PORTION 132 MIDDELVLEI (PTY) LTD

PROPOSED ESTABLISHMENT OF THE MIDDELVLEI SOLAR, 120MW SOLAR PV PROJECT, GAUTENG PROVINCE

LANDSCAPE & VISUAL IMPACT SCOPING REPORT

JANUARY 2023

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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 the Middelvlei Solar PV Project (known as Middelvlei Solar) and associated infrastructures by Savannah Environmental (Pty) Ltd on behalf of Portion 132 Middelvlei (Pty) Ltd, a special purpose vehicle (SPV) of Sigma Solar Africa 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 document 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 Portion 132 of the Farm Middelvlei 255 IQ. It is located approximately 7km south-west of Randfontein in Gauteng Province.

The above-mentioned 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

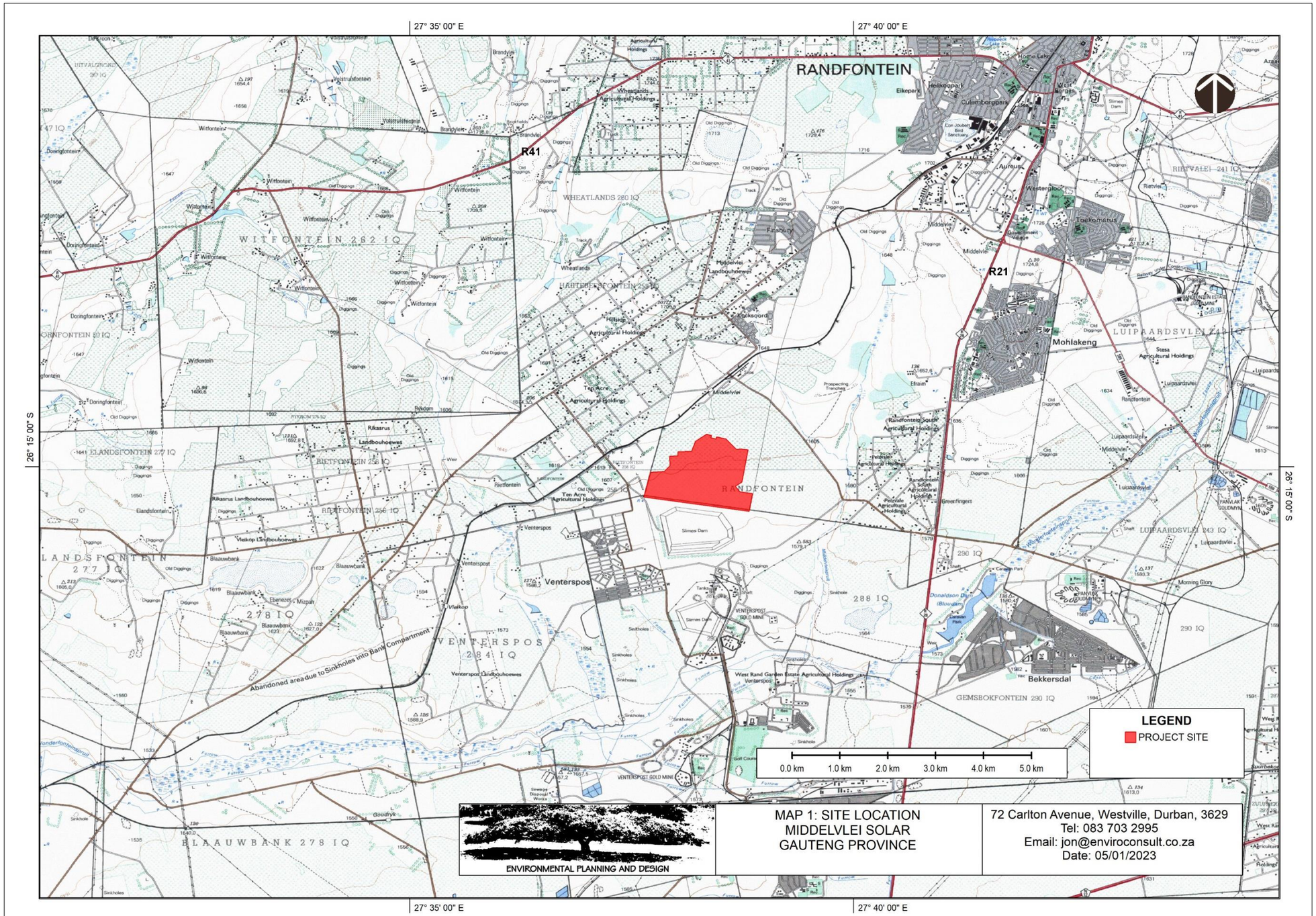
This Scoping Study identifies and evaluates potential environmental impacts associated with all aspects of the proposed Project. In terms of the EIA Regulations, feasible and reasonable alternatives should be assessed within the Scoping Study. The scope of an environmental assessment is defined by the 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) Project layouts and details were not available at the time of reporting. Assumptions as to height and nature of the development are indicated in section 2.3.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Ten Acre Agricultural Holdings
Holiokp Agricultural Holdings
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VENTERSPOST GOLD MINE
West Rand Garden Estate Agricultural Holdings
Randfontein South Agricultural Holdings
Petzetal Agricultural Holdings
Greenfingers
Stesa Agricultural Holdings
Donaldson Dam
Morning Glory
Caravan Park
Sinkholes
Slimes Dam
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LEGEND
PROJECT SITE
ENVIRONMENTAL PLANNING AND DESIGN
MAP 1: SITE LOCATION
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2. PROJECT DESCRIPTION

2.1 PROPOSED PROJECT INFRASTRUCTURE

The following project infrastructure is proposed:

- Solar PV Plant comprising approximately 220000 PV panels on single axis tracking PV modules
- Inverters and transformers (up to 120MW)
- Cabling between the panels
- On site facility substation, including a Twin-Tern Conductor ~379 MVA. Sub-station capacity - 2x 80MVA, 132/33kV sub-station ~ 50 x 70 m2 - including Eskom metering site.
- Cabling from the onsite substation to the collector substation (either underground or overhead)
- Electrical and auxiliary equipment required at the collector substation that serves the solar energy facility, including switchyard/bay, control building, fences, etc.
- Battery Energy Storage System (BESS)
- Site and internal access roads (up to 8m wide)
- Temporary and permanent laydown area
- Operations Building of ~180 sqm

2.2 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.

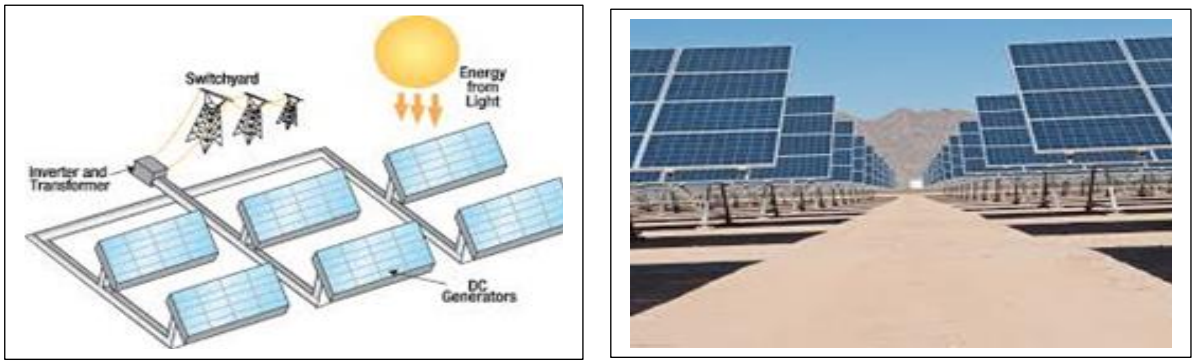


Figure 1: Overview of a typical/generic PV cell, module, and array/panel, noting that the photograph on the right appears to depict a single axis tracking mount, but it is not clear from the angle of the photograph. Whether these depict mono- or bi- facial modules is also unclear (pveducation.com).

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.

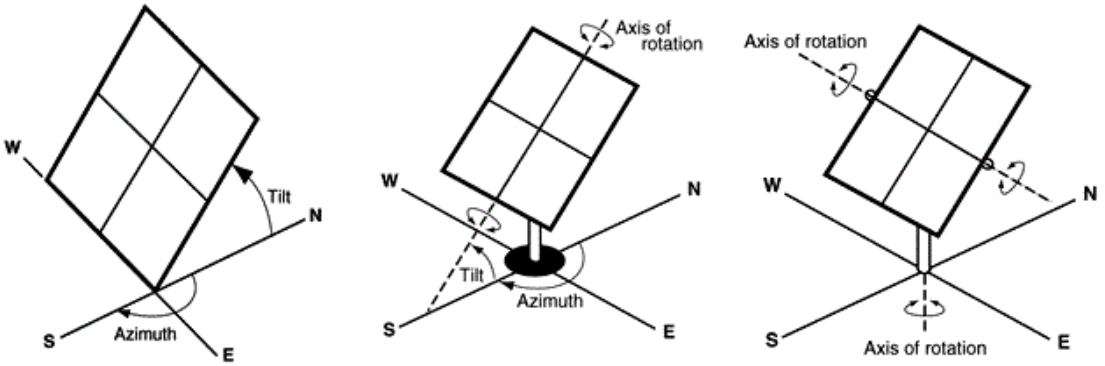


Figure 2: Overview of different PV tracking systems (from left to right: fixed-tilt, single-axis tracking, and double-axis tracking (Source: pveducation.com)).

It has been confirmed that the single axis tracking option will be used for this project.

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).

On-site substations serve as collection points for the AC current from inverters that are located within the solar array. They include step-up infrastructure (internal reticulation would be at 33kV, which will be stepped up by the sub-station to up to 132kV for evacuation into the grid network.

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.

2.3 PROJECT ASSUMPTIONS

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

- The operations building, solar array, inverters and BESS will be in the order of 5m high or lower:
- The main equipment within the on-site substation including transformers will be in the order of 8m high.
- The tallest element within the on-site substation will be bus-bars linking the substation to the 132kV power line. Given that a 132kV power line is in the order of 30m high, it is assumed that the bus-bars will be in the order of 20m high.

Using a recognised mathematical formula (**Appendix III**), this means that the various project elements might have the following Approximate Limits of Visibility (ALV).

PROJECT ELEMENTS	ALV
operations building, solar array, inverters and BESS (5m high)	8.0km
Substation Equipment (8m high)	10.1km
Substation bus-bars (20m high)	16.0km

The largest ALV has been used to define the initial study area.

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"[1].

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 urban character, interspersed with open space, 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 on the south facing slope of the Wonderfonteinspruit River Valley. The Wonderfonteinspruit is fed by the Tudor Dam which is approximately 25km to the north-east of the proposed project.

Two other minor rivers, the Middelvleispruit and the Brandvlei flow to the east and west of the proposed site flowing into the Wonderfontainspruit approximately 3km to the south.

In the vicinity of the proposed site, the valley floor is approximately 1557m amsl (above mean sea level) . The ridgeline which is approximately 10.4km to the north has an approximate level of 1720m amsl which means that the average slope is approximately 1:61. This is a relatively even shallow slope.

[1] UK Guidelines

Within the landform there are mine dumps with one located directly to the south of the proposed site.

3.1.2 Landcover

Refer to Map 3 for analysis of Landcover.

The proposed site is located within a transition area between a predominantly urban land use area to the east. and a predominantly rural land use area to the west.

The land use within the transition area around the proposed site is currently largely comprised of smallholdings, open space and mining. However it appears that formal, dense, residential land use in the form of a new housing area is under development. It seems likely therefore that this area is in the process of densifying.

There are also extensive areas of natural vegetation which is comprised of open grassland in the vicinity of the proposed site. The extent of natural grassland increases significantly in the rural area to the west and decreases significantly to the east as the density of development increases.

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 the extent and nature of development.

- **Urban Landscape Character Area** which is dominated by industry and residential development.

  The transition area that is largely comprised of smallholdings is included within the urban LCA. Whilst this area is less densely developed than areas to the east, it is densifying as new housing development is underway in the vicinity of the proposed site.

  Within this area there are numerous large industrial and mining structures that are obvious in the landscape, there are also numerous small scale light

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

industrial operations particularly to the north and north west of the proposed site.
Within this LCA, VAC is largely provided by building structures. The mine dump directly to the south of the proposed site will also provide screening from the south.

- **Rural Landscape Character Area** which is comprised of areas to the west of the proposed site where commercial cultivation and open natural grassland dominate the landscape. Within this area there are also mining operations as well as smallholdings. The dominant character however is rural in nature.

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

3.3 LANDSCAPE QUALITY AND IMPORTANCE

No protected landscapes will be affected.

Neither the Urban or the Rural Landscape Character Areas are scenic landscapes. However they do have qualities that are likely to be important to people that live and work in them. The extent of open space and the distance between residential areas and industry, particularly mining, are probably the most important qualities from this respect.

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

3.4.2 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 settlement /development areas that face onto the existing area of open grassland within which the project is proposed[4] as well as the settlement of Hillhaven which is located on the north facing valley slope overlooking the proposed site.

Linear Receptors:

Linear receptors generally include routes through the area:

- The R28 which is the main regional north – south arterial route that carries traffic between Randfontein and Krugersdorp in the north and Sebokeng in

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

[4] The edge of developed areas is identified on mapping. Houses close to this edge are most likely to have views of the proposed development.

the south. At its closest, the R28 runs approximately 3.4km to the east of the proposed site.

- The R559 runs in a north-east – south west direction to the west. It links Randfontein to the north to the mining town of Carletonville to the south-west.
- Local Roads that service residential, industrial and smallholdings that surround the proposed site. At the time of reporting many of these roads were in a poor state and unusable by normal cars.

In addition to roads, there is a railway line that runs close and to the north-west of the proposed site. It is assumed that this line is used for both passengers and goods.

Point Receptors,
Point receptors include houses within the surrounding area. It is likely that houses on the edge of the residential areas facing towards the proposed project will have views towards the proposed development.

The main receptors that have been identified are indicated on Maps 4 and 5 which indicate the Landscape Character Areas and Site Sensitivity respectively.

LANDSCAPE CHARACTER AREAS

RURAL LCA (PLATE 2)

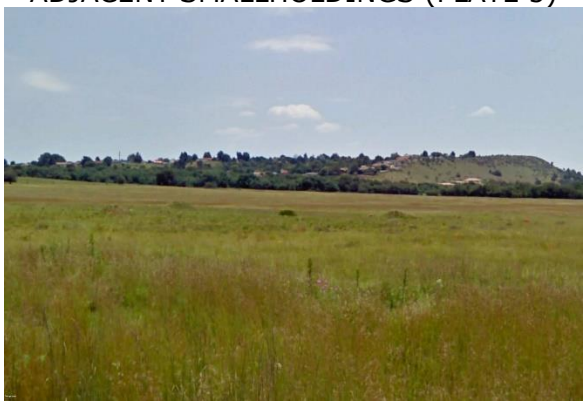
URBAN LCA (PLATE 3)

POSSIBLE VISUAL RECEPTORS

NEW ADJACENT HOUSING (PLATE 4)

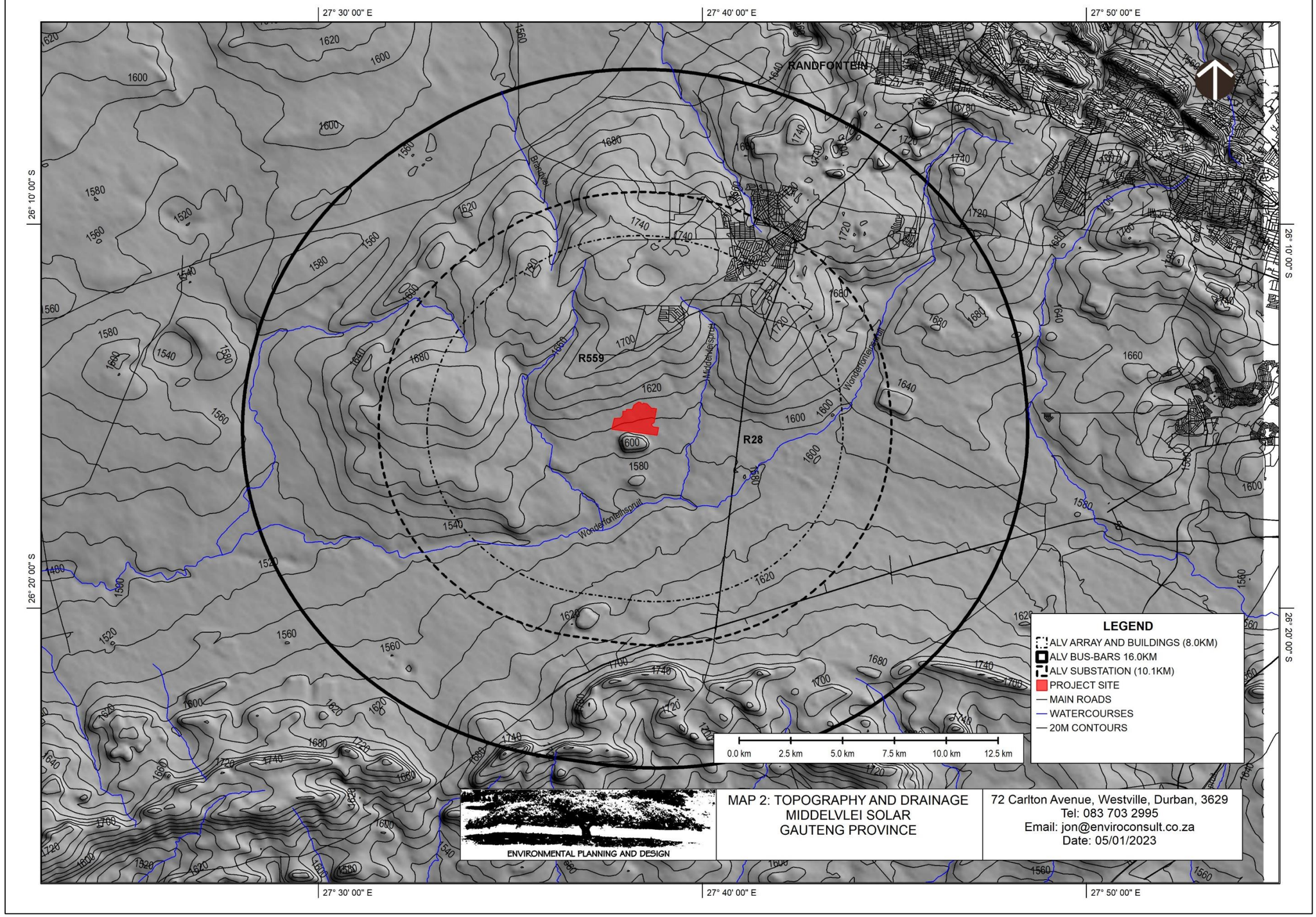
ADJACENT SMALLHOLDINGS (PLATE 5)

MAIN ROADS, R28 & R559 (PLATE 6)



HILLHAVEN (PLATE 7)

LOCAL ROADS (PLATE 8)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RANDFONTEIN
R559
R28
Middelvleispruit
Woodsfonteinspruit
Wonderfontein Spruit
LEGEND
ALV ARRAY AND BUILDINGS (8.0KM)
ALV BUS-BARS 16.0KM
ALV SUBSTATION (10.1KM)
PROJECT SITE
MAIN ROADS
WATERCOURSES
20M CONTOURS
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ENVIRONMENTAL PLANNING AND DESIGN
MAP 2: TOPOGRAPHY AND DRAINAGE
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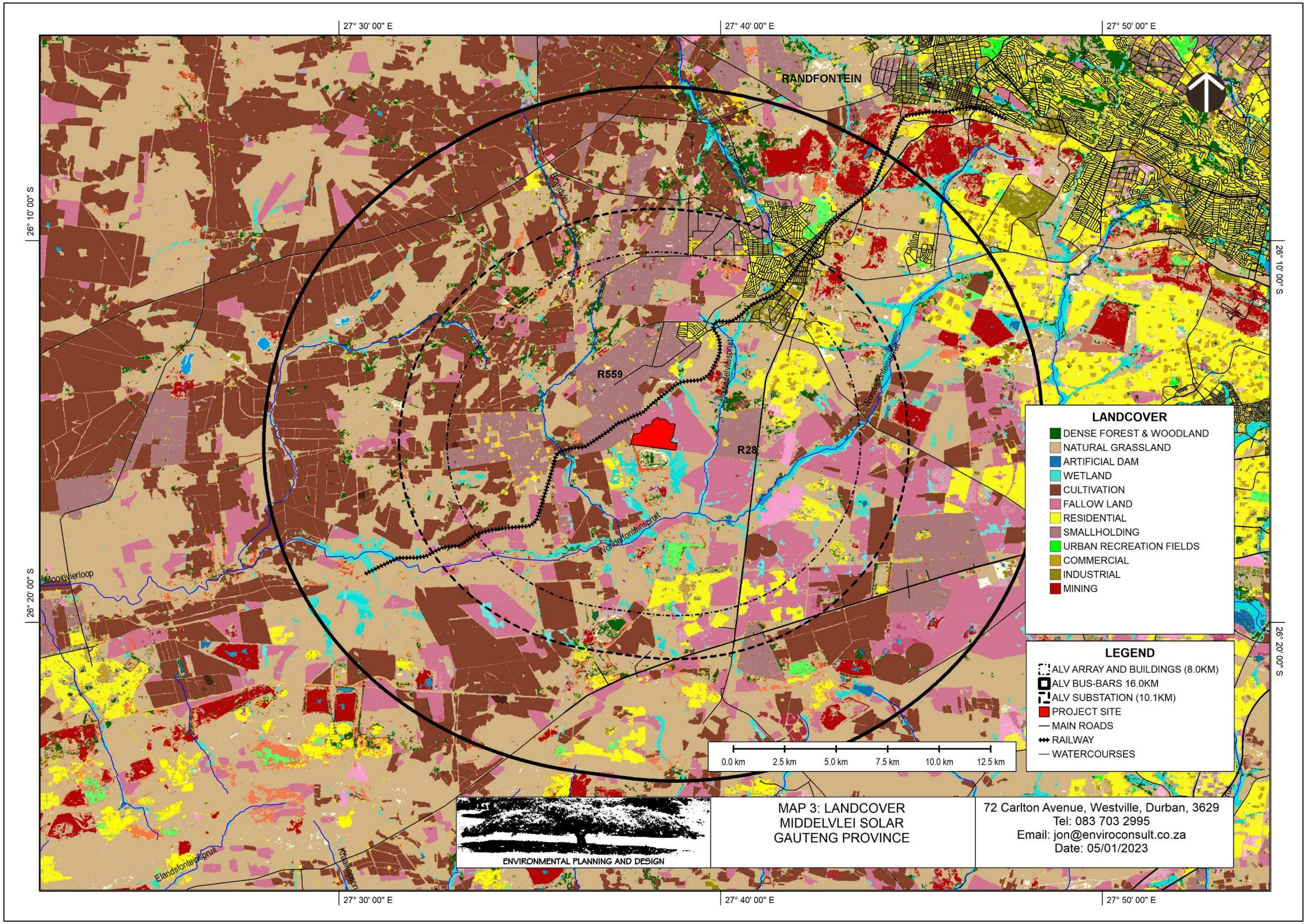

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RESIDENTIAL
SMALLHOLDING
URBAN RECREATION FIELDS
COMMERCIAL
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ALV ARRAY AND BUILDINGS (8.0KM)
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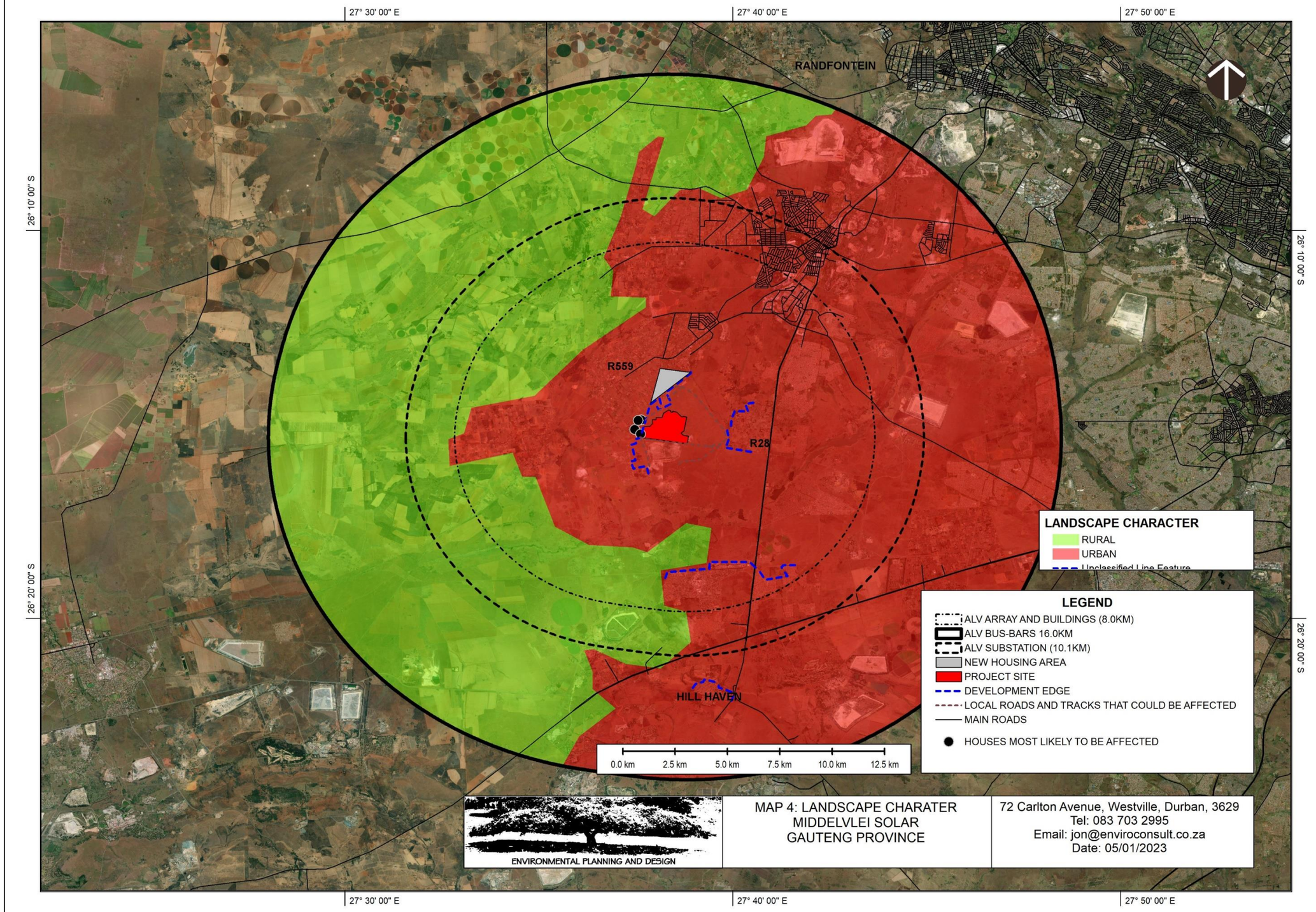
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LANDSCAPE CHARACTER
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Unclassified Line Feature
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ALV ARRAY AND BUILDINGS (8.0KM)
ALV BUS-BARS 16.0KM
ALV SUBSTATION (10.1KM)
NEW HOUSING AREA
PROJECT SITE
DEVELOPMENT EDGE
LOCAL ROADS AND TRACKS THAT COULD BE AFFECTED
MAIN ROADS
HOUSES MOST LIKELY TO BE AFFECTED
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ENVIRONMENTAL PLANNING AND DESIGN
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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;
- preparation 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 single access tracking supports that will move during the day to rotate panels approximately from east in the early morning through north at mid-day to west in the late afternoon /evening.

The orientation of panels and hence the view will therefore change during the day. When orientated towards the viewer they will appear as a continuous dark line. When orientated away from the viewer the profile will be broken and the support structures and rear of panels will be visible.

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;

- From the north, east and west and if the project is viewed from a similar level, for part of the day 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. The dark line will gradually break up as the panels turn.

- From the south and from east in the afternoon and west in the morning, 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. The profile however will be jagged.

- 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 surrounding development meaning that the front row of development is likely to experience maximum impact and .

- 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 could 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 fixed array or 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 the open nature of the grassland to the north, east and west, the proposed project is likely to be most visible from these directions particularly from the front row of development and from adjacent minor roads. However, from the south, it is likely to be largely screened by the existing mine dump.

Plate 9 indicates the location of the existing array at Upington Airport. **Plates 10, 11 and 12**, 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 9, Existing solar arrays at Upington Airport as seen from the air

Plate 10, Existing array seen in a flat landscape from approximately 700m. The array is clearly visible.

Plate 11, 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 12, **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[5] 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

[5] 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[6].

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. It is possible therefore that adjacent houses to the east and west of the site could be affected during the afternoon and morning respectively. However, if it does occur, this impact will be short in duration and is likely to only occur during certain times of the year. Given the similar levels, it is also likely to be relatively simple to provide mitigation by way of screening should it prove necessary.

Plate 13 - Glare experienced in the Control Tower at Boston Regional Airport from an adjacent PV array

[6] 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 houses and flats 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 and likely issues include:

a) Impact on views from adjacent housing development particularly on adjacent small holdings, the informal settlement and a new housing area to the north of the site that was under construction at the time of reporting:
b) Lighting impacts on adjacent housing including small holdings and the new housing area;
c) Impact on views from the closest major roads including the R559 and R28:
d) Impact on views from local unsurfaced roads; and
e) Glare impacts on adjacent housing.

No protected areas will be affected.

Due to the relatively developed / degraded / industrial nature of the affected landscape, the preservation of key landscape characteristics does not appear to be a significant issue. The existing landscape is therefore not likely to be sensitive to the degree of change that is likely to result from the proposed project.

Perhaps more important is ensuring that potential impacts on surrounding individual receptors are mitigated to acceptable levels.

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 OVERVIEW OF LIKELY VISUAL EFFECTS FOR RECEPTORS

Sensitivity to project development relates to guiding development away from areas of the site that would make it most obvious to surrounding sensitive receptors.

The closest receptors include:

a) One house within a smallholding immediately to the south-east of the proposed site that is approximately 30m from the proposed site boundary;
b) The next closest formal house is also on a smallholding and is approximately 350m from the proposed site;
c) The remainder of the formal housing which also consists of smallholding development is located in excess of 900m to the north-east and in excess of 1.6km to the east and north-east. Whilst the solar project is likely to be visible from these areas, views of the project will not dominate and glare is unlikely to be problematic;
d) The area of existing informal settlement is located approximately 150m to the north of the proposed site;
e) The area of new housing development; and
f) An informal track that runs close to the southern edge of the proposed site and immediately north of the existing adjacent mine dump.

g) A minor unsurfaced road that extends across the open grassland area to the north of the proposed project site. At its closest this road is approximately 1km from the site.

All receptors listed above could have clear views over the proposed project. The closest receptor (a) is likely to be the worst affected in that it could be affected by glare and a large proportion of the views from the property +/-50% are likely to be blocked by the proposed development.

All other listed receptors, with the exception of the existing informal track to the south, are likely to have clear views over the proposed solar project however, there will be a buffer between the development and the receptors. Therefore views of the development will not be as overpowering and dominant as (a).

It is possible that house (b) could be affected by glare as well as the project being visually obvious to residents.

The informal track (e) runs immediately to the south of the proposed site and views over the array and infrastructure will be obvious. As the track runs between the mine dump and the proposed project, views will be far from attractive, however, users of the track will only be impacted for a short period of time whilst they are on the track. This is not considered significant. This track will not be affected by glare.

Users of the unsurfaced road that runs to the north of the proposed project (g) will have views of the project. However, given the extent of open grassland between the road and the project, it is unlikely to visually dominate receptors.

Hillhaven is a small settlement approximately 11.5km to the south of the proposed development. This settlement is located on the valley ridgeline overlooking areas to the north. Because the proposed project is located on the south facing slope of the valley, it is possible that oblique views of the proposed development will be possible. However, due to distance, the location of the mine dump to the south of the proposed site and the shallow angle of the view, it is highly unlikely that this settlement will be affected to any significant degree. **See Figure 3, View of Proposed Development Site from Hillhaven.**

Highly Sensitivity Areas:

- The only highly sensitive section of the proposed development is likely to be the south-west corner of the proposed site. Should this be developed it is possible that views of the project will dominate the landscape as seen from the closest house (a).It is also possible that glare could affect this property. It is therefore recommended that the development is set back a minimum of 100m from the site boundary and that the area is monitored for glare. Should glare prove problematic, appropriate screening should be erected.

Medium Sensitivity Areas:

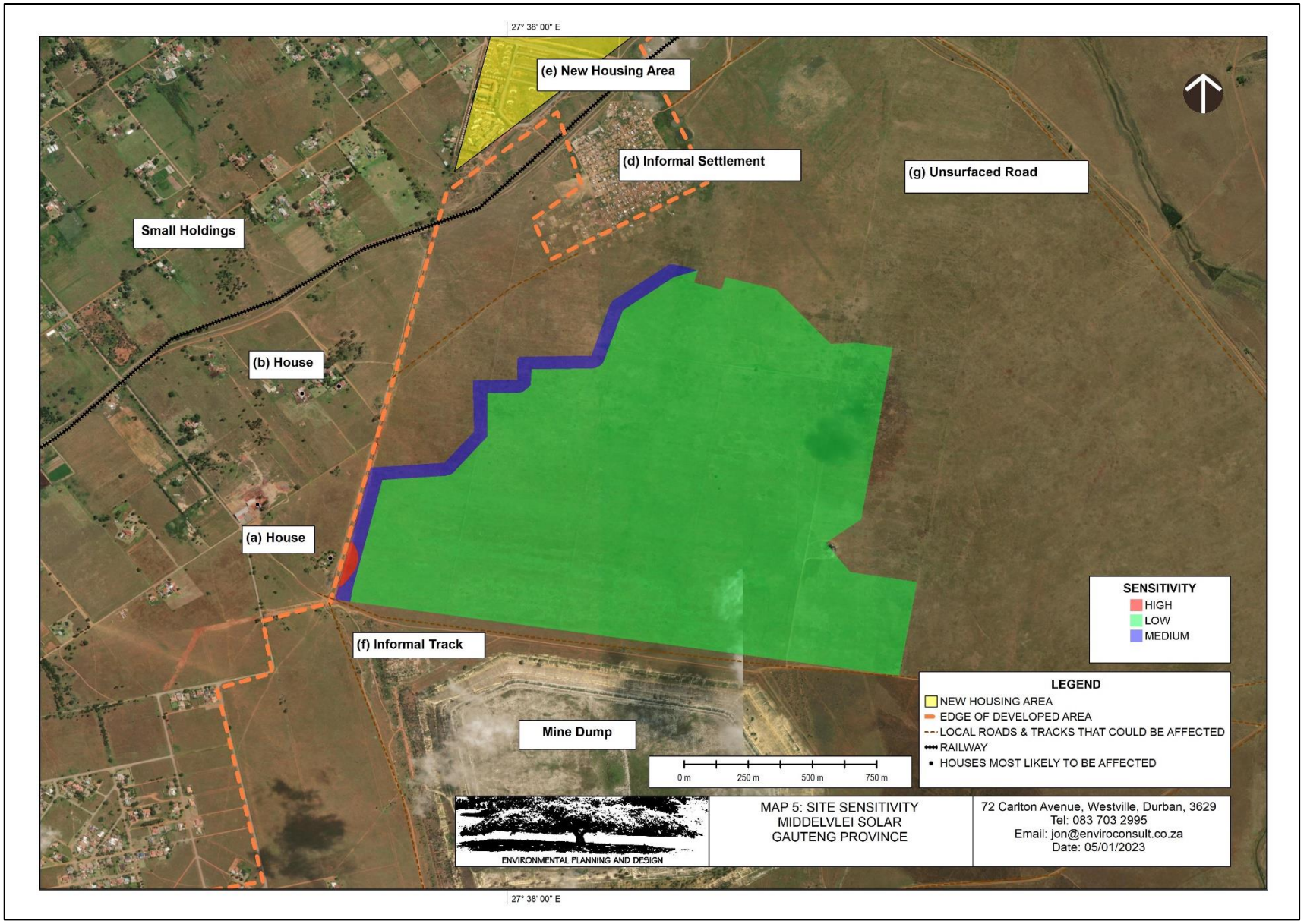
- The western boundary of the proposed site. This is due to the potential for glare to affect existing small holdings and newly constructed /planned houses and flats. It is recommended that the proposed project is sufficiently set back from the site boundary

in this area to ensure that screening is possible subject to the need following monitoring.

Low Sensitivity Areas include:

- All other areas of the proposed site.

Figure 3, View looking towards the proposed development site from Hillhaven approximately 11.5km to the south.
Note: The proposed site is indicated in red to left of centre of picture.


27° 38' 00" E
(e) New Housing Area
(d) Informal Settlement
(g) Unsurfaced Road
Small Holdings
(b) House
(a) House
(f) Informal Track
Mine Dump
SENSITIVITY
HIGH
LOW
MEDIUM
LEGEND
NEW HOUSING AREA
EDGE OF DEVELOPED AREA
LOCAL ROADS & TRACKS THAT COULD BE AFFECTED
RAILWAY
HOUSES MOST LIKELY TO BE AFFECTED
0 m
250 m
500 m
750 m
ENVIRONMENTAL PLANNING AND DESIGN
MAP 5: SITE SENSITIVITY
MIDDELVLEI SOLAR
GAUTENG PROVINCE
72 Carlton Avenue, Westville, Durban, 3629
Tel: 083 703 2995
Email: jon@enviroconsult.co.za
Date: 05/01/2023
27° 38' 00" E

6 IDENTIFICATION AND INITIAL ASSESSMENT OF ISSUES

6.1 IMPACTS TO BE CONSIDERED

Possible impacts identified include:

a) Change in landscape character;
b) Impact on views from housing development including adjacent small holdings, the adjacent new housing area that was under construction at the time of reporting, the adjacent informal settlement and Hillhaven:
c) Lighting impacts on adjacent housing including the new housing area;
d) Impact on views from the closest major roads including the R559 and R28:
e) Impact on views from local unsurfaced roads; and
f) Glare impacts on adjacent housing.

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 urban landscape	Direct impacts: **Degradation of rural landscape**. The landscape is not protected and is relatively degraded. The character is also relatively common within the region. Indirect impacts: No indirect impacts	Local	None identified at this stage
Description of expected significance of impact Without an indication of the possible location and layout of the project, it is not possible to be confident regarding possible significance of impacts.			

The 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.	Direct impacts: **Industrialisation of views from local unsurfaced roads**. Indirect impacts: **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 roads that runs through the adjacent area. Without an indication of the possible location and layout of the project it is not possible to be definite regarding possible significance of impacts. They will however be seen in the context of major mining elements. As long as the proposed development does not dominate views from roads, the change in view is unlikely to be significant.			
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 R28, the R559.	Direct impacts: **Industrialisation of views from main roads**. Indirect impacts: **No indirect impacts**	Local	None identified at this stage

Description of expected significance of impact

Whilst they are relatively close, the proposed development is likely to be completely screened from them by existing development. Therefore it is highly unlikely that there will be a significant impact.

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 Adjacent Houses

Potential Impact

Issue	Nature of Impact	Extent of Impact	No-Go Areas
Potential visual impacts as experienced by residents and guests at local houses	Direct impacts: **Industrialisation of views from local houses**. Indirect impacts: **No indirect impacts.**	Local	None identified at this stage

Description of expected significance of impact

One house is within 30m of the proposed development. The second closest is within 350m. All other formal housing, including the new housing area that is under development, is in excess of 900m from the proposed development.

There is also an area of informal settlement approximately 150m to the north.

The settlement of Hillhaven which is located approximately 11.5km to the south of the proposed site could also have oblique views over the project.

Given the extent of mining in the area as well as other industry, it is generally unlikely that residents will object to the introduction of a solar project into their view. The exception to this could be the closest house from which the proposed development is likely to block approximately 50% of the view.

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: **Industrialisation of views from the train**. Indirect impacts: **No indirect impacts.**	Local	None identified at this stage

Description of expected significance of impact

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

However, views of the proposed development are likely to be largely screened by other development. It is also 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 obvious from the train.

Gaps in knowledge & recommendations for further study

The proposed development layout.

Recommendations with regards to general field surveys

Assessing the extent of change that will be obvious.

6.3.5 Lighting

Potential Impact			
Issue	**Nature of Impact**	**Extent of Impact**	**No-Go Areas**
Lighting Impacts.	Direct impacts: **Light pollution affecting local houses**. Indirect impacts: **No indirect impact.**	Local	None identified at this stage

Description of expected significance of impact

Lighting is likely to be required for security, maintenance and the safety / convenience of workers.

There are other large scale industrial operations in the area. The surrounding urban area is relatively well lit. The issue really is the potential for overspill lighting to affect houses. It is only the closest houses that could potentially be affected.

It is possible to mitigate lighting impacts to a large degree through design, the use of motion sensors for security lighting and ensuring that lighting is only used in areas where workers are located / working.

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

Gaps in knowledge & recommendations for further study

The proposed layout and the nature of proposed lighting.

Recommendations with regards to general field surveys

Assess existing levels of impact.

6.3.6 Glare

Potential Impact

Issue	Nature of Impact	Extent of Impact	No-Go Areas
Glare Impacts on adjacent houses.	Direct impacts: **Glare affecting houses**. Indirect impacts: **Nuisance.**	Local	None identified at this stage

Description of expected significance of impact

Glare could affect the local houses particularly the closest houses.

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 affected landscape is industrialised, in accordance with the Western Cape Guidelines, a Level 3 Assessment should be undertaken which 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; and
7. Review by independent, experienced visual specialist (if required).

Based on the fact that the landscape is already industrialised /degraded 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**

It will be assumed that affected receptors are likely to prefer views of a open space areas and urban development 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.

REFERENCES

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

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

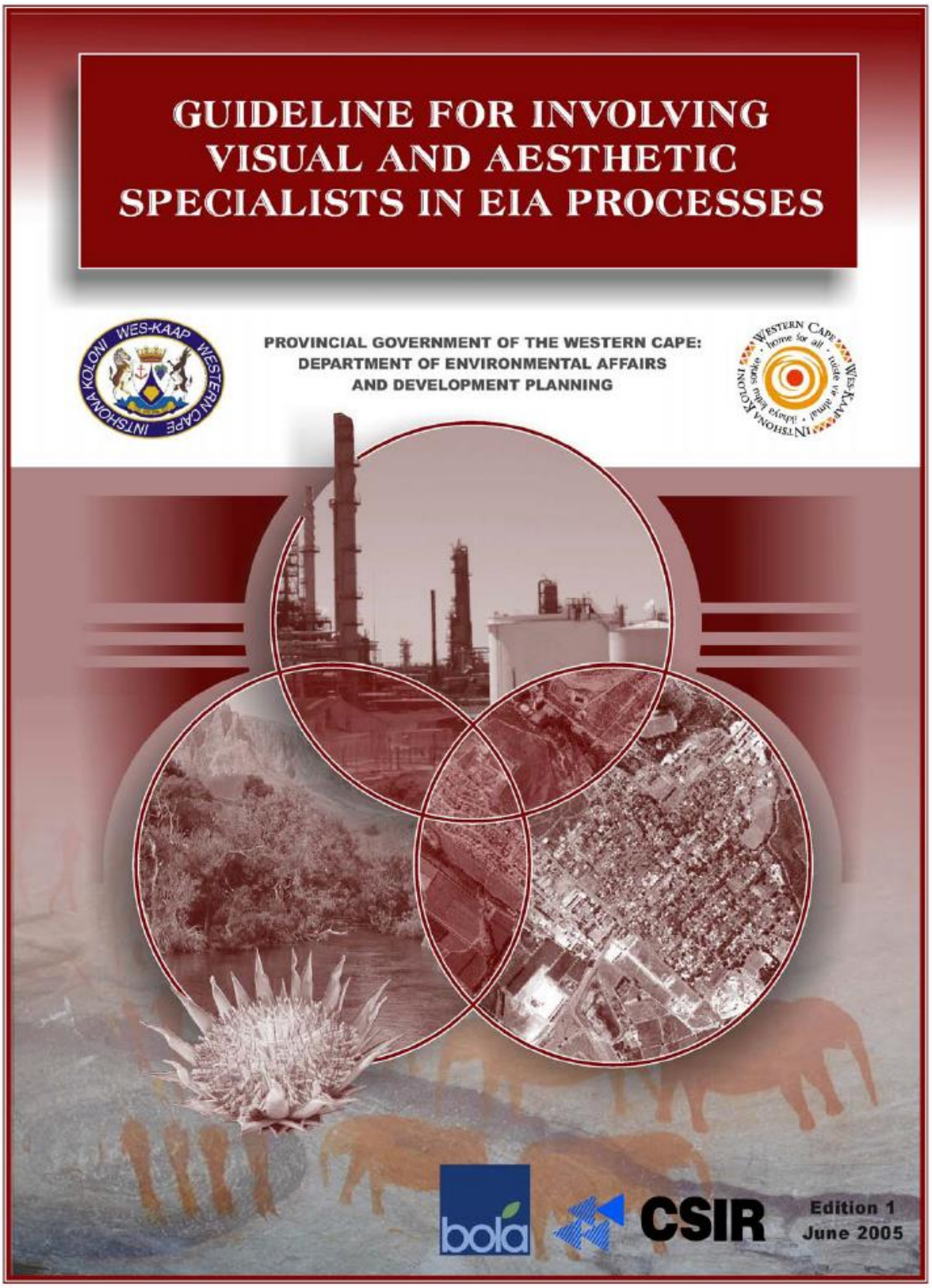
- **Eskom Tuthuka PV Installation** - Scoping and LVIA for the development of a solar PV plant within Eskom's Thutuka Power Station in Mpumalanga.
- **Eskom Majuba PV Installation** - Scoping and LVIA for the development of a solar PV plant within Eskom's Majuba Power Station in Mpumalanga.
- **Golden 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
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GUIDELINE FOR INVOLVING VISUAL AND AESTHETIC SPECIALISTS IN EIA PROCESSES

Edition 1

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Stakeholders engaged in the guideline development process:

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PREFACE

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

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

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

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

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

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

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

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

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

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

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

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

Who is the target audience for these guidelines?

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

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

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

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

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

What will these guidelines not do?

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

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

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

How are these guidelines structured?

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

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

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

SUMMARY

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

CONTENTS

APPENDIX III

FORMULA FOR DERIVING THE APPROXIMATE VISUAL HORIZON

The Mathematics behind this Calculation

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

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