MUTSHO POWER (PTY) LTD

# PROPOSED ESTABLISHMENT OF FOUR SOLAR PV POWER PROJECTS NEAR MAKHADO, LIMPOPO PROVINCE

# LANDSCAPE & VISUAL IMPACT BASELINE REPORT

**JUNE 2022**


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# 1 INTRODUCTION

## 1.1 GENERAL

This Landscape and Visual Impact Scoping Report (LVISR) study forms part of the Scoping and Environmental Impact Assessment that is being undertaken for the proposed establishment of a cluster of up to four Solar PV Energy Facilities (collectively known as the Mutsho PV Cluster) and associated infrastructures by Savannah Environmental (Pty) Ltd on behalf of Mutsho Power (Pty) Ltd.

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

This desktop Visual Impact Assessment Report has been prepared for inclusion in the project Environmental Impact Assessment Scoping Report.

## 1.2 PROJECT LOCATION

The property that has been identified for the development of the proposed projects is:

| Farm Name: | Farm Number: | SG21-Digit Code | Area |
|---|---|---|---|
| **Vrienden** | 589 | T0MS00000000058900000 | 1 285.3ha |

The abovementioned property is indicated on the Site location Plan **(Map 1)**.

## 1.3 BACKGROUND OF SPECIALIST

Jon Marshall qualified as a Landscape Architect in 1978. He has also had extensive experience of environmental impact assessment processes in South Africa. He has been involved in Visual Impact Assessment over a period of more than 30 years. He has developed the necessary computer skills to prepare viewshed analysis and three dimensional modelling to illustrate impact assessments. He has undertaken landscape and visual impact assessments for major buildings, industrial developments, mining, infrastructure projects and numerous renewable energy projects.

A brief Curriculum Vitae outlining relevant projects is included as **Appendix I.**

## 1.4 THE NATURE OF VISUAL IMPACT

Visual impacts may relate to a general change in the character of an area or in the change in a specific view for a person or group of people.

Visual impacts can be positive or negative and a degree of subjectivity is required in deciding this point. The approach of any visual assessment should, as objectively as possible, describe a landscape and as far as is possible reflect the likely majority view regarding positive / negative aspect of an impact. This can be difficult particularly in South Africa due to different values and cultures associated with various sectors of the population. For example, poorer and particularly rural based sectors of the population are possibly more concerned with the productive nature of a landscape than its appearance, whereas the wealthier sectors might be more concerned with

scenic value particularly as it is associated with property values. If possible the values and opinions of all impacted sectors of the community should be considered.

General change to a landscape might have greater or lesser significance subject to;

a) Numbers of people that might use the landscape,
b) The use of the landscape,
c) The level of protection afforded the landscape,
d) The rarity of the landscape.

In terms of change to a specific view this might be defined as either visual intrusion or visual obstruction.

a) 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 been removed as far as is possible in this assessment 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.
b) Visual obstruction is the blocking of views or foreshortening of views. This can generally be measured in terms of extent.

More often than not such an impact will be a combination of intrusion and obstruction. Obstruction can be measured in terms of the extent of an existing view that is screened by a development. However, judging intrusion requires a degree of subjectivity. It is however possible to relate this judgement to the manner in which proposed change would impact on the use or enjoyment of an area which again requires an understanding or local values.

## 1.5 RELEVANT GUIDELINES

Work is to be undertaken in accordance with the following guideline documents;

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

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

## 1.6 SCOPING OBJECTIVES

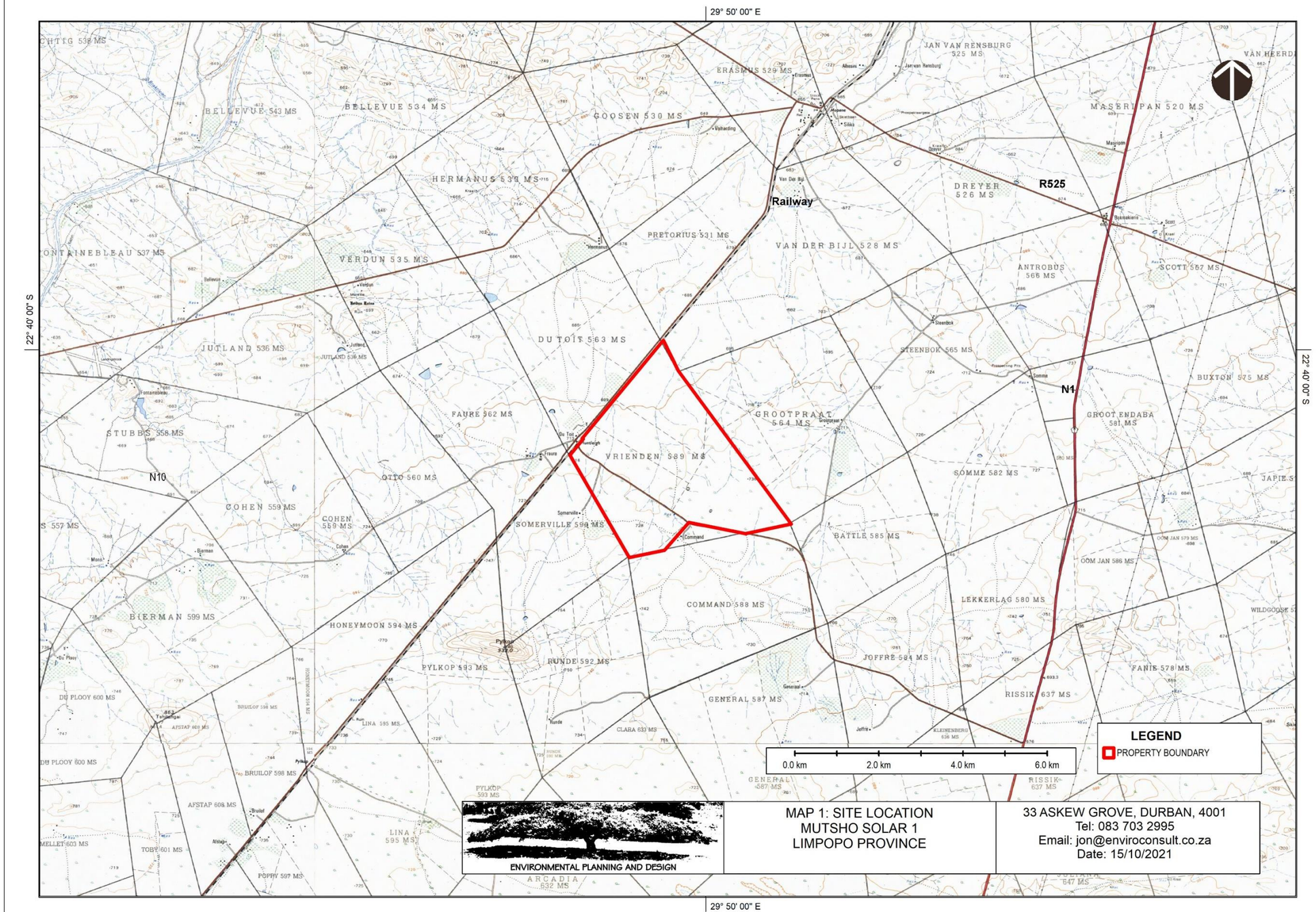
This Scoping Study identifies and evaluates potential environmental impacts associated with all aspects of the proposed Project. In terms of the EIA Regulations, feasible and reasonable alternatives should be assessed within the Scoping Study. The scope of an environmental assessment is defined by the range of issues and feasible alternatives to be considered, and the approach towards the assessment that will follow.

The characteristics of a scoping exercise are as follows:

a) Feasible and reasonable alternatives are identified and selected for further assessment;
b) Important characteristics of the affected environment are identified;
c) Significant issues that are to be examined in the assessment procedure are identified; and
d) It provides the basis for determining terms of reference for the assessment procedure.

## 1.7 LIMITATIONS AND ASSUMPTIONS

a) This initial assessment is a desk top study that has made use of existing GIS data sets, on line mapping / photography, and the assessor's knowledge of the area.
b) Project details were not available at the time of reporting. Assumptions as to height and nature of the development are indicated in section 2.2.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Railway
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N1
N10
BELLEVUE 543 MS
BELLEVUE 534 MS
GOOSEN 530 MS
ERASMUS 529 MS
JAN VAN RENSBURG 525 MS
MASERUPAN 520 MS
HERMANUS 539 MS
PRETORIUS 531 MS
VAN DER BIJL 528 MS
DREYER 526 MS
VERDUN 535 MS
DU TOIT 563 MS
ANTROBUS 566 MS
SCOTT 567 MS
JUTLAND 536 MS
STEENBOK 565 MS
BUXTON 575 MS
FAURE 562 MS
GROOTPRAAT 564 MS
GROOT ENDABA 581 MS
STUBBS 558 MS
VRIENDEN 589 MS
SOMME 582 MS
OTTO 560 MS
COHEN 559 MS
SOMERVILLE 590 MS
BATTLE 585 MS
OOM JAN 586 MS
COMMAND 588 MS
LEKKERLAG 580 MS
BIERMAN 599 MS
HONEYMOON 594 MS
PYLKOP 593 MS
RUNDE 592 MS
JOFFRE 584 MS
FANIE 578 MS
DU PLOOY 600 MS
GENERAL 587 MS
RISSIK 637 MS
LINA 595 MS
CLARA 633 MS
BRUILOF 598 MS
AFSTAP 608 MS
TOBY 601 MS
POPPY 597 MS
ARCADIA 632 MS
0.0 km
2.0 km
4.0 km
6.0 km
LEGEND
PROPERTY BOUNDARY
ENVIRONMENTAL PLANNING AND DESIGN
MAP 1: SITE LOCATION
MUTSHO SOLAR 1
LIMPOPO PROVINCE
33 ASKEW GROVE, DURBAN, 4001
Tel: 083 703 2995
Email: jon@enviroconsult.co.za
Date: 15/10/2021

# 2. PROJECT DESCRIPTION

## 2.1 OVERVIEW OF SOLAR PV TECHNOLOGY

Solar energy facilities, such as those which utilise PV technology use the energy from the sun to generate electricity through a process known as the **Photovoltaic Effect**. Generating electricity using the Photovoltaic Effect is achieved through the use of the following components:

**Photovoltaic Modules**

PV cells are made of crystalline silicon, the commercially predominant PV technology, that includes materials such as polycrystalline and monocrystalline silicon or thin film modules manufactured from a chemical ink compound. PV cells are arranged in multiples / arrays and placed behind a protective glass sheet to form a PV module (Solar Panel). Each PV cell is positively charged on one side and negatively charged on the opposite side, with electrical conductors attached to either side to form a circuit. This circuit captures the released electrons in the form of an electric current (i.e. Direct Current (DC)). When sunlight hits the PV panels free electrons are released and flow through the panels to produce direct electrical (DC) current.

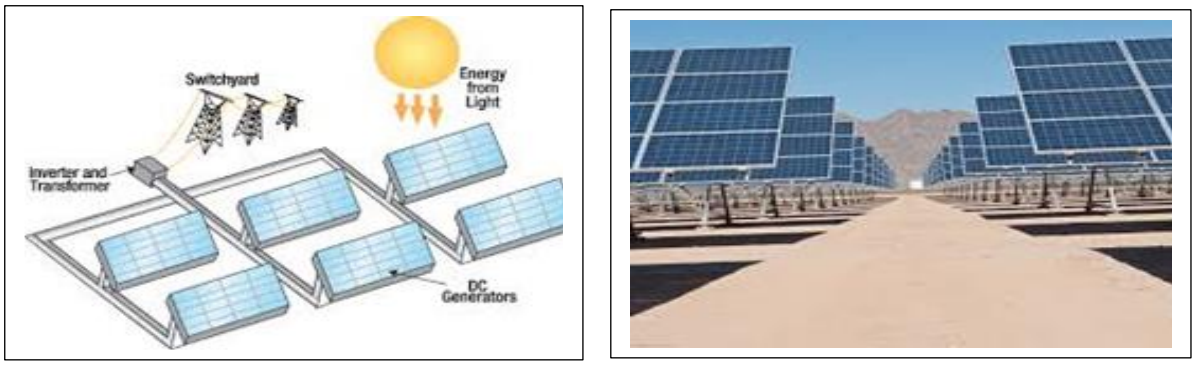



**Figure 1:** Overview of a typical/generic PV cell, module, and array/panel, noting that the photograph on the right appears to depict a single axis tracking mount, but it is not clear from the angle of the photograph. Whether these depict mono- or bi- facial modules is also unclear (pveducation.com).

**Inverters**

Inverters are used to convert electricity produced by the PV panels from Direct Current (DC) into Alternating Current (AC), to enable the facility to be connected to the national electricity grid. In order to connect a large solar facility such as the one being proposed to the national electricity grid, numerous inverters will be arranged in several arrays to collect, and convert power produced by the facility.

**Support Structures**

PV panels will be fixed to a support structure. PV panels can either utilise fixed / static support structures, or alternatively they can utilise single or double axis tracking support structures. PV panels which utilise fixed / static support structures are set at an angle (fixed-tilt PV system) so as to optimise the amount of solar irradiation. With fixed / static support structures the angle of the PV panel is dependent on the latitude of the proposed development, and may be adjusted to optimise for summer and winter solar radiation characteristics. PV panels which utilise tracking support structures track the

movement of the sun throughout the day so as to receive the maximum amount of solar irradiation.

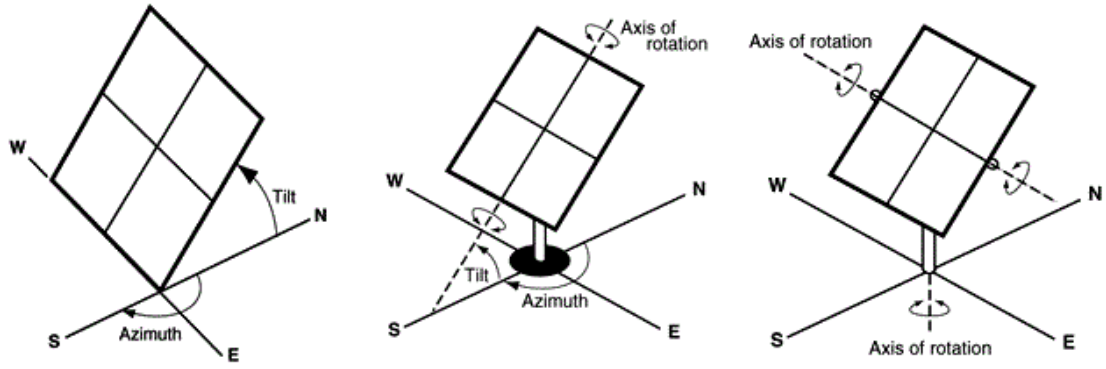



**Figure 2:** Overview of different PV tracking systems (from left to right: fixed-tilt, single-axis tracking, and double-axis tracking (Source: pveducation.com)).

PV panels are designed to operate continuously for more than 20 years and with low maintenance.

**Plate 1 - Typical Battery Energy Storage System**

**On Site Electrical Infrastructure Compound:**

An on-site electrical infrastructure compound typically comprises of a substation and associated infrastructure and could include additional collector infrastructure and / or a Battery Energy Storage System (BESS).

The on-site substation would serve as a collection point for the AC current from each inverter and includes step-up infrastructure (internal reticulation would be at 11/22kV, which would be stepped up by the sub-station to up to 132kV for evacuation into the grid network / proposed collector sub-station) and typically it would be a maximum of 8m in height.

The need for a BESS stems from the fact that electricity is only produced by the Renewable Energy Facility while the sun is shining, while the peak demand may not necessarily occur during the daytime. Therefore, the storage of electricity and supply thereof during peak-demand will mean that the facility is more efficient, reliable and electricity supply more constant.

The BESS will store and integrate a greater amount of renewable energy from the Solar PV Facilities into the electricity grid. This will assist with the objective to generate electricity by means of renewable energy to feed into the National Grid via relevant available procurement programs applicable at the time.

## 2.2 PROJECT ASSUMPTIONS

The following assumptions have been made in order to indicate the maximum extent of the landscape that the project might affect:

- The solar array and BESS will be in the order of 5m high or lower:
- The main equipment within the on-site substation will be in the order of 8m high.

Using a recognised mathematical formula (**Appendix III**), this means that the project might have an Approximate Limit of Visibility (ALV) of 10.1km. This ALV is indicated on mapping.

# 3. DESCRIPTION OF RECEIVING ENVIRONMENT AND RECEPTORS

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

This section will;

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

## 3.1 LANDSCAPE CHARACTER

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

Landscape character has been defined using a desk top assessment using existing data sets and aerial photography as well as from knowledge of the area.

The affected area has a strong rural character, interspersed with agriculture and industrial activities, particularly mining, and settlement.

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

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

### 3.1.1 Landform and Drainage

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

The proposed site is located within an area of undulating topography.

The Limpopo River is the main regional drainage feature. As this river forms the border between the Republic of South Africa and Zimbabwe. The Limpopo River at its closest is in excess of 50km from the proposed site. Views of the development will not be visible from this range.

The rugged Soutpansberg lies approximately 22km to the south and east of the proposed site.

A cross section of the landform ranges in elevation between approximately 680m amsl at the Limpopo River to the north and 1400m amsl at the top of the Soutpansberg to the south. By comparison the proposed project site has current levels between 690-730m amsl.

The Landform and Drainage Map (Map 5) indicates that the generally undulating landform is created by a series of water courses within minor valleys that gradually fall towards the Limpopo River. The landform to the north of the site

slopes gently towards the Sand River for approximately 11.5km and to the south it falls gently for approximately 13km towards the Mutamba River.

Within the undulating landform, there are a number of koppies and secondary ridgelines that rise up to 130m above the surrounding landform. There are numerous minor koppies to the north of the site as well as two major koppies close and to the south and one major koppie to the north in the vicinity of Mopane. These koppies are likely to provide a degree of screening. They also provide a degree of enclosure forming near continuous valley sides that run in a south-west to north-east direction.

To the south the Soutpansberg is likely to provide significant screening for areas further south of this more rugged terrain, which rises steeply forming the southern edge of the larger Limpopo Valley.

### 3.1.2 Landcover

**Refer to Map 3** for analysis of Landcover.

Landcover within the study area can be divided into the following types;

- **Urban development** includes the settlements of Musina which is approximately 41km to the north east and Makhado (Louis Trichardt) which is approximately 40km south of the proposed site. Both settlements have both well-established middle and upper income housing areas and more recent low cost housing areas.

  There is also a band of well-established settlements approximately 25km to the south of the proposed site that extends to the east within the Soutpandberg. These settlements include Makusha, Mudimeli, Manyii, Musekwa and Makhado. Given the distances involved and the fact that topography and vegetation are both likely to play a major role in screening views, it is unlikely that the proposed development will be visible from these settlements to the south and east.

  Mopane is a small village that is located approximately 6.5km to the north-east of the proposed site. This small settlement is located on a minor ridgeline. From the southern edge, views over the landscape towards the proposed site are possible. However, vegetation within the settlement is relatively dense and will screen views.

- **Natural areas** are the main land cover type surrounding the proposed development. From the site visit these areas appear to be largely used for game and low intensity cattle grazing. This activity has resulted in the majority of the area retaining a relatively natural appearance. A proportion of landowners also appear to have diversified into tourism as is evident from the number of bush lodges in the area.

  Within the natural areas there are also a large number of farmsteads that are likely to include; farm sheds, farm houses and workers accommodation. It is also likely that a proportion of these are used as guest houses.

  There are a number of protected areas in the region, the closest of which include the Averal Private Nature Reserve which is approximately 11.5km to the north-east. Within protected areas vegetation is likely to be relatively

dense and more pristine than surrounding areas due to conservation management.

In terms of visual implications, natural areas are likely to provide a significant amount of screening for the development particularly, where thicket and woody vegetation extends above head height.

- **Cultivation** occurs within the natural areas and is focused around the Sand River at Waterpoort approximately 15km to the south west of the proposed site. There are also isolated areas of clearing in the vicinity of the proposed site.

  Cultivated areas are likely to be relatively open, providing opportunities for long distance views across the surrounding landscape.

- **Degraded areas** are evident largely on the edges of settlement. This probably stems from grazing and clearing for cultivation.

- **Industrial development** within the area is relatively sparse; however, there is a mine site (Syerfontein) in the vicinity of Mopane which is approximately 6km to the north east of the proposed site. This facility includes extensive dumps and over burden stockpiles which are likely to have a similar appearance and scale as the dumps and stockpiles that are associated with the proposed development.

### 3.1.3 Vegetation Patterns

The extent of natural vegetation and agricultural areas is indicated on Map 3. The main natural vegetation types as defined by Mucina and Rutherford[1]in the vicinity of the site can be divided into:

a) Musina Mopane Bushveld;
b) Limpopo Ridge Bushveld; and
c) Soutpansberg Mountain Bushveld.

In addition, the following are also evident;

d) Ornamental vegetation; and
e) Arable crops

**Musina Mopane Bushveld** is the most dominant vegetation type surrounding the proposed site and extending to the Limpopo River in the north and the Soutpansberg in the south. According to Mucina and Rutherford, this vegetation type occurs on the undulating plains from around Baines Drift and Alldays in the west, remaining north of the Soutpansberg and south of the Limpopo River. It is comprised of open woodland to moderately closed shrubveld.

**Limpopo Ridge Bushveld** occurs on and around the minor ridgelines and koppies to the north and south of the proposed site. This vegetation type is a moderately open savanna with a poorly developed ground layer.

**Soutpansberg Mountain Bushveld** occurs on the slopes of the Soutpansberg Mountains to the south of the site. It is generally comprised of a dense tree layer and poorly developed grassy layer.

[1] Vegetation types of South Africa (including Prince Edward and Marion Islands), Lesotho and Swaziland, 2006

Whilst botanically, these vegetation types are different, in visual terms they are all comprised of a matrix of herbaceous / grasses and small trees and shrubs. Areas with greater water retention close to water courses and pans have a greater proportion of shrub and tree vegetation whereas dryer areas have a greater proportion of grass and herbaceous vegetation cover.

Trees and tall shrubs within the bushveld matrix generally extend to above head height in most areas and they have a significant screening effect for all but the shortest views.

Ornamental garden vegetation and street trees appear to be relatively dense within Mopane. This vegetation is likely to restrict views from within the settlement.

Arable cropping occurs close to the Sand River to the south west of the site and in isolated areas throughout the study area. Where this occurs, generally the natural vegetation, including tree cover, has been cleared over a wide area which could open up long distance views from these areas; however, they are generally outside the Approximate Limit of Visibility.

## 3.2 LANDSCAPE CHARACTER AREAS & VISUAL ABSORPTION CAPACITY

Landscape Character Areas (LCAs) are defined as "single unique areas which are the discrete geographical areas of a particular landscape type"[2].

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

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

- **Undulating Plains Landscape Character Area** which is comprised of the undulating plains to the north of the Soutpansberg and south of the Limpopo River. It is largely covered with semi-natural bushveld. The LCA is generally used for low intensity grazing. There also appears to be a significant eco-tourism secondary bias to the land use.

  The bushveld and in particular the taller shrubs and trees that extend above head height provide significant VAC screening for all but the closest elements. It is only likely that major elements will be obvious when the viewer is located in an elevated area above the natural vegetation or when a road alignment or a clearing enables vistas that extend further than the viewer's immediate vicinity.

[2] Landscape Institute & Institute of Environmental Management and Assessment

- **Soutpansberg Landscape Character Area** which is comprised of the Soutpansberg mountain range to the south and east of the proposed site. The mountain slopes are vegetated but much of the valley floors are developed. The dominant element is the landform which provides a high degree of VAC within this LCA.

- **Limpopo Valley Ridgelines Landscape Character Area** which is comprised of the narrow ridgelines and koppies that run through the plain to the north and south of the proposed site. The ridgelines are generally covered with natural bushveld. This LCA provides a moderate degree of VAC. It will limit visibility of the development within the surrounding undulating plain. However people located on the ridgelines and Koppies may have a panoramic view over the plains below them.

This landscape analysis was ground truthed during a 2017 site visit. It should be noted that the landform is the main character defining factor.

The LCAs as indicated generally coincide with vegetation types which are largely dictated by topography. These LCAs will be further verified by a site visit prior to completing the LVIA.

The landscape analysis is indicated on **Map 4**

## 3.3 LANDSCAPE QUALITY AND IMPORTANCE

### 3.3.1 Undulating Plains Landscape Character Area.

The importance of this LCA lies both with its agricultural and tourism roles. It is both important for its productivity as well as its natural aesthetics which support ecotourism activities.

Due to topography and the natural vegetation cover which results in a high VAC, it is likely that there is capacity for limited development to occur without compromising these natural aesthetics as experienced by the majority of stakeholders.

### 3.3.2 Soutpansberg Landscape Character Area

This is undoubtedly the most dramatic LCA. The contrast between the wide undulating plains to the north and the rugged mountains with narrow valleys provides a dramatic and memorable scene that underpins and provides potential for tourism related activities in the region. It is also critical to regional landscape character.

### 3.3.3 Valley Ridgelines Landscape Character Area

This LCA provides high points within the undulating plain. It punctuates the area with points of focus within what would otherwise be a relatively featureless landform. It provides opportunities for over views of the plains. It also breaks up and provides separation and identity to the surrounding LCA. The natural aesthetics of this area are important particularly for eco-tourism activities.

From a visual perspective, the most important LCAs are therefore the Soutpansberg and the Limpopo Valley Ridgelines. These are the two characteristics that provide the regional and local landscape with identity. Any

development that reduces or changes the existing natural ruggedness of these LCAs is likely to have broader negative visual implications.

The contrast between the Undulating Plains and the rugged upland areas is also critical, however, due to the extent of the plains and the degree of VAC that is likely to be provided by its natural vegetative cover, it is likely that a degree of development can occur before the landscape change as experienced by most stakeholders and undermining the regional and local landscape character.

## 3.4 VISUAL RECEPTORS

### 3.4.1 Definition

Visual Receptors are defined as "individuals and / or defined groups of people who have the potential to be affected by the proposal"[3].

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

### 3.4.2 Visual receptors

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

**Area Receptors**:

- Settlement Areas, particularly Mopane which is the closest settlement to the proposed development; and
- A number of Protected Areas to the north and east of the proposed site area. The closest include the Averal Private Nature Reserve;

**Linear Receptors:**

Linear receptors generally include routes through the area. Because there is such a focus on eco-tourism activities, both major and minor routes are important. It might be argued that minor un-surfaced roads are more important than major surfaced roads as they are likely to provide access to the eco-tourism attractions. Major routes include:

- The N1 which is the main regional arterial route that carries traffic from the Zimbabwe border crossing at Beitbridge and Gauteng. At its closest the N1 runs approximately 6km from the proposed site;
- Regional roads including the R525, the R572, the R508 and the R523. The closest regional road is the R525 which at its closest is approximately 10km from the proposed site; and
- Local Roads that are largely un-surfaced. A number of local roads run in close proximity to the proposed site area, including one that runs immediately to the north and west of the site adjacent to a railway line and one that runs through the southern section of the Farm Vrienden linking directly to the N1.

In addition to roads, there is a railway line that runs to the north and west of the site. This section of the railway is likely to be largely carrying freight between Zimbabwe and South Africa. Passenger services in South Africa currently terminate at Messina and commence on the Zimbabwe side of the border at Beitbridge so it is likely to carry passengers. Research indicates that

[3] Landscape Institute & Institute of Environmental Management and Assessment

no major tourist trains such as the Blue Train use this route. The importance of the railway as a receptor is therefore likely to be relatively low.

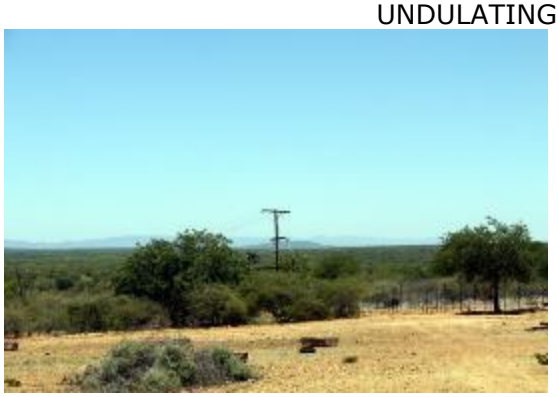
**Point Receptors**,
More than 40 point receptors have been identified from mapping and aerial photography within the approximate visual limit of the proposed development. These include;

- Individual buildings that are likely to be mainly rural homesteads and farms. It is likely that a proportion of these include tourist lodges and accommodation;
- Small groups of dwellings that are likely to include small settlement areas and larger farm establishments which may also include tourist bush camps; and
- Game Lodges including;
    - The Command Game Lodge which is located adjacent to the southern boundary of the property; and
    - The Bujstaan Game Lodge that is located approximately 6.6km due east of the property.

The main receptors that have been identified are indicated on Map 4 which indicates the Landscape Character Areas.

## LANDSCAPE CHARACTER AREAS

UNDULATING PLAINS LCA



VALLEY RIDGELINE LCA

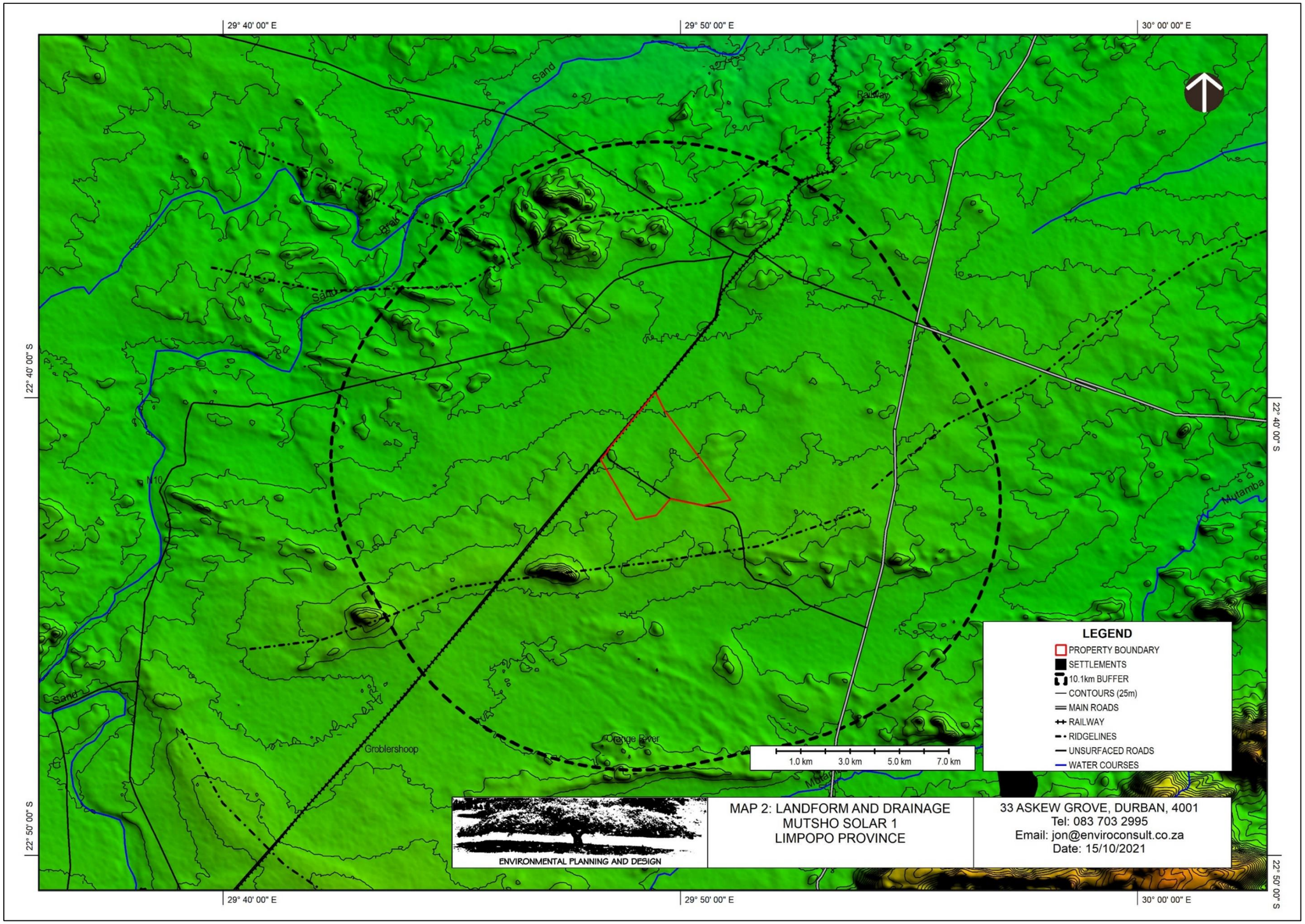
SOUTPANSBERG LCA

## POSSIBLE VISUAL RECEPTORS

AREA RECEPTORS

POINT RECEPTORS


LINEAR RECEPTORS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Sand
Railway
Grail
Sand
N10
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Orange River
1.0 km
3.0 km
5.0 km
7.0 km
LEGEND
PROPERTY BOUNDARY
SETTLEMENTS
10.1km BUFFER
CONTOURS (25m)
MAIN ROADS
RAILWAY
RIDGELINES
UNSURFACED ROADS
WATER COURSES
ENVIRONMENTAL PLANNING AND DESIGN
MAP 2: LANDFORM AND DRAINAGE
MUTSHO SOLAR 1
LIMPOPO PROVINCE
33 ASKEW GROVE, DURBAN, 4001
Tel: 083 703 2995
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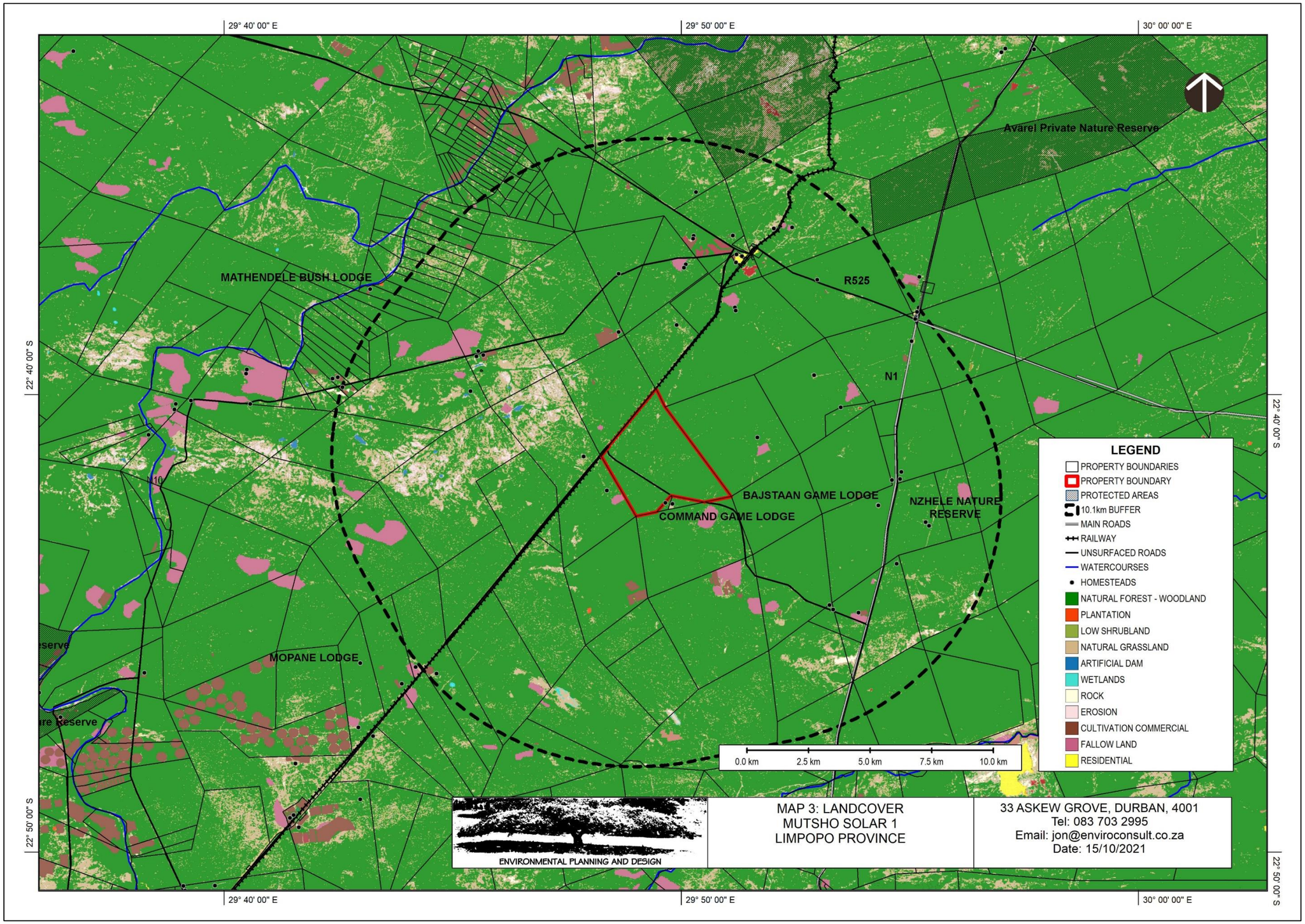
Date: 15/10/2021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29° 50' 00" E
30° 00' 00" E
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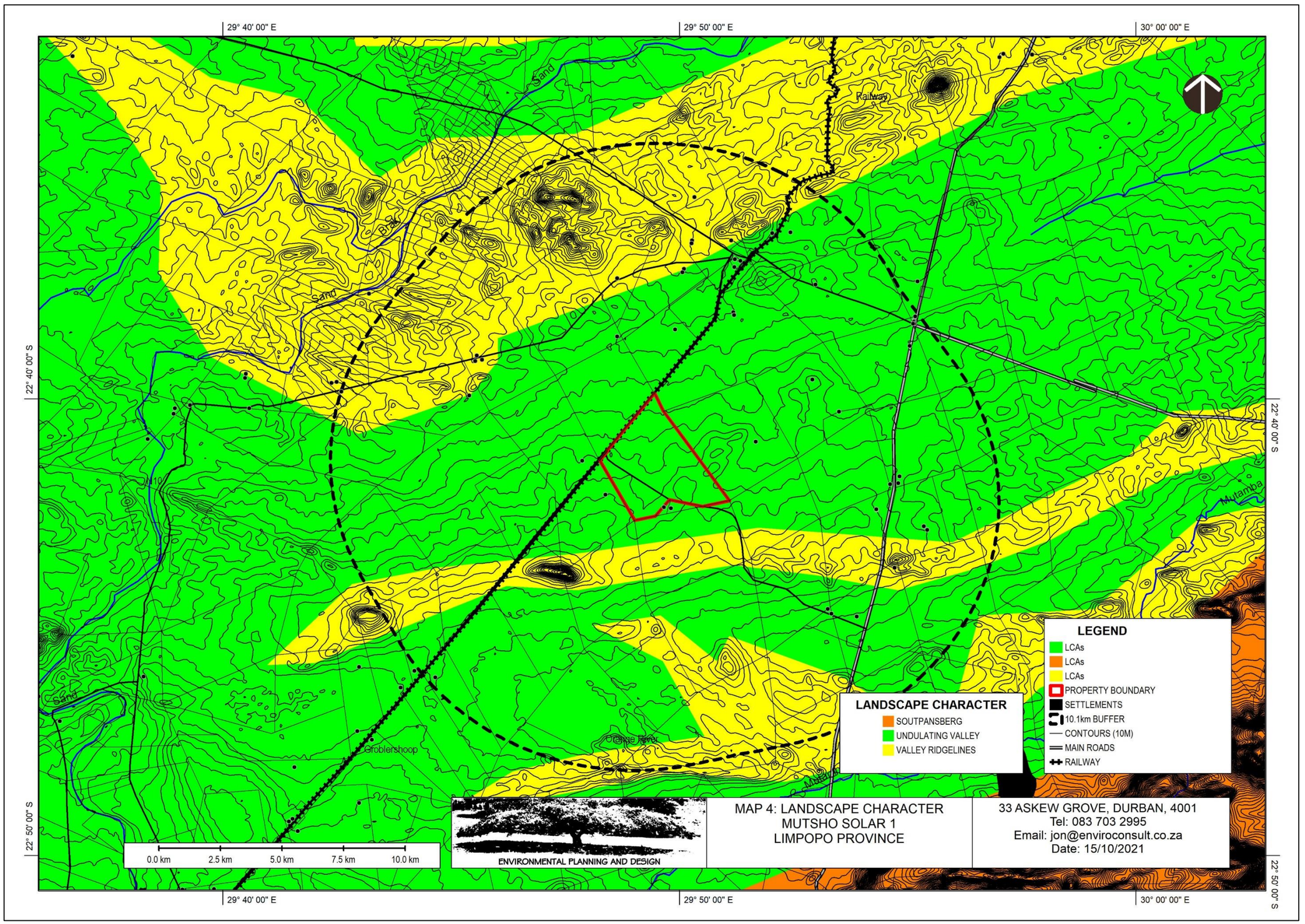
Avarel Private Nature Reserve
R525
N1
BAJSTAAN GAME LODGE
COMMAND GAME LODGE
NZHELE NATURE RESERVE
MOPANE LODGE
LEGEND
PROPERTY BOUNDARIES
PROPERTY BOUNDARY
PROTECTED AREAS
10.1km BUFFER
MAIN ROADS
RAILWAY
UNSURFACED ROADS
WATERCOURSES
HOMESTEADS
NATURAL FOREST - WOODLAND
PLANTATION
LOW SHRUBLAND
NATURAL GRASSLAND
ARTIFICIAL DAM
WETLANDS
ROCK
EROSION
CULTIVATION COMMERCIAL
FALLOW LAND
RESIDENTIAL
0.0 km
2.5 km
5.0 km
7.5 km
10.0 km
ENVIRONMENTAL PLANNING AND DESIGN
MAP 3: LANDCOVER
MUTSHO SOLAR 1
LIMPOPO PROVINCE
33 ASKEW GROVE, DURBAN, 4001
Tel: 083 703 2995
Email: jon@enviroconsult.co.za
Date: 15/10/2021


29° 40' 00" E
29° 50' 00" E
30° 00' 00" E
22° 40' 00" S
22° 50' 00" S
Sand
Railway
Sand
Sand
N10
Mutamba
Groblershoop
Orange River
Mutamba
LANDSCAPE CHARACTER
SOUTPANSBERG
UNDULATING VALLEY
VALLEY RIDGELINES
LEGEND
LCAs
LCAs
LCAs
PROPERTY BOUNDARY
SETTLEMENTS
10.1km BUFFER
CONTOURS (10M)
MAIN ROADS
RAILWAY
0.0 km
2.5 km
5.0 km
7.5 km
10.0 km
ENVIRONMENTAL PLANNING AND DESIGN
MAP 4: LANDSCAPE CHARACTER
MUTSHO SOLAR 1
LIMPOPO PROVINCE
33 ASKEW GROVE, DURBAN, 4001
Tel: 083 703 2995
Email: jon@enviroconsult.co.za
Date: 15/10/2021

# 4 THE NATURE OF POTENTIAL VISUAL IMPACTS

## 4.1 NATURE OF LIKELY VIEWS OF THE DEVELOPMENT

During the construction phase, it is expected that traffic will be slightly increased as trucks will be required to transport materials and equipment such as PV panels and frames to the site.

Site preparation will generally include the following activities:

- vegetation clearance – removal or cutting of any vegetation if present (bush cutting);
- levelling and grading of areas where the array will be sited would normally occur, the assessment indicates that the land is relatively flat so only minor grading should be required;
- levelling of hard-standing areas, e.g. for temporary laydown and storage areas, as indicated above only minor grading is likely to be necessary;
- erection of site fencing;
- construction of a temporary construction camp which could occur within a lay down area within the overall site.

These activities are only likely to be visible from the immediate vicinity of the site.

As the site is developed, concrete bases will be constructed (if required), the support structures will then be assembled and PV panels attached, ancillary structures and minor buildings will also be constructed.

The development will therefore appear on a progressive basis in the landscape, however once the concrete bases are constructed, the structures are likely to be assembled rapidly.

The construction of the proposed on-site substations will follow a similar pattern.

Construction of the proposed facility is likely to take up to approximately 16 months, the start date of which, is dependent upon award of a bid/procurement. Construction activities could take place concurrently for multiple facilities.

By the end of the construction process, the array will be assembled and minor buildings constructed and the full visual impact of the project will be experienced.

The operational phase (25 years) is highly unlikely to result in any significant additional impact. It is possible however, that work crews will be visible from time to time undertaking maintenance within the facility.

The main visible elements therefore are likely to include:

1. The solar array, including minor buildings and structures located within a fence line with an associated on-site electrical infrastructure compound that is slightly taller than surrounding elements;
2. The proposed on-site substation; and
3. Operational and security lighting at night.

### 4.1.1 The likely Nature of Views of the Proposed Solar Array

The PV panels will be mounted on supports and orientated to face north (fixed system) and the orientation would shift should tracking modules be used.

Continuous supports aligned in rows are generally used when the PV panels are fixed and are set at an angle and direction to maximise the average efficiency during the day or have a basic tracking set up that varies the angle of tilt of the unit in order to improve efficiency.

From areas to the north a solar array, whether constructed on individual supports or continuous rows, is likely to appear as a continuous structure in the landscape.

The nature of the impact is also likely to vary with location and elevation;

- If the array is located on a hillside or if it is viewed from a higher level, the rows of PV units are likely to visually combine and will be read as a single unit. From a distance this results in a PV array having a similar appearance as a large industrial structure when viewed from above. It should be noted that the proposed project will not be viewed from a higher elevation and so this type of view will not apply;

- From the north and if the project is viewed from a similar level, the front row of PV units will be seen in elevation. This is likely to result in the project being seen as a continuous dark line in the landscape possibly with slightly higher elements such as the on-site electrical infrastructure compound extending above the line. How prominent the dark line is, is likely to be dependent on the distance of the viewer from the project as well as the extent to which the view of the elevation is broken by other elements such as vegetation and landform.

- From the south, east and west the dark face of the PV units is not obvious and subject to the colour of the undersides of the units, the supporting structures are likely to become more apparent. With distance however, the shadow cast by the structures is likely to be more obvious and the facility will probably appear much as the northern face, a long dark structure.

- If the landscape does not have significant Visual Absorption Capacity (VAC), because of the contrast in colour with the surrounding landscape, the array could be visible to the limit of visibility. Subject to the colour and reflectivity of the underside of the PV units and supporting structure, it is possible that a similar level of impact could also be experienced from the south, east and west. It should be noted that the VAC of the landscape surrounding the proposed development is largely dependent on minor ridgelines.

- Mitigation or screening of views is possible at least from close views. This can be achieved either by earthworks berms by planting or by a combination of both. From a distance and particularly from elevated viewpoints as views over screening may be possible and excessively tall screening is likely to be less feasible as the it is likely to cast shadow over the PV units.

- In addition to the way that a solar array may change a landscape, the nuisance factor associated with resulting glare is often raised by stakeholders on similar projects. PV units, however, are designed to absorb as much energy as possible and are designed

not to reflect light. This issue is generally more likely to be associated with a focussed array which tracks the sun's path during the day and uses reflective surfaces to focus energy onto receptors. It is therefore not expected that this will be a significant issue with a PV array such as the one proposed.

Due to relatively dense and consistent vegetation cover, the landscape has relatively high VAC which is likely to mean that the proposed development will be largely screened from surrounding areas.

Where it is visible however, because the site and surrounding area is relatively flat. the array is likely to be largely viewed either in elevation or at an acute elevated view from minor ridgelines.

A new solar array has been developed adjacent to Upington Airport. This array has been developed in two sections on either side of the airport runway. It is probably somewhat smaller than the subject project, covering approximately 25ha and the longest edge of the array being approximately 500m long. The PV panels are mounted on fixed frames approximately 2m high. Despite obvious differences compared with the proposed project, it does illustrate the effect of distance in mitigating the visibility of the solid line of solar panels.

**Plate 2** indicates the location of the existing array at Upington Airport. **Plates 3, 4 and 5**, illustrate how the array is seen from distances of approximately 700m, 1500m and 5000m respectively.

The following effects are noted:

- From 700m the array is clearly visible. For the same effect relative to a 5.0m high array, this distance will be approximately 2100m.
- From 1500m, the array is visible but even with the minimal vegetation providing screening at the airport, the dark line of panels is starting to blend into the background. The array is visible but might be missed by a casual viewer. For the same effect relative to a 5.0m high array, this distance will be approximately 4500m.
- From 5000m, the line of panels is indistinguishable from the horizon. For the same effect relative to a 5.0m high array, this distance will be approximately 15000m.

A single axis tracking system could slightly increase the height of structures particularly during late afternoon and early morning when the units are tilted to their fullest extent.

This provides an indication of potential levels of impact relative to the height and distance of the viewer from the facility

**Plate 2, Existing solar arrays at Upington Airport as seen from the air**

**Plate 3, Existing array seen in a flat landscape from approximately 700m. The array is clearly visible.**

**Plate 4, Existing array seen in a flat landscape from approximately 1500m**. The array is visible but even with the minimal vegetation providing screening at the airport, the dark line of panels is starting to blend into the background. The array is clearly visible but might be missed by a casual viewer who was not aware of its existence.

**Plate 5**, **Existing array seen in a flat landscape from approximately 5000m**. The line of panels is barely distinguishable. The viewer would have to know where to look to be able to differentiate the array from surrounding landscape features.

### 4.1.2 The likely Nature of Views of the Proposed On-Site Substation

On-site substations are likely to have elements up to 10m[4] high (bus bars). These will be viewed as an isolated higher section of the development.

The upper sections of these elements are comprised of steel lattice structures. They are therefore likely to be relatively transparent.

### 4.1.3 Glare from the PV array

A common misconception about solar photovoltaic (PV) panels is that they inherently cause or create glare, posing a nuisance to neighbours. While in certain situations the glass surfaces of solar PV systems can produce glint (a momentary flash of bright light) and glare (a reflection of bright light for a longer duration).

Light absorption, rather than reflection, is central to the function of a solar PV panel to absorb solar radiation and convert it to electricity. Solar PV panels are constructed of dark-coloured (usually blue or black) materials and are covered with anti-reflective coatings. Modern PV panels reflect as little as two percent of incoming sunlight, about the same as water and less than soil. Some of the concern and misconception is likely due to the confusion between solar PV systems and concentrated solar power (CSP) systems. CSP systems typically use an array

[4] This is likely to be the highest structure, the majority of structures will be lower.

of mirrors to reflect sunlight to heat water or other fluids to create steam that turns an electric generator[5].

Glare experienced at ground level generally occurs when the sun is low in the sky and the angle of incidence is such that light is reflected rather than refracted through the panel surface. The risk of this occurring is therefore highest during early morning and late afternoon.

In South Africa affected areas during the early morning will generally vary from the west of the array during summer months to the north west of the array during winter months when the rising sun is further north.

Affected areas during the late afternoon will generally vary from the east of an array during summer months to the north east of an array during winter months.

Because glare is reflected light from an inclined panel, it will generally affect areas above the level of the panel surface.

**Plate 6 - Glare experienced in the Control Tower at Boston Regional Airport from an adjacent PV array**

The extent and height of existing vegetation within and around the proposed site could provide a large degree of screening which should also minimise the potential impact of glint and glare.

[5] US Department of Energy

### 4.1.4 Security Lighting

The facility will be lit by security lights to a level sufficient to ensure that security cameras can operate at night. This could result in the facility being obvious at night from surrounding areas.

### 4.1.5 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 and where disturbance of surrounding vegetation has been minimised is unlikely to be obvious past 100m from the road edge.

The main 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 LANDSCAPE AND VISUAL SENSITIVITY

The review of the proposed project indicates that the following issues need to be considered during site planning and assessment.

The most sensitive receptors are likely to include:

a) Protected areas:
b) The N1;
c) The R525:
d) Local unsurfaced roads including the road that runs through the project property; and
e) Local homesteads, particularly those that have tourism uses such as the Command Game Lodge that is located immediately adjacent to the proposed development.

Due to distance, formally protected areas are highly unlikely to be affected.

Due to the likely degree of screening by existing vegetation, the preservation of key landscape characteristics does not appear to be a significant issue, however, this needs to be confirmed.

## 5.1 NO GO AREAS

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

## 5.2 DEVELOPMENT SENSITIVITY

Sensitivity to development relates to:

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

**Highly Sensitivity Areas include**:

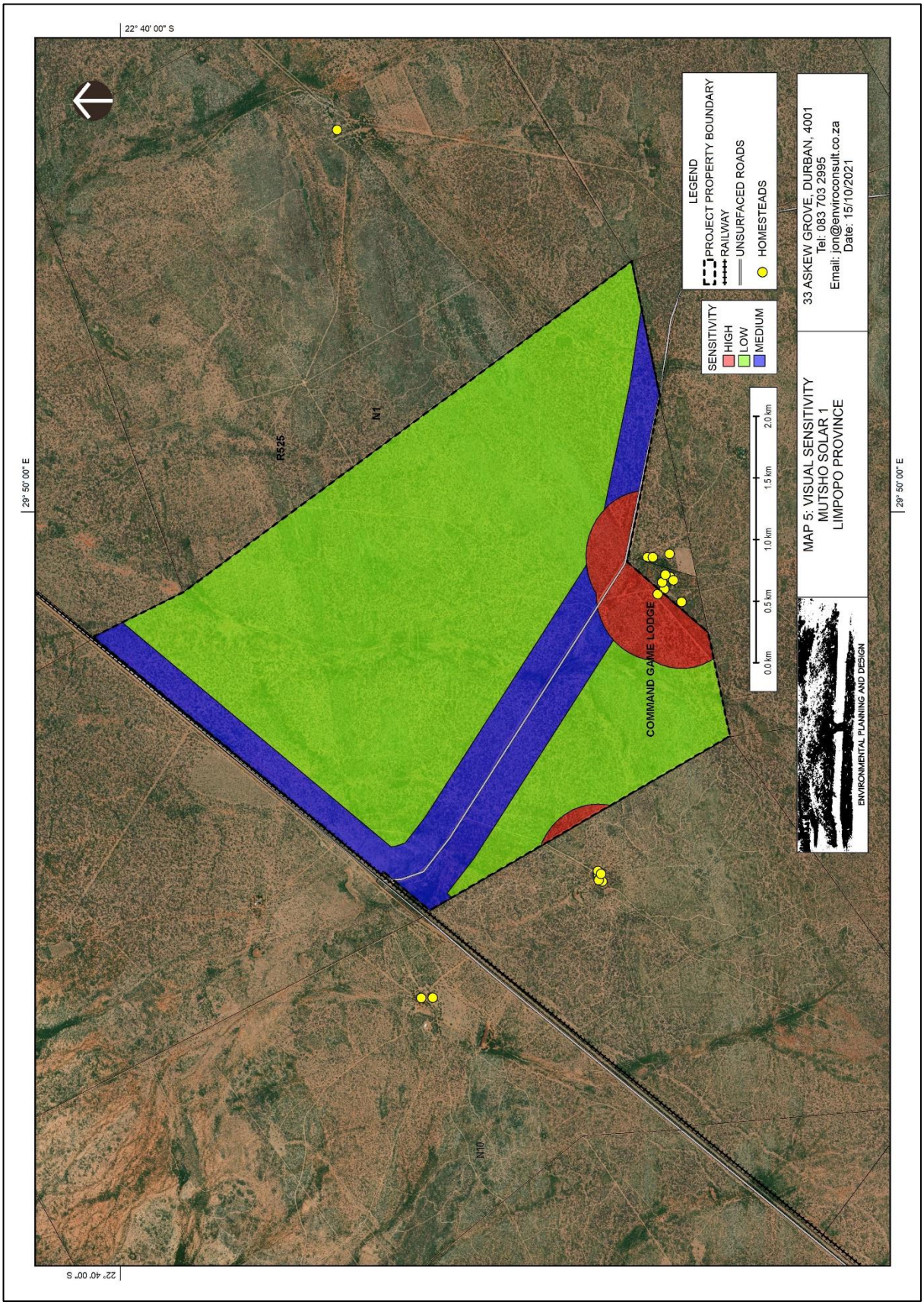
- Areas immediately surrounding homesteads development of which is likely to significantly change the character of views for residents and guests. A 500m buffer is proposed which should be sufficient to ensure that development does not totally dominate views. It is possible that receptors (owners /residents / guests) have no concern regarding the development of these areas, in which case the sensitivity rating will reduce;

**Medium Sensitivity Areas include**:

- Corridors beside the roads that could be affected. Due to distance, the main roads that run through the area are unlikely to be significantly impacted. As indicated in previously, given that local unsurfaced roads are likely to provide access to local lodges, these also have tourism importance;

**Low Sensitivity Areas include**:

- All other areas of the proposed site.


22° 40' 00" S
29° 50' 00" E
R525
N1
N10
COMMAND GAME LODGE
LEGEND
PROJECT PROPERTY BOUNDARY
RAILWAY
UNSURFACED ROADS
HOMESTEADS
SENSITIVITY
HIGH
LOW
MEDIUM
0.0 km
0.5 km
1.0 km
1.5 km
2.0 km
MAP 5: VISUAL SENSITIVITY
MUTSHO SOLAR 1
LIMPOPO PROVINCE
ENVIRONMENTAL PLANNING AND DESIGN
33 ASKEW GROVE, DURBAN, 4001
Tel: 083 703 2995
Email: jon@enviroconsult.co.za
Date: 15/10/2021

# 6 IDENTIFICATION AND INITIAL ASSESSMENT OF ISSUES

## 6.1 IMPACTS TO BE CONSIDERED

Possible impacts identified include:

a) Potential change to the rural landscape;
b) Potential visual impacts as experienced by travellers on the adjacent local roads;
c) Potential visual impacts as experienced by travellers on main roads, including the N1 and the R525;
d) Potential visual impacts as experienced by residents and visitors to homesteads in close proximity;
e) Potential visual impacts as experienced by travellers on the train;
f) Potential lighting impacts; and
g) Potential impacts associated with glare impacting on roads.

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

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

## 6.2 SIGNIFICANCE OF ISSUES

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

## 6.3 INITIAL ASSESSMENT OF ISSUES

### 6.3.1 Landscape Change

| **Potential Impact** | | | |
|---|---|---|---|
| **Issue** | **Nature of Impact** | **Extent of Impact** | **No-Go Areas** |
| **Potential change to the rural landscape** | Direct impacts:<br>**Loss of rural landscape**.<br>The landscape is not protected. The character is also relatively common within the region.<br>Indirect impacts:<br>No indirect impacts | Local | None identified at this stage |
| **Description of expected significance of impact** | | | |

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

The project will result in the industrialisation of a small section of the landscape and a small reduction of rural landscape.

**Gaps in knowledge & recommendations for further study**

The proposed development layout.

**Recommendations with regards to general field surveys**

Assessing the extent of change that will be obvious.

### 6.3.2 Local Roads

| **Potential Impact** | | | |
|---|---|---|---|
| **Issue** | **Nature of Impact** | **Extent of Impact** | **No-Go Areas** |
| **Potential visual impacts as experienced by users of adjacent local roads particularly users of the R525.** | Direct impacts:<br>**Industrialisation of views from local unsurfaced roads**.<br>Indirect impacts:<br>**No indirect impacts** | Local | None identified at this stage |

**Description of expected significance of impact**

The landscape is neither protected or of a very high quality. The landscape character is also relatively common in the region.

Views over the large the scale industrial development are likely from the unsurfaced road that runs through the project property.

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

**Gaps in knowledge & recommendations for further study**

The proposed development layout.

**Recommendations with regards to general field surveys**

Assessing the extent of change that will be obvious.

### 6.3.2 Main Roads

| **Potential Impact** | | | |
|---|---|---|---|
| **Issue** | **Nature of Impact** | **Extent of Impact** | **No-Go Areas** |
| **Potential visual impacts as experienced by users of adjacent local roads particularly users of the N1, the R525.** | Direct impacts:<br>**Industrialisation of views from main roads**.<br>Indirect impacts:<br>**No indirect impacts** | Local | None identified at this stage |
| **Description of expected significance of impact**<br>The landscape is neither protected or of a very high quality. The landscape character is also relatively common in the region.<br>Views over the proposed development are likely to be obvious from main roads due to distance from the road and the likely nature of intervening vegetation.<br>Without an indication of the possible location and layout of the project it is not possible to be confident regarding possible significance of impacts. However, as long as the proposed development does not dominate views from roads, the change in view is unlikely to have a high significance. | | | |
| **Gaps in knowledge & recommendations for further study**<br>The proposed development layout.<br>**Recommendations with regards to general field surveys**<br>Assessing the extent of change that will be obvious. | | | |

### 6.3.4 Homesteads

| **Potential Impact** | | | |
|---|---|---|---|
| **Issue** | **Nature of Impact** | **Extent of Impact** | **No-Go Areas** |
| **Potential visual impacts as experienced by residents and guests at homesteads** | Direct impacts:<br>**Industrialisation of views from homesteads**.<br>Indirect impacts:<br>**Possible loss of income from homesteads that have a tourism related use.** | Local | None identified at this stage |
| **Description of expected significance of impact**<br>It is possible that residents of homesteads that have a purely agricultural use may not be concerned regarding possible change in view due to the proposed development. However, for residents of homesteads with a tourism related use, subject to the proximity and extent of the proposed development that is visible, this could be a significant issue. | | | |

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

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

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

### 6.3.4 Travellers on the Train

| **Potential Impact** | | | |
|---|---|---|---|
| **Issue** | **Nature of Impact** | **Extent of Impact** | **No-Go Areas** |
| **Potential visual impacts as experienced by travellers on the train.** | Direct impacts:<br>**Industrialisation of views from the train**.<br>Indirect impacts:<br>**No indirect impacts.** | Local | None identified at this stage |

**Description of expected significance of impact**

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

However, views of the proposed development are likely to be largely screened by vegetation. It is unlikely that travellers on the train will be sensitive to the change in view over a small section of their journey.

It is unlikely therefore that views of the proposed development as seen from the train will be a significant issue.

**Gaps in knowledge & recommendations for further study**

The proposed development layout.

**Recommendations with regards to general field surveys**

Assessing the extent of change that will be obvious.

### 6.3.5 Lighting

| **Potential Impact** | | | |
|---|---|---|---|
| **Issue** | **Nature of Impact** | **Extent of Impact** | **No-Go Areas** |

| | | | |
|---|---|---|---|
| **Lighting Impacts.** | Direct impacts:<br>**Light pollution affecting areas that would otherwise be dark at night**.<br>Indirect impacts:<br>**No indirect impact.** | Local | None identified at this stage |
| **Description of expected significance of impact**<br>Lighting is likely to be required for security, maintenance and the safety / convenience of workers.<br>There are other large scale industrial operations including a power station and mines, that create islands of light in the night time sky.<br>There are also numerous homesteads that create low levels of light.<br>It is possible to mitigate lighting impacts to a large degree through design, the use of motion sensors for security lighting and ensuring that lighting is only used in areas where workers are located / working.<br>Without an indication of the possible location and layout of the project it is not possible to be confident regarding possible significance of impacts. However, if suitable mitigation measures are used, it is unlikely that lighting impacts will be significant. | | | |
| **Gaps in knowledge & recommendations for further study**<br>The proposed layout and the nature of proposed lighting.<br>**Recommendations with regards to general field surveys**<br>Assess existing levels of impact. | | | |

### 6.3.6 Glare

| **Potential Impact** | | | |
|---|---|---|---|
| **Issue** | **Nature of Impact** | **Extent of Impact** | **No-Go Areas** |
| **Glare Impacts on local unsurfaced roads as well as main roads.** | Direct impacts:<br>**Glare affecting drivers on local unsurfaced roads as well as main roads**.<br>Indirect impacts:<br>**Road safety.** | Local | None identified at this stage |
| **Description of expected significance of impact**<br>Glare could affect the local unsurfaced road that runs through the project property and could impair road safety particularly in the early morning and late afternoon when the sun is low in the sky. However traffic volumes are anticipated to be low and whilst a driver's | | | |

sight may be momentarily affected, it is highly unlikely that there would be another vehicle in the immediate vicinity that could result in a possible collision.

Glare is highly unlikely to affect main roads including the N1 and the R525. Both the distance between these main roads and the proposed project which is in excess of 7.5km and relatively dense vegetation is likely to prevent glare from being problematic.

Glare impacts are relatively easily mitigated through screening as long as there is sufficient space between possible receptors and solar panels.

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

**Gaps in knowledge & recommendations for further study**

The proposed layout and the nature of the proposed array.

**Recommendations with regards to general field surveys**

Undertake a basic geometric assessment.

# 7 RECOMMENDED ASSESSMENT METHODOLOGY

## 7.1 REQUIREMENTS IN ACCORDANCE WITH THE WESTERN CAPE GUIDELINES

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

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

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

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

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

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

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

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

Based on the predicted visual impacts described in this report, and on the basis that the proposed new facility, it seems that the proposed development could have significant local impacts.

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

1. Verification 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 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. Complete 3D modeling and simulations, with and without mitigation; and
8. Review by independent, experienced visual specialist (if required).

However, subject to the location of the project relative to receptors, particularly homesteads and given the nature and of existing natural vegetation, it is possible that the VAC of the landscape is relatively high resulting in a large degree of screening. If this should prove to be the case and if views of the proposed project are limited then the preparation of simulations (7) is unlikely to indicate anything. If this is the case then it is recommended that a Level 3 Assessment is prepared.

A Level 3 Assessment requires the same input as Level 4 with the exception of input 7, **complete 3D modeling and simulations, with and without mitigation**.

## 7.2 DETAILED METHODOLOGY

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

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

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

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

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

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

### 7.2.2 **Description of the receiving environment and the proposed project**

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

### 7.2.3 **Establishment of view catchment area, view corridors, viewpoints and receptors**

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

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

### 7.2.4 **Indication of Potential Visual Impacts using Established Criteria**

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

Criteria will include:

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

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

### 7.2.5 **Inclusion of Potential Lighting Impacts at night**

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

### 7.2.6 **Description of Alternatives, Mitigation Measures and Monitoring Programme**

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

### 7.2.7 **Complete 3D Modelling and Simulations With and Without Mitigation**

Should significant views of the proposed development be possible particularly from local homesteads, key development elements will be modelled using CAD. Views of the model will be superimposed onto photographs from key viewpoints.

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

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

## APPENDIX I

## ASSESSOR'S CURRICULUM VITAE


| | |
|---|---|
| **Name** | JONATHAN MARSHALL |
| **Nationality** | British |
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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 of 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 LVIA 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 Landscape & 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.

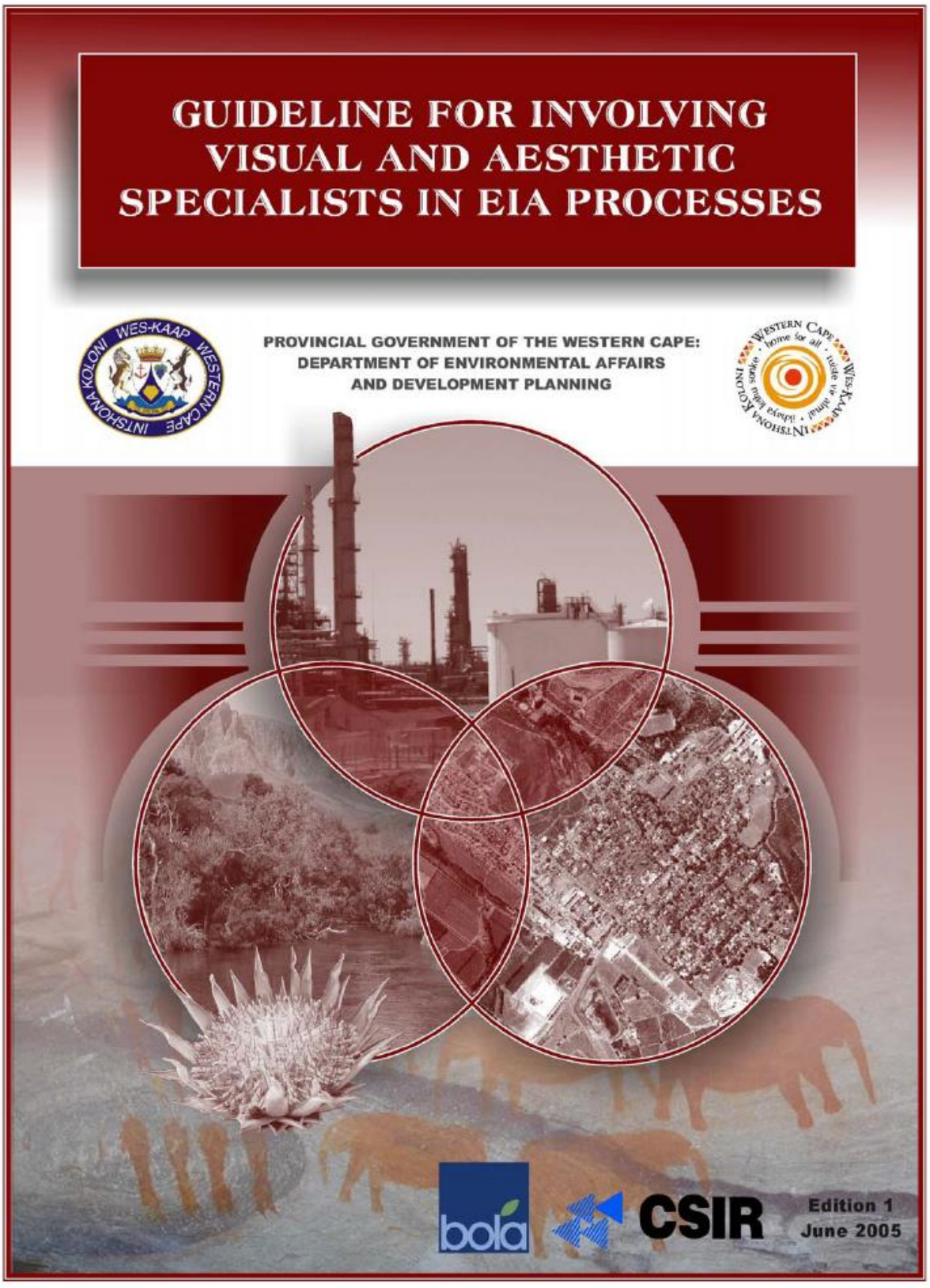
- **Eskom Tuthuka PV Installation** - Scoping and LVIA for the development of a solar PV plant within Eskom's Thutuka Power Station in Mpumalanga.
- **Eskom Majuba PV Installation** - Scoping and LVIA for the development of a solar PV plant within Eskom's Majuba Power Station in Mpumalanga.
- **Golden 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
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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# 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?<br>▪ What are appropriate approaches that specialists can employ?<br>▪ What qualifications, skills and experience are required? |
| QUALITY | ▪ What triggers the review of specialist studies by different roleplayers?<br>▪ 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.