriate mitigation.

Operations:

- Undertake mitigation measures arising from the shadow flicker study.

Cumulative Impacts:
If shadow flicker studies are undertaken for both the Hendrina and Ummbila projects and identified mitigation measures are undertaken, it is highly unlikely that there will be a cumulative shadow flicker impact.

See appendix IV.

Residual Impacts:
There are no residual risks.

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

Nature of impact:
The environment surrounding the proposed facility is not totally dark. Existing lighting is typically comprised of:

- Bright lighting areas associated with existing largescale industrial operations that are generally located in excess of 25km away;
- Bright lighting areas associated with settlements including Bethal, Morgonzon and Ermelo; and
- Occasional low intensity lighting associated with homesteads and farms in the surrounding rural area.

Lighting associated with the facility is likely to include:

- Security and operational lighting at key installation areas such as the control room and on-site substations; and
- Aircraft warning lights located on the nacell of each turbine.

From experience of other similar projects, aircraft warning lighting is typically comprised of red lights with an intensity and performance requirement range of up to 4 nautical miles which is approximately 8km. Subject to weather conditions, lighting at night may be visible at a greater distance but the performance is likely to deteriorate significantly with distance.

Security and operational lighting could be comprised of high mast flood lighting which not only lights necessary areas on the site but also sheds light on large surrounding areas.

Aircraft warning lighting is a requirement of the South African Civil Aviation Authority.

Security and operational lighting are practical requirements needed to secure, maintain and run the facility.

Aircraft warning lights therefore are a legal requirement that will create additional lighting that is likely to be visible over a limited area and is unlikely to cause nuisance.

However, security and operational lighting has the potential to be visible over a large area and create nuisance for local residents.

Therefore, mitigation of impacts of operational and security lighting is only likely to be possible and likely to be most effective.

	Without mitigation	**With mitigation**
Extent	Aircraft warning lighting Site and immediate surroundings, **(2)** Security lighting, Region, **(3)**	Aircraft warning lighting Site and immediate surroundings, **(2)** Security lighting, Site and immediate surroundings, **(2).**
Duration	All lighting Long term, **(4)**	All lighting Long term, **(4)**
Magnitude	Aircraft warning lighting Minor to Small, **(1)** Security lighting Moderate, **(6)**	Aircraft warning lighting Minor to Small, **(1)** Security lighting Minor to Low **(3)**
Probability	Aircraft warning lighting Probable, **(3)** Security lighting Definite, **(5)**	Aircraft warning lighting Probable, **(3)** Security lighting Improbable, **(2)**
Significance	Aircraft warning lighting Low, **(21)** Security lighting High, **(65)**	Aircraft warning lighting Low, **(21)** Security lighting Low, **(18)**
Status	Aircraft warning lighting Given the limited range as well as there being no nuisance created, this is unlikely to be seen as a negative impact. **Neutral** Security Lighting This has the potential to create a new area of intense lighting. It also has the potential to create nuisance for local residents. Unmitigated it is therefore likely to be seen as a negative impact. **Negative.**	Aircraft warning lighting **Neutral** Security Lighting **Neutral**

Irreplaceable loss	No irreplaceable loss	No irreplaceable loss
Can impacts be mitigated?	**Aircraft warning lighting – No** **Security and operational lighting - 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 medium significance.

See appendix IV.

Residual Impacts:

There are no residual risks

8 IMPACT STATEMENT

8.1 VISIBILITY

The natural grain of the landform is formed by small ridgelines that run approximately east to west.

The height of the proposed turbine field is likely to make the project highly conspicuous. The landform will provide a degree of screening ability for receptors, however, it is unlikely to completely screen the proposed wind turbines unless viewers are approximately 10km or more from the project.

From best practice verified by local experience the following general areas of impact have been defined:

Distance	**Visual Perception of Turbines**
Up to 4 km (Short Distance)	Likely to be a prominent feature
4-10 km (Mid Distance)	Relatively prominent
10-20 km (Long Distance)	Only prominent in clear visibility – seen as part of the wider landscape
20-30+ km	Only seen in very clear visibility – a minor element in the landscape

The analysis also indicates that:

The ZTV assessment indicates the following:

viii. The proposed turbine field is likely to be visible over the majority of the 4km buffer (short distance) within which turbines are likely to be seen as prominent features;

ix. The proposed turbine field is likely to be visible over the majority of the 10km buffer (mid distance) within which turbines are likely to be seen as relatively prominent features;

x. The proposed turbine field is only likely to be visible over higher sections of the landscape that are mainly comprised of minor ridgelines within the 30km buffer (long distance). Within this distance turbines will only be prominent in clear visibility and when visible will be seen as part of the wider landscape;

xi. Outside the 30km buffer, turbines are unlikely to be seen as being prominent in the landscape in any conditions;

xii. There are a large number of homesteads and local unsurfaced roads within the 10km buffer from which turbines could be prominent. This may be locally mitigated by stands of trees particularly in the vicinity of farmsteads;

xiii. There are three settlements within the 10km buffer including:

- Bethal which is approximately 7.5km from the project;
- Morgonzon which is within the 4km buffer; and
- Davel which is also just within the 4km buffer.

It is likely that the turbine field will be prominent within views from the edges of the settlements facing the project;

ix. The turbine field is likely to be prominent from the Silver Waters Private Nature Reserve;

x. The turbine field may be visible under clear conditions from sections of the Rietvlei Private Nature Reserve but it will be seen is as part of the wider landscape.

8.2 LANDSCAPE CHARACTER AREAS AND VISUAL ABSORPTION CAPACITY

The affected landscape can generally be divided into the following LCAs:

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 array.

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.

8.3 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;**
  - 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.

8.4 Impacts Original Layout

8.4.1 Landscape Impacts

The proposed solar project is located within a landscape area with an overriding rural character within which there are large industrial nodes including mining operations and coal fired power stations.

Whilst the proposed project will create a new large scale industrial node within the agricultural landscape, this is not entirely out of character with the broader region.

However, it will be a significant local character change.

The impact was assessed as having a local impact of medium significance and a regional impact of low significance after mitigation.

8.4.2 Views from Local Main Roads

The N17,the R35 and the R39 are the main roads that will be particularly impacted within 4km of the proposed turbines.

All three of these roads pass through the turbine field and so some sections will have turbines located on both sides of the road.

All three roads will also have extensive views over the turbine field and will have numerous turbines within 4km which means that they will be prominent features.

All three roads also have turbines within 500m of the main carriageway. These are likely to be visually imposing.

All other affected roads generally fall in the long distance category (10-30km distance). The impact is likely to consist of occasional views of the facility for motorists as they travel over the undulating landform. Views will therefore be intermittent, only prominent in clear visibility and will be seen as part of the wider landscape.

The impact was assessed as having a medium significance within 10km and of low significance within 30km after mitigation.

8.4.3 Views from Local Unsurfaced Minor Roads

There are several unsurfaced roads that run close to and through the proposed turbine field. All of these roads are within 4km of the proposed turbines which means that the turbine structures are likely to be prominent features.

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 impact was assessed as having a medium significance within 10km and of low significance within 30km after mitigation.

8.4.4 Views from Local Homesteads

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

These are largely comprised of farmsteads and agricultural workers houses.

The applicant has allowed a buffer of 1km between any homestead and the closest turbine which should ensure that the view of turbines does not totally dominate views (VP 3).

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

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.

The impact was assessed as having a Medium Negative Significance without mitigation and a Low Significance after mitigation.

8.4.5 Views from Private Nature Reserves

There are two nature reserves that are most likely to be affected including:

- The Silver Waters Nature Reserve which is a private facility and is primarily a local tourism facility offering accommodation in tranquil surroundings around a large dam; and
- The Rietvlei Nature Reserve which is also a private nature reserve

Silver Waters is located within the proposed turbine field. The closest turbine is approximately 1.4km from the closest accommodation unit within the reserve.

Rietvlei is located approximately 15.7km from the closest turbine.

The analysis has indicated that whilst existing vegetation will screen the majority of the turbine field from Silver Waters, a number of turbines will be highly conspicuous from the reserve.

The analysis has also indicated that whilst turbines are likely to be visible from sections of Rietvlei but only prominent in clear visibility.

With mitigation, the impact was assessed as having a medium significance from Silver Waters and low significance from Rietvlei.

8.4.6 Shadow Flicker

The term "shadow flicker" refers to the flickering effect caused when rotating wind turbine blades periodically cast shadows over neighbouring properties as they turn, through constrained openings such as windows

The analysis has shown that a number of farmsteads could be affected by shadow cast by the turbine structures.

If buildings are in shadow during clear weather when the turbine is turning then they are likely to be affected by shadow flicker.

There are a minimum of 60 homesteads are at risk of being impacted by shadow flicker.

Homesteads close to the edges of risk areas are only likely to be subject to shadow for short periods of the year and so the risk of shadow flicker is low. Whereas homesteads over which shadow is cast for long periods of the year are at greater risk of the impact.

In order to confirm levels of impact a detailed Shadow Flicker Study is necessary.

With appropriate mitigation the impact of shadow flicker is likely to have a low significance.

8.4.7 Lighting

The environment surrounding the proposed facility is not totally dark. Existing lighting is typically comprised of:

- Bright lighting areas associated with existing largescale industrial operations that are generally located in excess of 25km away;
- Bright lighting areas associated with settlements including Bethal, Morgonzon and Ermelo; and
- Occasional low intensity lighting associated with homesteads and farms in the surrounding rural area.

Lighting associated with the facility is likely to include:

- Security and operational lighting at key installation areas such as the control room and on site substations; and
- Aircraft warning lights located on the nacell of each turbine

From experience of other similar projects, aircraft warning lighting is typically comprised of red lights with an intensity and performance requirement range of up to 4 nautical miles which is approximately 8km. Subject to weather conditions, lighting at night may be visible at a greater distance but the performance is likely to deteriorate significantly with distance.

Security and operational lighting could be comprised of high mast flood lighting which not only lights necessary areas on the site but also sheds light on large surrounding areas.

Aircraft warning lighting is a requirement of the South African Civil Aviation Authority.

Security and operational lighting are practical requirements needed to secure, maintain and run the facility.

Aircraft warning lights therefore are a legal requirement that will create additional lighting that is likely to be visible over a limited area and is unlikely to cause nuisance.

However, security and operational lighting has the potential to be visible over a large area and create nuisance for local residents.

The impacts of both aircraft warning lighting and security and operational lighting were assessed as likely to have low significance with mitigation.

8.5 ALTERNATIVES

Following initial specialist assessments, an Optimised Layout (2) was prepared by the applicant. In terms of landscape and visual impacts, this alternative layout is likely to resulted in:

a) A minor reduction in landscape impacts due to the fact that the layout occupies a marginally smaller area, however, this reduction is not sufficient to reduce assessed levels of impact; and
b) A small reduction in levels of impact on main roads due to the fact that turbines adjacent to the N17 are reduced and are setback further from the road.

8.6 CUMULATIVE IMPACTS

The proposed project will result in loss of rural landscape. However, it will not change the character of the broader landscape that is generally comprised of islands of large scale industrial operations surrounded by extensive rural areas.

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

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

Local Unsurfaced Roads
The project was assessed as likely to result in a low level contribution to an overall cumulative impact of medium significance

Homesteads
The project was assessed as likely to result in a low level contribution to an overall cumulative impact of medium significance

Nature Reserves
The project was assessed as likely to have no contribution to cumulative impacts.

Shadow Flicker
Given that a shadow flicker study is necessary for a WEF project and that this will highlight necessary mitigation measures to minimise risk of shadow flicker. As long as required mitigation measures are undertaken for both Hendrina and Ummbila WEF projects , it is highly unlikely that there will be a cumulative shadow flicker impact.

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

8.6 CONCLUSION

The proposed project will generally result in landscape and visual impacts of low to high significance.

The proposed landscape is relatively typical of the region and is not protected.

The proposed Optimised Layout is favoured from a Landscape and Visual Impact perspective. However, subject to mitigation measures being undertaken, particularly the necessary shadow flicker study, mitigation measures arising and recommended mitigation measures detailed in this report, from a Landscape and Visual Impact perspective, there is no reason why the either proposed project layout should be authorised.

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APPENDIX I

SPECIALIST'S BRIEF CV

Name	JONATHAN MARSHALL
Nationality	British
Year of Birth	1956
Specialisation	Landscape Architecture / Landscape & Visual Impact Assessment / Environmental Planning / Environmental Impact Assessment.
Qualifications	
Education	Diploma in Landscape Architecture, Gloucestershire College of Art and Design, UK (1979) Environmental Law, University of KZN (1997)
Professional	Registered Professional Landscape Architect (SACLAP) Chartered Member of the Landscape Institute (UK) Member of the International Association of Impact Assessment, South Africa
Languages	English - Speaking - Excellent - Reading - Excellent - Writing - Excellent
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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

- **Coega Power Ship** – Landscape and Visual Impact Assessment for the proposed Coega Power Ship project in the Eastern Cape Province.
- **Saldanha Power Ship** - Landscape and Visual Impact Assessment for the proposed Coega Power Ship project in the Western Cape Province.
- **Modderfontein Wind Energy Facility** - Landscape and Visual Impact Assessment for a proposed amendment to the layout and wind turbine specification of a previously authorised project near Beaufort West.
- **Western Cape Wind Energy Facility** – Due diligence assessment for a proposed wind energy facility near Swellendam in the Western Cape Province.
- **Hyperion Thermal Generation Facility** - Landscape and Visual Impact Assessment for a proposed gas powered power generation plant near Kathu in the Northern Cape Province.
- **Beachfront House on ERF 766 Scarborough -** Landscape and Visual Impact Assessment for a proposed development of beachfront house on the edge of the Table Mountain National Park in Scarbourough, Western Cape Province.
- **Springs Special Economic Zone -** Landscape and Visual Impact Assessment for the proposed Springs SEZ in the Gauteng Province.
- **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 – L**VIA for the Pondoland Section of this project for the South African National Roads Agency.
- **Mpushini Park Ashburton –** LVIA 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 -** LVIA for a solar project near Vryburg 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** – LVIA for a proposed tourism development within the iSimangaliso Wetlend Park World Heritage Site.
- **Palesa Power Station** - LVIA for a new 600MW power station near Kwamhlanga in Mpumalanga for a private client.
- **Heuningklip PV Solar Project** – LVIA for a solar project in the Western Cape Province for a private client.
- **Kruispad PV Solar Project** – LVIA for a solar project in the Western Cape Province for a private client.
- **Doornfontein PV Solar Project** – LVIA for a solar project in the Western Cape Province for a private client.
- **Olifantshoek Power Line and Substation** – LVIA for a new 10MVA 132/11kV substation and 31km powerline, Northern Cape Province, for Eskom.
- **Noupoort Concentrating Solar Plants -** Scoping and LVIAs for two proposed parabolic trough projects.
- **Drakensberg Cable Car –** Preliminary LVIA and draft terms of reference as part of the feasibility study.
- **Paulputs Concentrating Solar Plant (tower technology)** – LVIA for a new CSP project near Pofadder in the Northern Cape.
- **Ilanga Concentrating Solar Plants 1, 2, 3, 4 & 5** – Scoping and LVIAs 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** –LVIA 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 LVIAs 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 LVIAs for three new Solar PV projects near Pofadder in the Northern Cape.
- **Gunstfontein Wind Energy Facility** – Scoping and LVIA for a proposed WEF near Sutherland in the Northern Cape.
- **Moorreeesburg Wind Energy Facility** – LVIA for a proposed WEF near Moorreeesburg in the Western Cape.
- **Semonkong Wind Energy Facility** - LVIA 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** – LVIA for a proposed power line to evacuate power from a wind energy facility near Sutherland in the Northern Cape.
- **Tshivhaso Power Station** – Scoping and LVIA for a proposed new power station near Lephalale in Limpopo Province.
- **Saldanha Eskom Strengthening** – Scoping and LVIA for the upgrading of strategic Eskom infrastructure near Saldanha in the Western Cape.
- **Eskom Lethabo PV Installation** - Scoping and LVIA for the development of a solar PV plant within Eskom's Lethabo Power Station in the Free State.
- **Eskom Tuthuka PV Installation** - Scoping and LVIA for the development of a solar PV plant within Eskom's Thutuka Power Station in Mpumalanga.

- **Eskom Majuba PV Installation** - Scoping and LVIA for the development of a solar PV plant within Eskom's Majuba Power Station in Mpumalanga.
- **Golden Valley Power Line** - LVIA for a proposed power line to evacuate power from a wind energy facility near Cookhouse in the Eastern Cape.
- **Mpophomeni Shopping Centre** – LVIA 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 LVIA for two proposed solar PV projects near Vryburg in the North West Province.
- **AngloGold Ashanti, Dokyiwa (Ghana)** – LVIA for proposed new Tailings Storage Facility at a mine site working with SGS as part of their EIA team.
- **Gateway Shopping Centre Extension (Durban)** – LVIA for a proposed shopping centre extension in Umhlanga, Durban.
- **Kouroussa Gold Mine (Guinea)** – LVIA for a proposed new mine in Guinea working with SGS as part of their EIA team.
- **Mampon Gold Mine (Ghana)** - LVIA for a proposed new mine in Ghana working with SGS as part of their EIA team.
- **Telkom Towers** – LVIAs for numerous Telkom masts in KwaZulu Natal.
- **Eskom Isundu Substation** – LVIA for a proposed major new Eskom substation near Pietermaritzburg in KwaZulu Natal.
- **Eskom St Faiths Power Line and Substation** – LVIA for a major new substation and associated power lines near Port Shepstone in KwaZulu Natal.
- **Eskom Ficksburg Power Line** – LVIA for a proposed new power line between Ficksburg and Cocolan in the Free State.
- **Eskom Matubatuba to St Lucia Power Line** – LVIA for a proposed new power line between Mtubatuba and St Lucia in KwaZulu Natal.
- **Dube Trade Port, Durban International Airport** – Landscape & Visual Impact Assessment.
- **Sibaya Precinct Plan** – LVIA as part of Environmental Impact Assessment for a major new development area to the north of Durban.
- **Umdloti Housing** – LVIA as part of Environmental Impact Assessment for a residential development beside the Umdloti Lagoon to the north of Durban.
- **Tata Steel Ferrochrome Smelter** - LVIA of proposed new Ferrochrome Smelter in Richards Bay as part of EIA undertaken by the CSIR.
- **Durban Solid Waste Large Landfill Sites –** LVIAs 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 -** LVIA 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** - EDP acted as advisor to the Province of KwaZulu Natal in an appeal brought

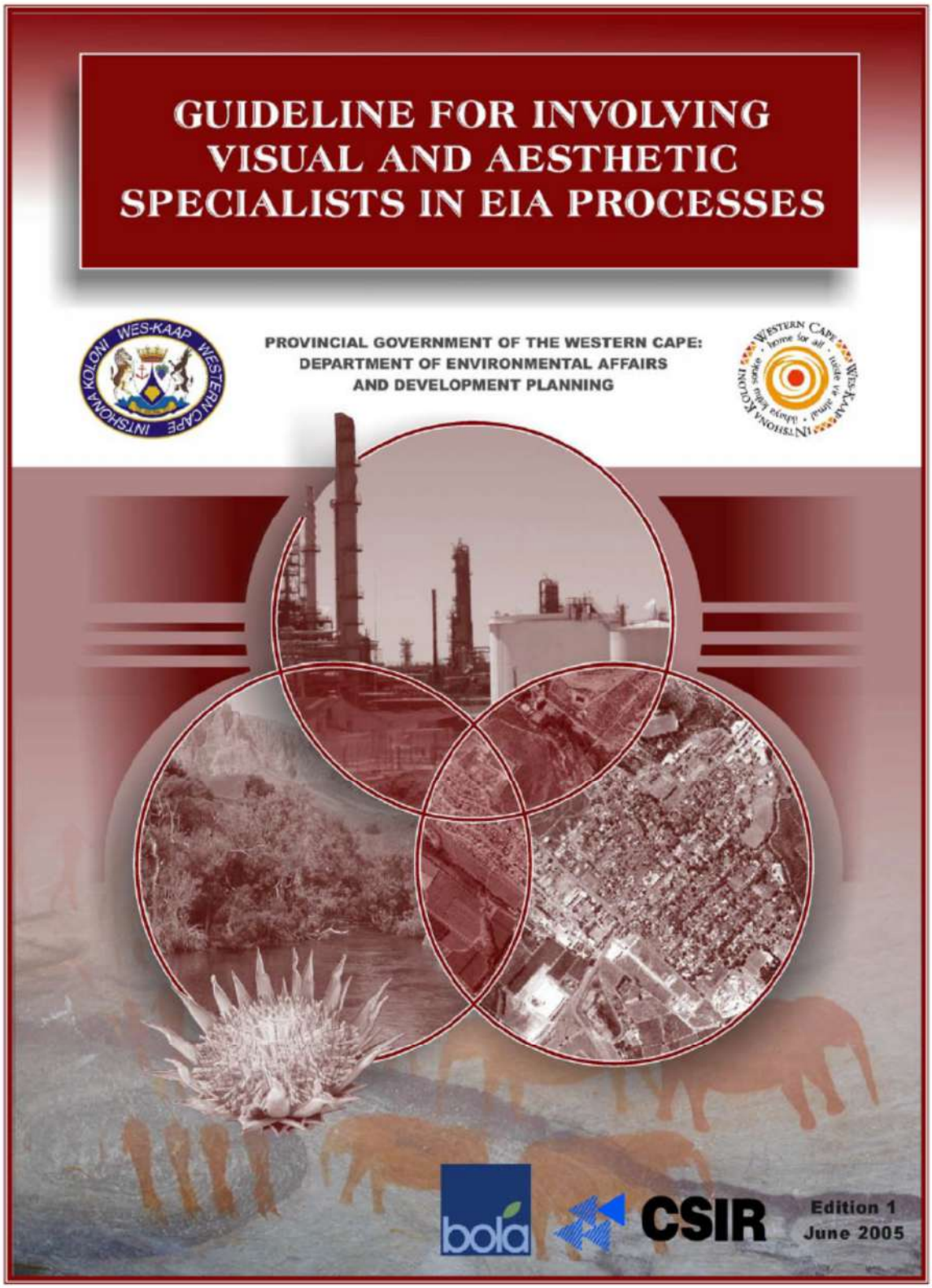
about by a developer to extend a light industrial development within a 60 metre building line from the National N3 Highway.

- **La Lucia Mall Extension** - LVIA using three dimensional computer modelling / photo realistic rendering and montage techniques for proposed extension to shopping mall for public consultation exercise.
- **Redhill Industrial Development** - LVIA assessment using three dimensional computer modelling / photo realistic rendering and montage techniques for proposed new industrial area for public consultation exercise.
- **Avondale Reservoir** - LVIA 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** - LVIA 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** - LVIA and Landscape Design for AECI.
- **Sainsbury's Bryn Rhos** - Computer Aided Landscape & Visual Impact Assessment/ Planning Application for the development of a new store within the Green Wedge North of Swansea.
- **Ynyston Farm Access** - Computer Aided Landscape & 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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bola
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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:

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

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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

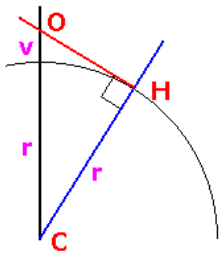
APPENDIX III

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 large scale industry as there are no other wind energy facilities within the region.

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

Note: where alternative viewpoint 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:
The proposed project is located within a landscape area with an overriding rural character.
Other large scale industrial operations including mining operations and power stations are relatively obvious in the region.
Whilst the proposed project will create a new large scale industrial operation and change the character of an area of rural landscape, this is not entirely out of character with the region.

	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Region, **(3)**	Region **(3)**
Duration	Long term, **(4)**	Long term **(4)**
Magnitude	Minor to Small, **(1)**	Low **(4)**
Probability	Very Improbable, **(3)**	Probable, **(3)**
Significance	**Low, (24)**	**Low (33)**
Status (positive or negative)	Due to the fact that the project is generally in keeping with regional landscape character it is unlikely to be seen as negative within the region context. **Neutral**	It is likely that a proportion of people will see large scale industry in the region in a negative light. **Neutral - Negative**
Reversibility	High	Low
Irreplaceable loss of resources?	No	Yes
Can impacts be mitigated?	**Yes,** Possible mitigation will not change the level of significance	N A

2) The cumulative impact on views from main roads.

Nature:
The proposed project is located within a landscape area with an overriding rural character.
Other large scale industrial operations including mining operations and power stations are relatively obvious in the region.

Whilst the proposed project will create a new large scale industrial operation and change the character of an area of rural landscape, this is not entirely out of character with the region.		
	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other industrial development in the area**
Extent	Region **(3)**	Region, **(3)**
Duration	Long term **(4)**	Long term, **(4)**
Magnitude	Minor to Small **(1)**	Low, **(4)**
Probability	Improbable **(2)**	Probable, **(3)**
Significance	Low **(16)**	Medium, **(33)**
Status (positive or negative)	Due to the fact that the project is generally in keeping with regional landscape character it is unlikely to be seen as negative within the region context. **Neutral**	It is likely that a proportion of people will see large scale industry in the region in a negative light. **Neutral - Negative**
Reversibility	High	Low
Irreplaceable loss of resources?	No irreplaceable loss.	Yes
Can impacts be mitigated?	**Yes** Possible mitigation will not change the level of significance.	Unknown

3) Cumulative impact on views from local unsurfaced roads.

Nature: The proposed project is located within a landscape area with an overriding rural character. Other large scale industrial operations including mining operations and power stations are relatively obvious in the region. Whilst the proposed project will create a new large scale industrial operation and change the character of an area of rural landscape, this is not entirely out of character with the region.		
	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other industrial development in the area**
Extent	Region **(3)**	Region, **(3)**
Duration	Long term **(4)**	Long term, **(4)**
Magnitude	Minor to Small **(1)**	Low, **(4)**
Probability	Improbable **(2)**	Probable, **(3)**
Significance	Low **(16)**	Medium, **(33)**
Status (positive or negative)	Due to the fact that the project is generally in keeping with regional landscape character it is unlikely to be seen as	It is likely that a proportion of people will see large scale industry in the region in a negative light. **Neutral - Negative**

	negative within the region context. **Neutral**	
Reversibility	High	Low
Irreplaceable loss of resources?	No irreplaceable loss.	Yes
Can impacts be mitigated?	**Yes** Possible mitigation will not change the level of significance.	

4 Cumulative impact on local homesteads

Nature:
The proposed project is located within a landscape area with an overriding rural character.
Other large scale industrial operations including mining operations and power stations are relatively obvious in the region.
Whilst the proposed project will create a new large scale industrial operation and change the character of an area of rural landscape, this is not entirely out of character with the region.

	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Region **(3)**	Region, **(3)**
Duration	Long term **(4)**	Long term, **(4)**
Magnitude	Minor to Small **(1)**	Low, **(4)**
Probability	Improbable **(2)**	Probable, **(3)**
Significance	Low **(16)**	Medium, **(33)**
Status (positive or negative)	Due to the fact that the project is generally in keeping with regional landscape character it is unlikely to be seen as negative within the region context. **Neutral**	It is likely that a proportion of people will see large scale industry in the region in a negative light. **Neutral - Negative**
Reversibility	Medium	Low
Irreplaceable loss of resources?	No irreplaceable loss	Yes
Can impacts be mitigated?	Yes	Unknown

5 Cumulative impact on Nature Reserves

Nature:
No other large scale industrial operation is visible from the reserves. Therefore there is no cumulative impact.

6 Shadow Flicker Cumulative Impacts

Nature:

Including Ummbila WEF there are two WEF projects within 30km of each other.
The Ummbila WEF will be subject to a shadow flicker study and mitigation measures coming out of that study will be adopted. It is therefore highly unlikely that shadow flicker will be problematic on this project.

Without access to the Hendrina WEF assessment it is not possible to confirm that similar studies will be undertaken for this project. However, given that the Competent Authority are aware of possible impacts it is highly likely that a similar study will be undertaken for this project.

If both projects are subject to a shadow flicker study then it is highly unlikely that either project will create a significant impact.

I	**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	Small, **(0)**	Small, **(0)**
Probability	Very Improbable, **(1)**	Very Improbable, **(1)**
Significance	Low, **(6)**	Low, **(7)**
Status (positive or negative)	**Neutral - Negative**	**Neutral - Negative**
Reversibility	High	High
Irreplaceable loss of resources?	No irreplaceable loss	No irreplaceable loss
Can impacts be mitigated?	Yes	Yes

5 Lighting Impacts

Nature:
Existing lighting is typically comprised of:

- Bright lighting areas associated with existing largescale industrial operations that are generally located in excess of 25km away;
- Bright lighting areas associated with settlements including Bethal, Morgonzon and Ermelo; and
- Occasional low intensity lighting associated with homesteads and farms in the surrounding rural area.

There is potential for the proposed project to create a new node of intense lighting levels which could be obvious within the region.

However, with appropriate mitigation, and under normal operating conditions, lighting associated with the proposed project will not raise local lighting levels significantly higher than the current situation.

This will add minimally to cumulative lighting levels in the region.		
	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Site **(1)**	Region, **(3)**
Duration	Long term **(4)**	Long term, **(4)**
Magnitude	Minor to Small **(1)**	Low, **(4)**
Probability	Improbable **(2)**	Probable, **(3)**
Significance	Low **(12)**	Medium, **(33)**
Status (positive or negative)	Due to the fact that the project is generally in keeping with regional landscape character it is unlikely to be seen as negative within the region context. **Neutral**	It is likely that a proportion of people will see large areas of intense lighting in the region in a negative light. **Neutral - Negative**
Reversibility	Medium	High
Irreplaceable loss of resources?	No irreplaceable loss	No irreplaceable loss
Can impacts be mitigated?	Yes	Unknown

APPENDIX V

ENVIRONMENTAL MANAGEMENT PLAN

Project component/s	Ummbila PV, Construction, Operation and Decommissioning		
Potential Impact	Change in Landscape Character and the nature of stakeholder views: • Change in character and sense of place of the landscape setting; • Changing the nature of views from local roads; • Changing the nature of views from agricultural homesteads; • Changing the nature of views from Private Reserves; • Glare impacts; and • Lighting impacts.		
Activity/risk source	• The proposed array and substation may be obvious from local roads, local homesteads and private reserves; • Glare impacts are unlikely but could affect the R35 and adjacent unsurfaced roads; • Engineered change in landform being obvious against natural contours; • Vegetation clearance and lack of rehabilitation during construction and decommissioning making the development more obvious particularly from a distance; • The development industrialising the outlook for stakeholders; and • Security lighting exacerbating light pollution;		
Mitigation: Target/Objective	• Plan platforms and earthworks to blend into surrounding natural contours. • Minimise and reinstate vegetation loss. • Maintain and augment exiting surrounding natural vegetation in order to soften views of the development and maintain continuity with the surrounding natural landscape. • Remove structures and rehabilitate site to its natural condition on decommissioning. • Ensure PV panels use non reflective surfaces in order to minimise the potential for glint and glare. • Ensuring that under normal conditions, lighting appears similar to existing agricultural homesteads.		
Mitigation: Action/control		**Responsibility** Contractor (C) Environmental Officer (EO) Environmental Liaison Officer (ELO)	**Timeframe** Construction Phase (C) Operational Phase (O) Decommissioning Phase (D)
Minimise disturbance and maintain existing vegetation as far as is possible both within and surrounding the development area.		C, EO	C
Reinstate any areas of vegetation that have been disturbed during construction.		C, EO	C
Maintain and augment vegetation within the area surrounding the development.		C, EO	D

Rehabilitate disturbed areas to their natural state on decommissioning.	C, EO	C, D
Monitor rehabilitated areas post-construction and post-decommissioning and implement remedial actions.	C, EO	D
Remove all temporary works.	C, EO	D
Remove infrastructure not required for the post-decommissioning use of the site.	C, EO	D
Plan lighting to utilise infra-red security systems or motion sensor triggered security lighting	C, EO	C, EO
Adjust trackers as necessary to minimise the risk of glare impacting on the R35	EO	EO
Design /modify layout to keep PV panels off the low ridgeline that runs across the central section of the site	EO	EO

Performance Indicators	Visibility of the PV array from the R35. Natural contours rather than rigid engineered land form. Vegetation presence and density. Visibility of the development from surrounding areas. Presence of unnecessary infrastructure. Lighting appearing similar to existing farmsteads under normal conditions
Monitoring	Evaluate visibility from the R35, adjacent unsurfaced roads and homesteads. Evaluate vegetation before, during and after construction. Evaluate vegetation growth and reinstatement during decommissioning and for a year thereafter. Evaluate lighting impacts. Evaluate glare impacts on the R35 and adjacent unsurfaced roads. Take regular time-line photographic evidence. Responsibility: EO and ELO. Prepare regular reports.

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APPENDIX I

ASSESSOR'S CURRICULUM VITAE

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, 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.

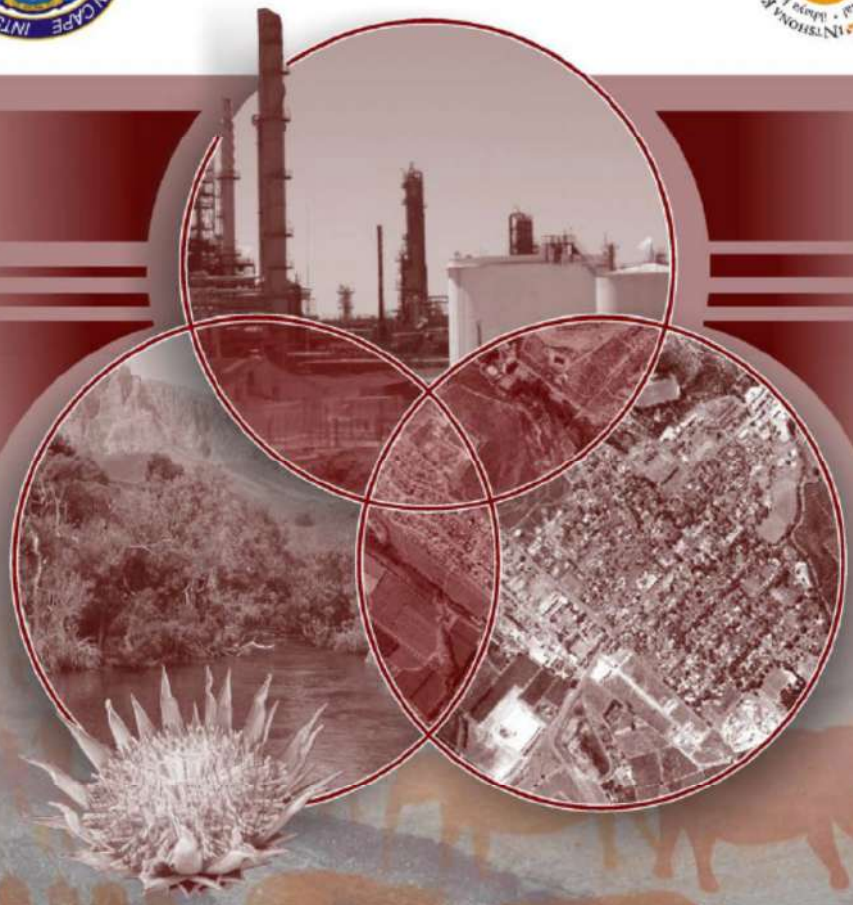
APPENDIX II

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
AND DEVELOPMENT PLANNING



bola CSIR

Edition 1
June 2005

GUIDELINE FOR INVOLVING VISUAL AND AESTHETIC SPECIALISTS IN EIA PROCESSES

Edition 1

Issued by:

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Department of Environmental Affairs and Development Planning
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ACKNOWLEDGEMENTS

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Stakeholders engaged in the guideline development process:

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

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

Finalisation of report figures and formatting:

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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.*

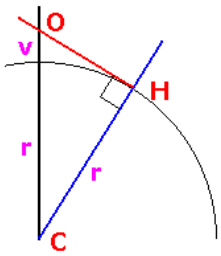
CONTENTS

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.