HYPERION SOLAR DEVELOPMENT (Pty) Ltd

PROPOSED HYPERION THERMAL ENERGY FACILITY, NEAR KATHU, IN THE NORTHERN CAPE PROVINCE

LANDSCAPE & VISUAL IMPACT ASSESSMENT REPORT

JANUARY 2021

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1 INTRODUCTION

1.1 GENERAL

This Landscape and Visual Impact Assessment forms part of the Environmental Impact Assessment that is being undertaken for the proposed Hyperion Thermal Facility by Savannah Environmental (Pty) Ltd on behalf of Hyperion Solar Development (Pty) Ltd. The project comprises a 75MW Thermal facility.

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

This Landscape and Visual Impact Assessment Report has been prepared for inclusion in the project Environmental Impact Assessment report.

1.2 PROJECT LOCATION

The project is located in the Gamagara Local Municipality and the John Taolo Gaetsewe District Municipality (**Map 1: Locality Map**).

The approximate geographic coordinates for the centre of the proposed site are;

South	27^0	33’	14.93”
East	23^0	03’	55.10”

1.3 BACKGROUND OF SPECIALIST

Jon Marshall qualified as a Landscape Architect in 1978. He has also had extensive experience working as an Environmental Assessment Practitioner (EAP) in South Africa. He has been involved in Visual Impact Assessment over a period of approximately 30 years. He has developed the necessary computer skills to prepare viewshed analysis and three dimensional modelling to illustrate impact assessments. He has undertaken visual impact assessments for major buildings, industrial development, renewable energy, mining and infrastructure projects and has been involved in the preparation of visual guidelines for large scale developments.

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

1.4 BRIEF AND RELEVANT GUIDELINES

The brief is to assess the visual impact that the proposed project will have on surrounding areas.

Work was 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) (Oberholzer, 2005). This is the only relevant local 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 (GVLIA) which provides detail of international best practice (UK Guidelines)

(Landscape Institute and Institute of Environmental Assessment and Management, 2013).

1.4.1 Western Cape Guidelines

The Western Cape Guidelines provide a useful guide as to the level of impact necessary for various types of developments and in various types of landscape. It also provides guidance as to the necessary consideration and content of an assessment. This information is applied in Section 6, Methodology.

1.4.2 UK Guideline

This document provides the following criteria which, at least, should be borne in mind as it could help the professional in carrying out the process of assessing the Landscape Effects as follows:

- Consider the physical state of the landscape. This includes the extent to which typical character is represented in individual areas, the intactness of the landscape from visual, functional and ecological perspectives and the condition of individual elements of the landscape;
- Consider scenic quality which depends upon perception and reflects the particular combination and pattern of elements in the landscape, its aesthetic qualities, its more intangible sense of place or 'genius loci' and other more intangible qualities;
- Consider the rarity of the landscape, it might be valued because it is a rare type, or because it contains rare elements, features or attributes;
- Consider representativeness, as a landscape may be valued because it is considered to be a particularly good example of its type either in terms of its overall character or because of the elements or features it contains;
- Consider conservation interests, i.e. the presence of features of wildlife, earth science or archaeological or historical and cultural interest can add to the value of the landscape as well as having value in their own right.
- Consider perceptual aspects as a landscape may be valued for its perceptual qualities, notably wildness and/or tranquillity; and
- If public opinion has been sought consider if there may be a consensus of opinion, expressed by the public, informed professionals, interest groups, and artists, writers and other media, on the importance of the landscape.

As regards the Visual Effects, the Guideline suggests the selection of the final viewpoints used for the assessment should take account of a range of factors including:

- Accessibility to the public;
- Potential number and sensitivity of viewers who may be affected;
- Viewing distance (i.e. short, medium and long distance views) and elevation
- View type (for example panoramas, vistas, glimpses);
- Nature of viewing experience (for example static views, views from settlements and points along sequential routes);
- Potential for cumulative views of the proposed development in conjunction with other developments

1.5 LIMITATIONS AND ASSUMPTIONS

The following limitations and assumptions should be noted:

In the assessment tables the subjective judgement as to whether an impact is negative or positive is based on the assumption that the majority of people are likely to prefer to view a natural or a rural landscape than an industrial landscape.

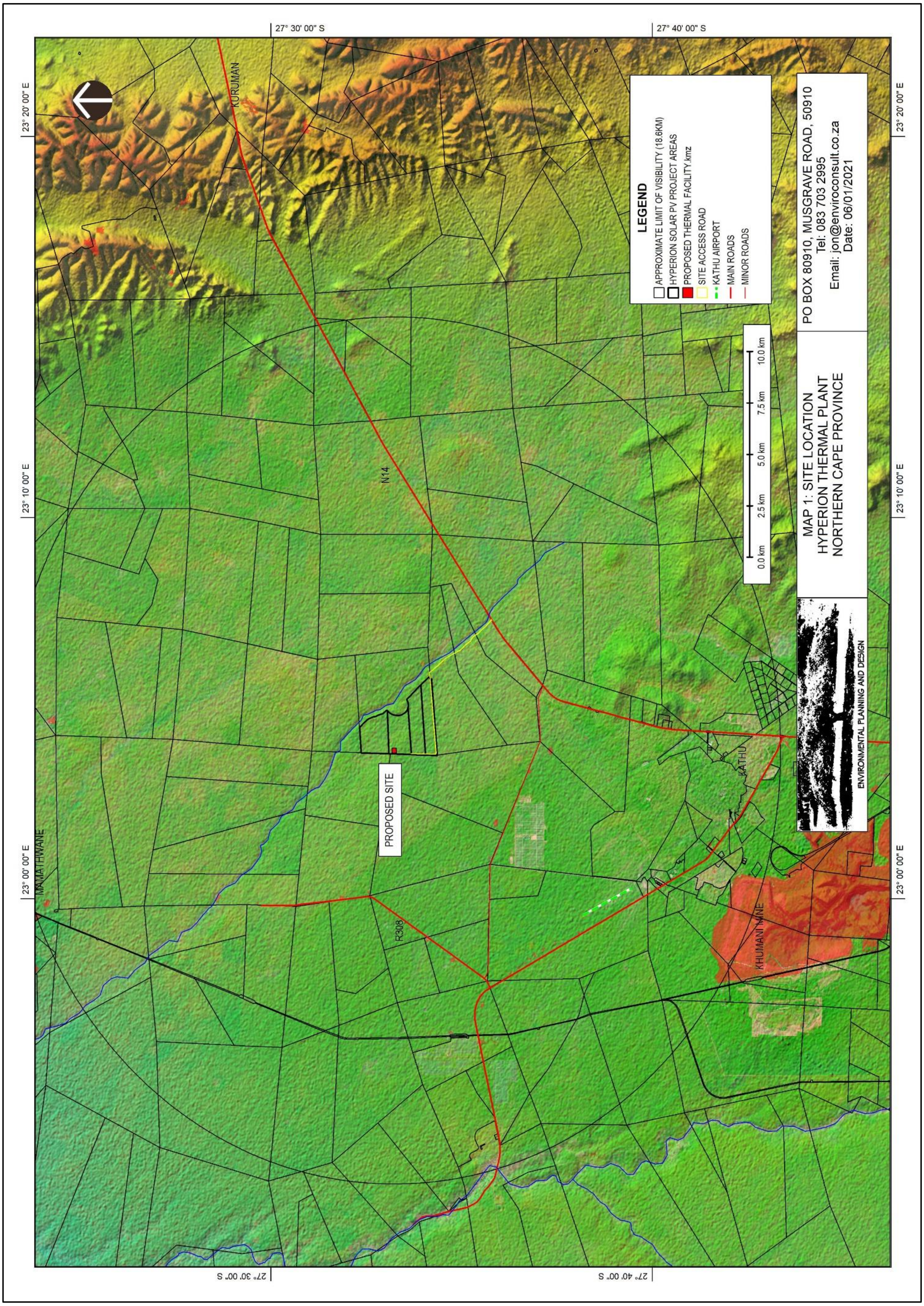
A site visit was undertaken on a single day (5th January 2019) to verify the likely visibility of the proposed solar development on the subject site. Information collected during this site visit has been used in the preparation of this report.

The site visit was planned to ensure that weather conditions were clear ensuring maximum visibility.

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

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

Calculation of visibility is based purely on the Digital Elevation Model and does not take into account the screening potential of vegetation.



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2.5 km
5.0 km
7.5 km
10.0 km
MAP 1: SITE LOCATION
HYPERION THERMAL PLANT
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Date: 06/01/2021
ENVIRONMENTAL PLANNING AND DESIGN

2. PROJECT DESCRIPTION

2.1 MOTIVATION AND CONTEXT

In response to the Department of Energy's requirement for power generation, the applicant is proposing the establishment of a thermal solar energy generation facility with a generating capacity of up to 75MW to generate electricity for input into the national grid to augment Eskom's power supply.

This project is intended to supplement the energy generated by the authorised Hyperion Solar PV projects that are located on the same site.

The project is proposed to be part of the Department of Energy's (DoE) Risk Mitigation Independent Power Producer Programme (RMIPPP).

2.1 PROJECT DESCRIPTION

Refer to Figure 1, Site Layout

The application is for construction and operation of a commercial thermal energy facility as well as associated infrastructure. The contracted capacity of the proposed facility will be up to 75 MW.

The main elements of the proposed project that are likely to have visual implications include:

- Two engine halls approximately 40m long, 20m wide and 10m high containing all power generation plant each housing six gas turbines and associated infrastructure;
- Two groups of exhaust stacks each containing 6 stacks approximately 27m high;
- Various associated infrastructure including pipework, water treatment and storage facilities and other ancillary buildings all of which will be located in the vicinity of the engine halls and exhaust stacks and will be lower than the engine halls;
- High mast lighting;
- A site access road the width of which will not exceed 15m; and
- On-site step-up transformers.

An existing unsurfaced road that links to the N14 will be used for site access. This road will be surfaced and will have a maximum width of 15m. The existing road alignment is indicated on Map 1.

2.1.1 Grid Connection

The thermal power plant will utilise the grid connection associated with the solar PV projects.

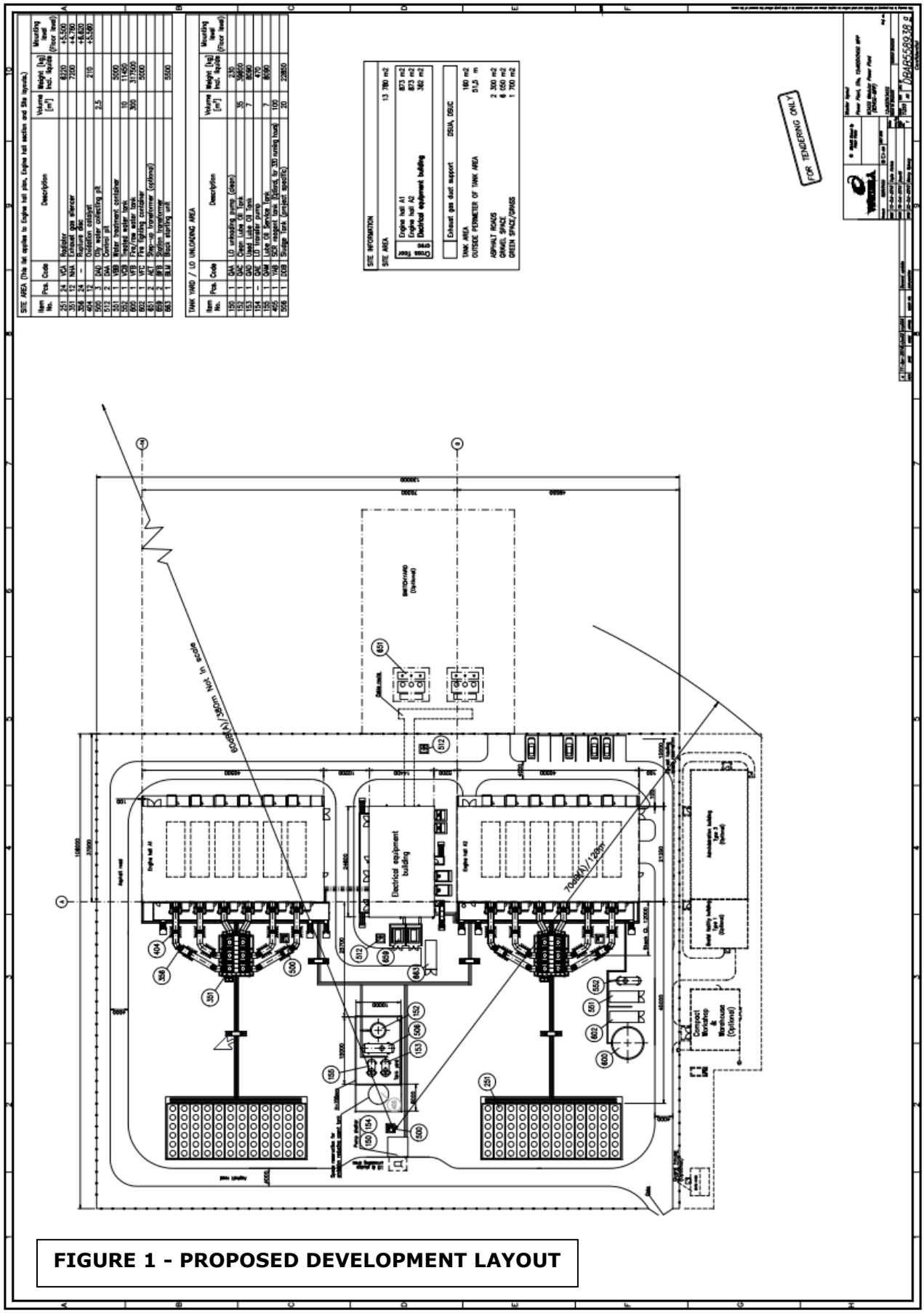

FIGURE 1 - PROPOSED DEVELOPMENT LAYOUT

3 DESCRIPTION OF RECEIVING ENVIRONMENT AND RECEPTORS

It is possible that landscape change due to the proposed development could impact the character of an important 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:

- Provide an initial description of the types of landscape that may be impacted;
- Provide an initial Indication of the likely degree of sensitivity; and
- Provide an initial description of how the landscape areas may be impacted.

The study area is defined by the limit of visibility of the proposed project. As a guide the limit has been set at 18.6km from the proposed site being the approximate limit of visibility of a 27m high stack structure. Refer to Section 4.3 for the justification for this distance.

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 is a composite of a number of influencing factors including:

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

3.1.1 Landform and Drainage

The proposed project is located on a broad valley floor that is drained by the Vlermuisleegte which is an intermittent stream that flows from south to north through the proposed site area.

The valley floor falls from south east to northwest at a gentle gradient of approximately 1:200.

The visual implications of landform are;

Because the N14 is located approximately 7km to the south at an elevation approximately 30m higher than the proposed project, it is possible that the project will be visible from this road. The shallow gradient is likely to mean that the project will be viewed largely in elevation with little or no extended overview and that intervening vegetation is likely to play a major role in screening the project.

Refer to Map 2, Landform and Drainage.

3.1.2 Landcover

The population density of the area immediately surrounding the proposed development varies.

[1] UK Guideline

Kathu is the largest town of five towns within the Gamagara Local Municipality. However both are relatively small towns. At the 2011 census, the municipality had a total population of approximately 41,617 people approximately 71% of which are based in urban areas.

The area of the Municipality is 2,619km^2.

Rural homesteads were found to have an average occupancy of 3.5 people. This means that there is a rural homestead for approximately every 0.75km^2.

Given the province's dry conditions and dependence on irrigation, many Northern Cape farmers are branching out into value-added activities such as game farming. This is apparent in rural areas surrounding the proposed alignment as low intensity grazing appears to be mixed with game farming, hunting operations and bush lodges.

Kathu is primarily a rural service centre. It is likely also that a proportion of its economy is derived from local mining operations as well as its position on the N14 as it acts as a transit stop for travellers including tourists.

Kathu has a regional airport that is located approximately 11.7km to the west of the proposed project site.

Apart from agriculture, mining is the largest industrial activity in the area. Kathu is the centre of this activity. Mines in the area include iron ore and manganese. The mine to the west of Kathu and south of the proposed project is the Mamatwan Manganese Mine that is operated by Anglo American.

In addition to Mamatwan, there are numerous areas of degraded land as indicated on **Map 3**. It is possible that these areas have resulted from informal mining operations.

All major mining activities are a significant distance from the proposed development area and are unlikely to have a major influence on the character of the landscape surrounding the project site.

Visual implications of landcover include the potential that homesteads on adjacent farms could have tourism importance if they have been developed with bush lodges and are used for game viewing or hunting operations, in which case they could be sensitive to the potential change in view associated with the proposed development.

Refer to Map 3, Landcover and Context.

3.1.3 Vegetation Patterns

According to Mucina and Rutherford[2] (2006), the proposed project is located in a relatively natural area. The natural areas indicated on Map 3, Landcover and Context include the following vegetation types:

- Kuruman Thornveld;
- Kathu Bushveld; and
- Kuruman Mountain Bushveld.

All vegetation types are usually open tree and shrub cover with a sparse grass layer.

Visual implications include;

- Where the viewer is amongst natural vegetation, it is likely that there will be a degree of screening provided by the natural vegetation.
- Where the viewer is set back from natural vegetation or where ground elevation provides a slightly elevated overview of the landscape, the extent of screening provided by natural vegetation is likely to be limited.

3.1.4 Future Development

From reference to the Department of Environmental Affairs web site that records the location of current renewable energy applications (https://dea.maps.arcgis.com), it is obvious that there are currently twenty one other similar and authorised projects proposed on twelve properties within 30km of the proposed development. From reference to Google Earth, a number of these projects are under construction. It is also understood that all preferred bidder projects in this area are operational. The list of projects is indicated below.

These developments are likely to result in a degree of industrialisation of what in essence is currently a rural landscape. The majority of the projects are located well away from main roads, so it is possible that the average person will not realise the extent of development. There are however six other projects that are located at a similar distance or closer to the N14 as the proposed Hyperion Projects. Whilst no detailed work has been undertaken, this could mean that other projects will be visible from the road.

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"[3].

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 landscape within the Approximate Limit of Visibility appears relatively uniform.

Overlaying the landform, landcover and vegetation, all potentially affected areas appear to be a composite of relatively flat topography, natural landcover which is generally comprised

[2] Vegetation types of South Africa (including Prince Edward and Marion Islands), Lesotho and Swaziland, 2006
[3] UK Guidelines.

of Kathu Bushveld. This combination of characteristics could provide a significant degree of VAC due to the following factors:

- Because the solar project will be viewed in a flat landscape it is likely to be seen in profile meaning that at any distance it will appear as a narrow dark band in the landscape;
- The Kathu Bushveld includes woody vegetation that extends above head height. This taller vegetation may not be very dense but the cumulative screening effect over distance is significant. Vegetation is therefore likely to at least visually break the horizontal dark line of solar panels.

Approximately 15km to the east of the project area is a north south running ridgeline that forms the eastern side of the valley. This ridgeline rises approximately 150m above the relatively flat valley floor. Due to distance it is unlikely that this ridgeline will be significant either in contributing to landscape character or providing an area from which an overview of the development is possible.

Approximately 12km to the south of the project area is the settlement of Kathu which is also located on the flat valley floor. Due to distance it is unlikely that this settlement will be significant either in contributing to landscape character or providing an area from which an overview of the development is possible.

3.3 LANDSCAPE QUALITY AND IMPORTANCE

The affected landscape currently consists of relatively flat topography that is covered with natural bush veldt and low intensity grazing is likely to be the predominant agricultural activity. In areas, some landowners may have diversified into game farming, hunting and bush lodges. Sparsely scattered homesteads are apparent in the landscape.

From the site visit it was apparent that none of the affected homesteads include lodge development.

There are no protected areas within the affected area.

The landscape is primarily important for its productivity including agriculture and mining.

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"[4].

It is also possible that an area might 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 possible Receptors within the landscape which due to use could be sensitive to landscape change. They include;

- **Point Receptors** that include homesteads that are scattered throughout the area. From the site visit, it is understood that no affected homesteads are likely to have a

[4] UK Guidelines.

tourism use. It is therefore likely that the focus for people residing in surrounding rural homesteads is likely to be agricultural production. There are eight groups of buildings within the Approximate Limit of Visibility,

- **Linear Receptors** that include the N14, the R380 and local routes through the area:
    - The N14 is a primary tourism route. Local routes surrounding the development are likely to be mainly used by local people and relate to agricultural activities;
    - The R380 which provides access to mining areas around Hotazel which is approximately 50km to the north of the proposed site. The road also links to northern Namibia and because of this it probably carries a proportion of tourism traffic;
    - Local roads including a minor road that runs to the south and south west of the site that provides a link between the N14 and the R380;
- **The Kathu (Sishen) Airport** which is located approximately 12km to the southwest of the proposed project. The airport is a regional airport with daily SA Airlink flights to and from O R Tambo. The main concern that is likely with regard to the airport is the potential for glint and glare affecting flights, particularly on approach to the airport.

Plate 1, Typical view of the landscape adjacent to the proposed site. The character is generally comprised of relatively flat topography, natural landcover which is generally comprised of Kathu Bushveld with isolated homesteads.


27° 30' 00" S
27° 40' 00" S
23° 20' 00" E
23° 10' 00" E
23° 00' 00" E
KURUMAN
N14
PROPOSED SITE
R308
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SITE ACCESS ROAD
CONTOURS (10M)
KATHU AIRPORT
MAIN ROADS
MINOR ROADS
WATER COURSES
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2.5 km
5.0 km
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10.0 km
MAP 2: LANDFORM AND DRAINAGE
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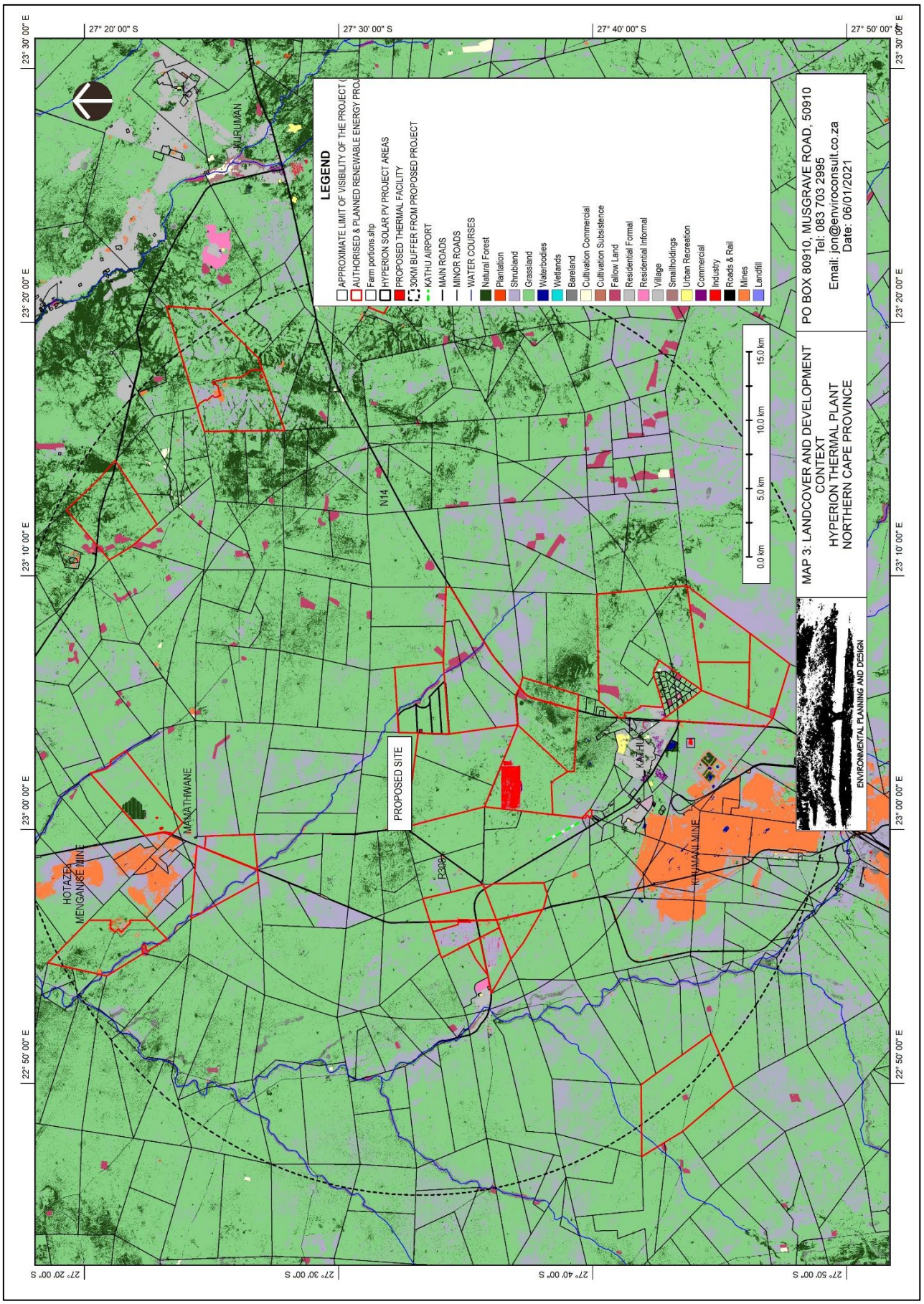
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PROPOSED THERMAL FACILITY
30KM BUFFER FROM PROPOSED PROJECT
KATHU AIRPORT
MAIN ROADS
MINOR ROADS
WATER COURSES
Natural Forest
Plantation
Shrubland
Grassland
Waterbodies
Wetlands
Bareland
Cultivation Commercial
Cultivation Subsistence
Fallow Land
Residential Formal
Residential Informal
Village
Smallholdings
Urban Recreation
Commercial
Industry
Roads & Rail
Mines
Landfill
0.0 km
5.0 km
10.0 km
15.0 km
MAP 3: LANDCOVER AND DEVELOPMENT CONTEXT
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HOTAZEL MANGANESE MINE
KURUMAN
27° 20' 00" S
27° 30' 00" S
27° 40' 00" S
27° 50' 00" S
23° 30' 00" E
23° 20' 00" E
23° 10' 00" E
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22° 50' 00" E

4 THE NATURE OF POTENTIAL VISUAL IMPACTS

4.1 THE NATURE OF VISUAL IMPACT

Visual impacts may relate to a general change in the character of an area or in the change of 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 if 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 the importance and quality of the surrounding landscape and the extent of change.

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 possible in this assessment by classifying the landscape character of the 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.

4.2 TYPICAL VISUAL EFFECTS ASSOCIATED WITH PV PROJECTS

4.2.1 Views of the proposed Thermal Facility

Whilst the surrounding landscape is covered with natural bushveld, the proposed facility is likely to stand above the natural tree cover.

Proposed structures including the engine halls and the stacks are relatively bulky elements. This means that where views of the development are possible, they are likely to be relatively obvious.

4.2.2 Security Lighting

The proposed high mast security lighting could result in the plant being obvious at night from surrounding areas.

4.2.4 Timing of Likely Visual Impacts

During the construction phase, it is expected that traffic will be slightly higher than normal as trucks will be required to transport materials and equipment 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 structures will be sited would normally occur, the assessment indicates that the land is relatively flat so only minor grading may be required;
- Levelling of hard-standing areas, e.g. for temporary lay-down and storage areas. As indicated above only minor grading is likely to be necessary;
- Construction of structure footings and foundations;
- Once footings and foundations are in place, because the main structures are likely to be comprised of clad steel frames, structures are likely to appear relatively quickly in the landscape;
- Erection of site fencing; and
- Construction of a temporary construction camp which will occur within a lay down area within the overall site.

The majority of site activities are only likely to be visible from the immediate vicinity of the site. However, once the main structures are under construction, these may be visible from a distance.

The construction phase is programmed to take approximately 18 months.

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

The operational phase is highly unlikely to result in any significant additional impact. It is possible however, that workers and plant will be visible from time to time undertaking maintenance within the facility.

The main visible elements are likely to include the engine halls and stacks.

4.3 ZONES OF THEORETICAL VISIBILITY

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

The order of height of the proposed highest structures (Stacks) is 27m.

The engine halls and other lower infrastructure will be a maximum height of 10m

The ZTV analysis has been undertaken using Arc Spatial Analyst Geographic Information System (GIS). The assessment is based on terrain data that has been derived from satellite imagery. This data was originally prepared by the National Aeronautics and Space Administration (NASA) and is freely available on the International Centre for Tropical Agriculture's- Climate Change, Agriculture and Food Security (CIAT-CCAFS) website (http://www.cgiar-csi.org).

The GIS Assessment does not take the curvature of the earth into account. In order to provide an indication of the likely limit of visibility due to this effect a universally accepted navigational formula has been used to calculate the likely distance that the proposed structures might be visible over (**Appendix III**). This indicates that in a flat landscape the proposed structures may be visible for the following distances;

Approximate limit of Visibility (ALV)

ELEMENT	APPROXIMATE LIMIT OF VISIBILITY
Stacks up to 27m high	18.6 kilometres

Engine halls and other infrastructure up to 10m high	11.3 kilometres

In reality these distances could be reduced by:

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

4.4 LIKELY VISIBILITY OF THE PROPOSED ELEMENTS

The ZTV analysis indicated on **Maps 4 and 5** is based on a points located on the location of the engine halls **(ZTV 10m)** and the stacks **(ZTV 27m)** respectively. The analysis therefore is an indication of the areas from which these proposed project may be visible. The mapping indicates that key receptors are likely to include travellers on the N14, the R380, Kathu Airport, other minor local roads as well as inhabitants of local homesteads.

4.4.1 Implications for Visual Receptors

It is likely that the elements associated with the adjacent four Solar PV projects will be visible over similar sections of the road as the engine halls and lower sections of the proposed project. However the introduction of 27m high stacks is likely to extend the visual influence of power generating projects.

Visual implications of the proposed project for identified receptors are likely to include:

a) Views from Roads

The project is likely to be visible from the N14. The proposed project is located approximately 7.3km from the road.

The ZTV analysis indicates that the engine halls could potentially be visible intermittently over approximately 10km of the road. The intermittent nature of views indicated on the analysis is due solely to landform. This is likely to be increased by existing vegetation close to the road which will also help to screen views of the structures.

The ZTV analysis indicates that the engine halls could potentially be visible over approximately 21km of the road. The analysis also indicates that due to landform there will be minor breaks in views. These breaks are also likely to be is likely to be increased by existing vegetation close to the road which will also help to screen views of the structures. Due to their height however, the views of the stacks are likely to be more continuous than the engine halls.

The authorised solar PV projects are likely to break the view of lower elements from the road.

The project may also be visible to the R380 which at its closest is approximately 6.3km to the west of the proposed project. As with views from the N14, it will be viewed over flat topography and through natural vegetation.

The ZTV analysis indicates that intermittent views of the engine halls from this road may be possible over approximately 7km of the road and at a distance in excess of 8km. Given the topography, screening provided by vegetation and the distance, that whilst clear views may be possible over sections of the road it is likely that the extent of the road over which these views are possible will be significantly reduced.

The ZTV analysis indicates that intermittent views of the stacks from this road may be possible over approximately 26km of the road and at a distances between 6.3km and 18km. The assessment indicates that unbroken views of the stacks may be possible over much of this length of road. However, due to the nature of existing vegetation and its proximity to the road, there are likely to be sections over which views of the stacks are screened. Vegetation will also partially break views over much of the road length.

At the distances involved, low structures and infrastructure within the plant are unlikely to be visually obvious, although glimpses may be possible through existing vegetation.

The access road is only likely to be obvious from these roads in the vicinity of its junction with local roads.

Plate 2, View looking towards the proposed site from the N14.

Plate 3, View looking towards the proposed site from the minor road to the south west

Plate 4, View looking towards the proposed site from the R380

b) Homesteads

There are twelve groups of buildings within the Approximate Limit of Visibility of the engine halls and twenty within the Approximate Limit of Visibility of which the stacks of which six fall within the ZTV of the engine halls and eighteen fall within the ZTV of the stacks.

The closest homestead is approximately 1.9km to the east of the development. From discussion with the Environmental Assessment Practitioner, this homestead is inhabited by the landowner who is in agreement with the project proceeding.

There is a homestead approximately 3km to the north of the proposed plant. From Google Earth, the main house is orientated east to west with relatively dense trees on its southern side. It is therefore unlikely that it is therefore likely that the proposed project will be largely screened from the house. Views of the project may be possible from the surrounding area; however, it is also likely that existing vegetation will at least partly screen the development.

There is also a group of buildings approximately 4.5km to the southeast of the proposed plant. It includes a single homestead with other farm buildings. These buildings are also surrounded by trees which are likely to provide a degree of screening. Any visual impact is likely to be part mitigated by distance as well as screening that is provided by existing natural vegetation.

The remaining groups of buildings are in excess of 6km from the proposed plant. It is possible that glimpses of the development may be possible from these, however, distance and intervening natural vegetation are likely to largely screen views of engine houses and lower structures. It is possible that the stacks will be visible from some of these however.

The access road has the potential to impact visually on three homesteads that are immediately adjacent to the alignment. It is possible that owners of the homesteads could favour this as it is likely to result in an upgraded access road that they might use. It will also mean that there will be an increased volume of traffic visible to the homesteads. This however is likely to be largely during the construction phase.

Plate 5, View of the existing homestead within 4.5km of the proposed project from the north east. Note the vegetation behind the house (right of picture) will largely screen the development.

Plate 6, View of the existing homestead within 3km of the proposed project to the north. Note, only the roof of the homestead is visible meaning that the development will be screened from the lower floor of the house and surrounding area.

Plate 7, View of the existing homestead within 2.6km to the south east looking north west towards the proposed project. Existing vegetation is likely to partially screen the development. The access road can be seen running close to this group of buildings. This road will be increased in width and will be surfaced.

c) Kathu Airport

Kathu Airport is located approximately 11.5km from the proposed plant. Largely due to distance and vegetation, it is highly unlikely that the proposed engine houses and lower elements will be visible from the airport.

The analysis also indicates that the stacks are likely to be visible from the airport. Given the extent of open landscape within and around the airport, it is unlikely that they will be screened to any significant extent.

There is one solar power facility that is significantly closer that is also visible from the airport. The stacks are likely to be visible in the vicinity and behind this project.

It is likely that the proposed plant will be visible from planes on approach and exit from the airport.

Plate 8, View from Kathu Airport looking north east across the runway. An existing solar project is visible on the horizon to left of picture (immediately right of sheds). This project is approximately 3km from the viewpoint. The proposed stacks associated with the proposed plant will be visible in the same vicinity as the existing solar project.

d) Lighting Impacts

High mast security and operational lighting is proposed that could make the project visible to receptors at night.

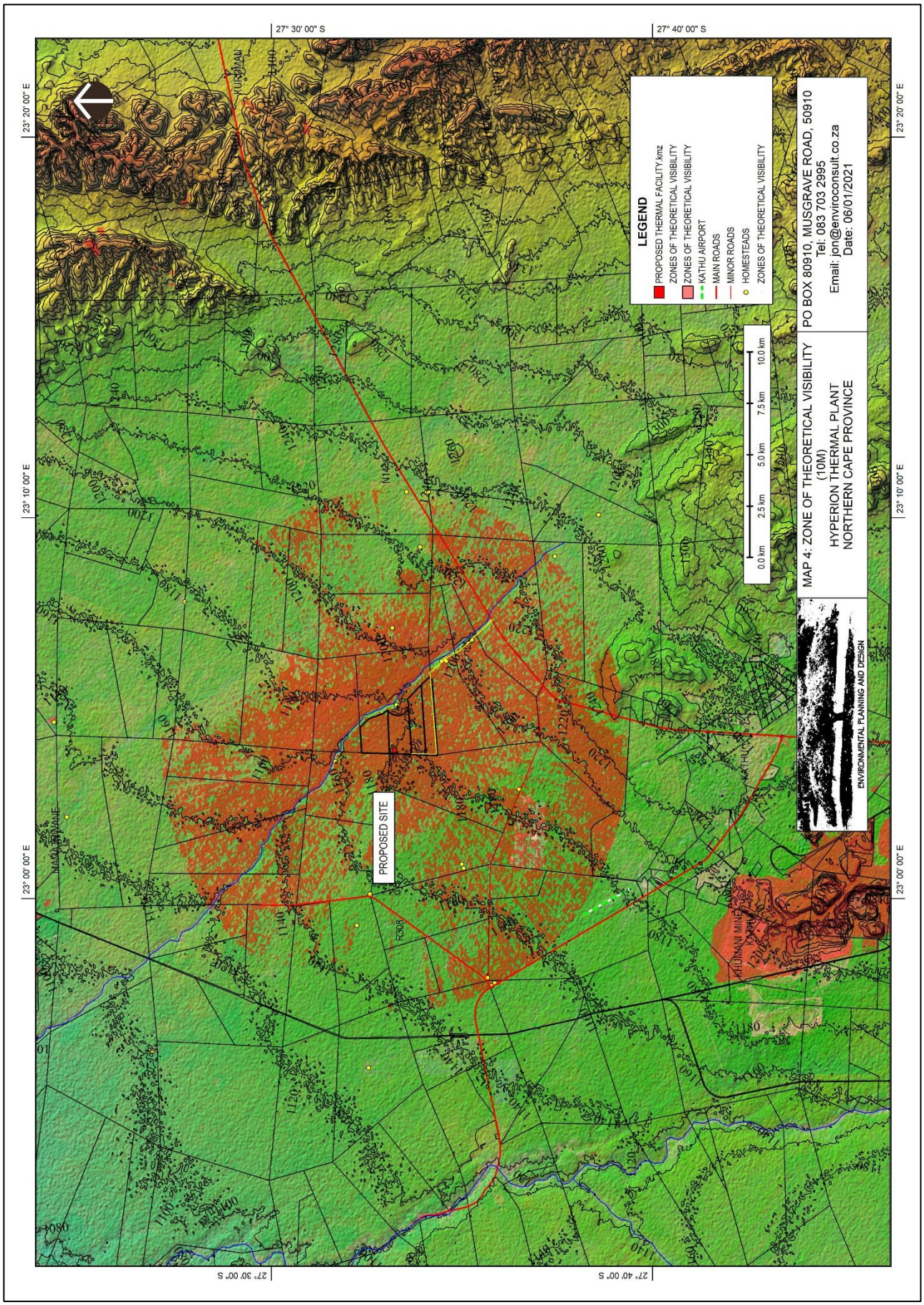
This will be seen in the context of other projects as well as lighting associated with mining and settlement.

Currently the lighting in the immediate vicinity of the project is largely associated with homesteads and is relatively low level.

The existing security and operational lighting associated with the solar project that is visible from Kathu Airport (Kalahari Solar Power Project) is visible at night. It should be noted that from observations made on site, only lighting associated with the turbine house of this development is visible. It is likely that the high mast lighting associated with the proposed plant could also be visible in the same area as this existing lighting.

Plate 9, View of Kalahari Solar Power Project at night from the Kathu Airport

There is potential therefore for the project to increase the visual influence of lighting.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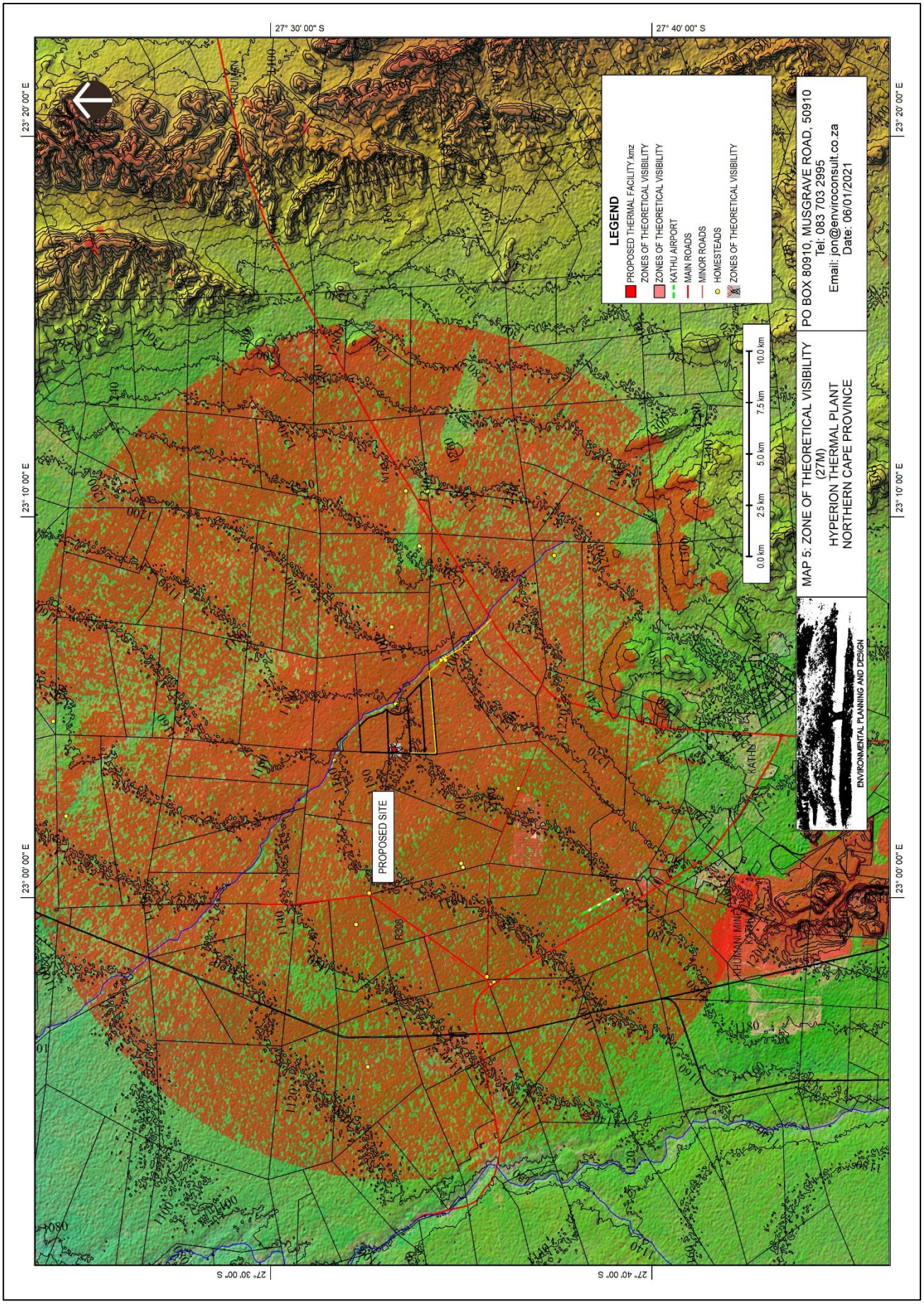
23° 10' 00" E
23° 00' 00" E
KURUMAN
MAKHUBUNG
KATHU
KHUMANI MINE
PROPOSED SITE
N14
R308
LEGEND
PROPOSED THERMAL FACILITY.kmz
ZONES OF THEORETICAL VISIBILITY
ZONES OF THEORETICAL VISIBILITY
KATHU AIRPORT
MAIN ROADS
MINOR ROADS
HOMESTEADS
ZONES OF THEORETICAL VISIBILITY
0.0 km
2.5 km
5.0 km
7.5 km
10.0 km
MAP 4: ZONE OF THEORETICAL VISIBILITY (10M)
HYPERION THERMAL PLANT
NORTHERN CAPE PROVINCE
ENVIRONMENTAL PLANNING AND DESIGN
PO BOX 80910, MUSGRAVE ROAD, 50910
Tel: 083 703 2995
Email: jon@enviroconsult.co.za
Date: 06/01/2021


27° 30' 00" S
27° 40' 00" S
23° 20' 00" E
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23° 00' 00" E
LEGEND
PROPOSED THERMAL FACILITY.kmz
ZONES OF THEORETICAL VISIBILITY
ZONES OF THEORETICAL VISIBILITY
KATHU AIRPORT
MAIN ROADS
MINOR ROADS
HOMESTEADS
ZONES OF THEORETICAL VISIBILITY
0.0 km
2.5 km
5.0 km
7.5 km
10.0 km
MAP 5: ZONE OF THEORETICAL VISIBILITY (27M)
HYPERION THERMAL PLANT
NORTHERN CAPE PROVINCE
PO BOX 80910, MUSGRAVE ROAD, 50910
Tel: 083 703 2995
Email: jon@enviroconsult.co.za
Date: 06/01/2021
ENVIRONMENTAL PLANNING AND DESIGN
PROPOSED SITE
R308
KATHU
KHUMANI MINE

4.5 LIKELY IMPLICATIONS FOR LANDSCAPE CHARACTER

As indicated in Section 4.3, the visibility of the proposed engine houses and lower infrastructure is likely to be limited and will be similar to the authorised solar power projects within and adjacent to which the proposed thermal facility is located. The proposed stacks are however likely to be visible over a broader area and could influence the landscape character as experienced by the majority of receptors.

The proposed project will not result in removal of significant area of vegetation over and above that removed for the authorised solar projects. Vegetation remaining between the project and possible receptors is likely to mean that this removal of vegetation will not be obvious.

At night lighting could make the development obvious in the landscape. This will be seen against the backdrop of other projects in the area. The general area is not a pristine night time landscape as lighting is also likely to be obvious from mining operations as well as the Kathu Airport. However, the area immediately around the project is relatively dark with only homesteads providing isolated low level lighting.

The proposed access road upgrade will result in a degree of vegetation removal. The formalisation of this road will also be obvious from a small number of homesteads.

5 VISUAL IMPACT ASSESSMENT

5.1 ISSUES TO BE ADDRESSED

From the review of the proposed project, it is proposed that the following issues should be addressed during the EIA phase;

1) The proposed development could impact on the general rural landscape character of the area;
2) The proposed development could impact on views from roads including the N14, the R308 and local roads;
3) The proposed development could impact on views from local homesteads; and
4) Lighting potentially creating light pollution and making the project obvious within a relatively dark night time landscape.

These issues will be considered in the context of Landscape Character, visual effects identified and the possible cumulative influence of other projects.

Possible mitigation measures will also be identified.

5.2 ASSESSMENT METHODOLOGY

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

The methodology for the assessment of potential visual impacts includes:

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

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

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

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

5.3 VISUAL IMPACT ASSESSMENT

5.3.1 The proposed development could impact on the general rural landscape character of the area

This impact is likely to be influenced by both the proposed project and the site access road.

Nature of Impact: Loss of natural vegetation and industrialisation of the landscape caused by the proposed project

The issue relates to the further degradation / industrialisation of the general rural landscape character.

The development area is located within an area that is perceived as being a semi-natural rural landscape. It is however being developed rapidly with other similar solar projects. However, the review indicates that glimpses of the lower sections of the project and broader views of the higher stacks will be obvious, the perception of a semi-natural landscape is likely to remain.

The proposed development is not likely to significantly change this perception.

	Without mitigation	With mitigation
Extent	Region, **(3)**	Region, **(3)**
Duration	Long term, **(4)**	Long term, **(4)**
Magnitude	Minor, **(2)**	Minor, **(2)**
Probability	Probable **(3)**	Probable **(3)**
Significance	Low, **(27)**	Low, **(27)**
Status	**Negative**	**Negative**
Reversibility	High	High
Irreplaceable loss	The proposed development can be dismantled and removed at the end of the operational phase. There will therefore be **no irreplaceable loss**. However, given the likely long term nature of the project, it is possible that a proportion of stakeholders will view the loss of view as irreplaceable.	**No irreplaceable loss**
Can impacts be mitigated?	**Yes** however this will not affect the overall level of impact.	**N/A**

Mitigation / Management:

It is the proposed stacks that are likely to have the largest influence on change of landscape character. It is not possible to mitigate views of these elements.

From close views, the loss of vegetation could have an influence on visibility of lower sections of the proposed plant. Minimising loss and disturbance are the key mitigation measures.

Planning:

- Plan development levels to minimise earthworks to ensure that levels are not elevated;
- Plan to maintain the height of structures as low as possible;
- Minimise disturbance of the surrounding landscape and maintain existing vegetation around the development;
- Retain and augment natural vegetation on all sides of the proposed project.

Operations:

- Reinstate any areas of vegetation that have been disturbed during construction;
- Remove all temporary works;
- Monitor rehabilitated areas post-construction and implement remedial actions;
- Minimise disturbance and maintain existing vegetation as far as is possible both within and surrounding the development area.
- Maintain and augment natural vegetation around the proposed project.

Decommissioning: • Remove infrastructure not required for the post-decommissioning use of the site; • Rehabilitate and monitor areas post-decommissioning and implement remedial actions.
Cumulative Impacts: Development of this site is likely to result in a contribution of low significance to a cumulative impact of medium significance. **See appendix IV.**
Residual Risks: The residual risk relates to the failure to remove infrastructure and loss of natural vegetation cover being obvious on decommissioning of the proposed project. It is therefore critical that infrastructure is removed and effective rehabilitation is undertaken.

5.3.2 The proposed development could impact on views from roads including the N14, the R308 and local roads

Nature of Impact: The issue relates to the industrialisation of the rural landscape due to views of the project from roads.

Possible receptors include travellers on the N14, the R308 and a local road that runs to the south and south west between the N14 and the R308.

The affected sections of all roads are in excess of 6km from the proposed plant. Due to the flat topography, the distance involved and the natural vegetation which is likely to provide a degree of screening particularly to the engine houses and lower infrastructure. The proposed stacks however are likely to be visible over long sections of the roads.

It is therefore likely that the stacks will be the elements that will largely affect views from these roads.

	Without mitigation	**With mitigation**
Extent	Region, **(3)**	Region, **(3)**
Duration	Long term, **(4)**	Long term, **(4)**
Magnitude	Minor, **(2)**	Minor, **(2)**
Probability	Probable **(3)**	Probable **(3)**
Significance	Low, **(27)**	Low, **(27)**
Status	**Negative**	**Negative**
Reversibility	High	High
Irreplaceable loss	The proposed development can be dismantled and removed at the end of the operational phase. There will therefore be **no irreplaceable loss**. However, given the likely long term nature of the project, it is possible that a	**No irreplaceable loss**

	proportion of stakeholders will view the loss of view as irreplaceable.	
Can impacts be mitigated?	**No**	**N/A**
Mitigation / Management: It is the proposed stacks that are likely to have the largest influence on change of view from roads. It is not possible to mitigate views of these elements.		
Cumulative Impacts: Development of this site is likely to result in a contribution of low significance to a cumulative impact of medium significance. **See appendix IV.**		
Residual Risks: The residual risk relates to the failure to remove infrastructure and loss of natural vegetation cover being obvious on decommissioning of the proposed project. It is therefore critical that infrastructure is removed and effective rehabilitation is undertaken.		

5.3.3. The proposed development could negatively impact on views from local homesteads

This impact is likely to be influenced by both the proposed project and the site access road upgrading

Nature of Impact: The issue relates to the industrialisation of the rural landscape due to views of the project from homesteads.

There is potential for a total of 20 homesteads to be affected.

There is one homestead approximately 1.9km from the proposed development. However this is inhabited by the landowner and his family. It has been confirmed that he is in agreement with the proposed development.

There is a homestead approximately 3km to the north of the proposed plant. It is unlikely that the development will be highly obvious from the house due to existing trees around the building and its orientation. Views of the plant may be possible from the surrounding area. However, it is likely that existing vegetation will at least part screen the development.

There is also a group of buildings approximately 4.5km to the southeast of the proposed plant. The buildings are also surrounded by trees which are likely to provide a degree of screening. Any visual impact is also likely to be part mitigated by distance as well as screening that is likely to be provided by existing natural vegetation.

The remaining affected buildings are in excess of 6km from the proposed plant. It is possible that glimpses of the development may be possible from these; however, distance and intervening natural vegetation is likely to largely screen views of the engine houses and lower sections of infrastructure. It is likely however that views of the higher stacks will be obvious from a number of homesteads.

The majority of affected homesteads are therefore likely to be at a distance in excess of 6km. The sight of stacks above existing vegetation will only affect a limited section of views and it will not change the perception that homesteads are largely surrounded by natural landscape.

If vegetation loss results from implementation, it is possible that new views could be opened up for the closest homesteads.

	Without mitigation	**With mitigation**
Extent	Region, **(3)**	Region, **(3)**
Duration	Long term, **(4)**	Long term, **(4)**
Magnitude	Minor to low, **(3)**	Minor, **(2)**
Probability	Probable **(3)**	Probable **(3)**
Significance	Low, **(30)**	Low, **(27)**
Status	**Negative**	**Negative**
Reversibility	High	High
Irreplaceable loss	The proposed development can be dismantled and removed at the end of the operational phase. There will therefore be **no irreplaceable loss**. However, given the likely long term nature of the project, it is possible that a proportion of stakeholders will view the loss of view as irreplaceable.	**No irreplaceable loss**
Can impacts be mitigated?	**Yes**	**N/A**

Mitigation / Management:

It is the proposed stacks that are likely to have the largest influence on change of landscape character. It is not possible to mitigate views of these elements.

From close views, the loss of vegetation could have an influence on visibility of the proposed plant from the closest homesteads. Minimising loss and disturbance of vegetation are the key mitigation measures.

Planning:

- Plan development levels to minimise earthworks to ensure that levels are not elevated;
- Plan to maintain the height of structures as low as possible;
- Minimise disturbance of the surrounding landscape and maintain existing vegetation around the development;
- Retain and augment natural vegetation on all sides of the proposed project.

Operations:

- Reinstate any areas of vegetation that have been disturbed during construction;
- Remove all temporary works;
- Monitor rehabilitated areas post-construction and implement remedial actions;

- Minimise disturbance and maintain existing vegetation as far as is possible both within and surrounding the development area.
- Maintain and augment natural vegetation around the proposed project.

Decommissioning:

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

Cumulative Impacts:

Development of this site is likely to result in a contribution of low significance to a cumulative impact of medium significance. **See appendix IV.**

Residual Risks:

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

5.3.4. The proposed development could negatively impact on views from Kathu Airport

Nature of Impact: The issue relates to the industrialisation of the rural landscape due to views of the project.

Kathu Airport is located approximately 11.5km from the proposed plant. Largely due to distance and vegetation, it is highly unlikely that the proposed engine houses and lower elements will be visible from the airport.

The analysis also indicates that the stacks are likely to be visible from the airport. Given the extent of open landscape within and around the airport, It is unlikely that they will be screened to any significant extent.

There is one solar power facility that is significantly closer that is also visible from the airport. The stacks are likely to be visible in the vicinity and behind this project. The proposed project is unlikely therefore to increase the extent of the view that will be affected by industrial development.

It is also likely that the proposed plant will be visible from planes on approach and exit from the airport.

	Without mitigation	**With mitigation**
Extent	Region, **(3)**	Region, **(3)**
Duration	Long term, **(4)**	Long term, **(4)**
Magnitude	Minor, **(2)**	Minor, **(2)**
Probability	Probable **(3)**	Probable **(3)**
Significance	Low, **(27)**	Low, **(27)**
Status	**Negative**	**Negative**

Reversibility	High	High
Irreplaceable loss	The proposed development can be dismantled and removed at the end of the operational phase. There will therefore be **no irreplaceable loss**. However, given the likely long term nature of the project, it is possible that a proportion of stakeholders will view the loss of view as irreplaceable.	**No irreplaceable loss**
Can impacts be mitigated?	**No**	**N/A**
Mitigation / Management: It is the proposed stacks that are likely to have the largest influence on change of landscape character. It is not possible to mitigate views of these elements.		
Cumulative Impacts: Development of this site is likely to result in a contribution of low significance to a cumulative impact of medium significance. **See appendix IV.**		
Residual Risks: The residual risk relates to failure to remove infrastructure making it obvious on decommissioning of the proposed project.		

5.3.5 Lighting potentially creating light pollution and making the project obvious within a relatively dark night time landscape

Nature of impact:

High mast security and operational lighting is proposed that could make the project visible to receptors. It is likely that this will be seen in the vicinity of lighting associated with an existing solar power project (Kalahari Solar Power).

There is potential therefore for the project to increase the influence of lighting into an area that would otherwise be relatively dark at night.

	Without mitigation	**With mitigation**
Extent	Site and immediate surroundings **(2)**	Site **(1)**
Duration	Long term **(4)**	Long term **(4)**
Magnitude	Low **(4)**	Small to minor **(1)**
Probability	Definite **(5)**	Improbable **(2)**
Significance	Medium **(50)**	Low **(12)**
Status	The appearance of a large lit area may be accepted by most people because it is close to the N14, major mining operations as well as Kathu, all of which are well lit. It is likely however that some people will see the expansion of lighting as a **negative** impact.	If the lights are generally not visible then the occasional light is unlikely to be seen as negative. **Neutral**
Irreplaceable loss	It would be possible to change the lighting / camera system so the impact cannot be seen as an irreplaceable loss.	No irreplaceable loss
Reversibility	High	High
Can impacts be mitigated?	Yes	

Mitigation / Management:

- Use low key lighting around buildings and operational areas that is triggered only when people are present;
- Plan to utilise infra-red security systems or motion sensor triggered security lighting;
- Ensure that lighting is focused on the development with no light spill outside the site; and
- Keep lighting low, if high mast lighting is required particularly for maintenance, ensure that it is only activated as it is needed.

Cumulative Impact:

There is potential for security lighting and operational lighting associated with proposed project to further impact on the area but with mitigation the contribution of this project to possible cumulative impacts is likely to be of low significance.

See appendix IV.

Residual Risks:

No residual risk has been identified.

6 IMPACT STATEMENT

6.1 LANDSCAPE CHARACTER

The affected landscape currently largely has a semi-natural rural character. However, there is evidence that this character is being eroded by additional energy generation projects in the vicinity of the proposed project.

Whilst there are a significant number of additional projects proposed in the area, it seems unlikely that the authorised projects will significantly change the overall character of the landscape as experienced by the majority of receptors. This is because of the relatively flat topography that allows limited elevated views, the vegetation that will provide a large degree of screening and the fact that they are likely to be set back from major roads.

6.2 RECEPTORS

The assessment has indicated that the sensitive receptors are likely to include:

1) Roads in the vicinity including the N14, the R308 and a local road;
2) Homesteads in the vicinity; and
3) The Kathu Airport.

6.3 VISUAL IMPACTS

Potential impacts associated with roads and homesteads relate to visual intrusion and the general industrialisation of a semi-natural rural landscape.

The assessment has indicated that;

It is possible that glimpses of the engine halls and lower sections of the development could be visible from sections of the affected roads. However, these views are likely to be mitigated by distance, the fact that the project will be seen in a flat landscape, meaning that there will be no overview and existing vegetation is likely to provide a large degree of screening. There is therefore only likely to be a low level of impact associated with these elements on the identified roads.

Taller elements including the stacks are likely to be more obvious and will be viewed largely as isolated elements standing above natural vegetation from numerous sections of the identified roads. Whilst these elements are likely to be relatively obvious from a wide area, existing vegetation will play a role in softening and in on some sections of road, completely screening views.

There is potential for a total of 20 homesteads to be affected.

There is one homestead approximately 1.9km from the proposed development. However this is inhabited by the landowner and his family. It has been confirmed that he is in agreement with the proposed development.

There is a homestead approximately 3km to the north of the proposed plant. It is unlikely that the development will be highly obvious from the house due to existing trees around the building and its orientation. Views of the plant may be possible from the surrounding area. However, it is likely that existing vegetation will at least part screen the development.

There is also a group of buildings approximately 4.5km to the southeast of the proposed plant. The buildings are also surrounded by trees which are likely to provide a degree of screening. Any visual impact is also likely to be part mitigated by distance as well as screening that is likely to be provided by existing natural vegetation.

The remaining affected buildings are in excess of 6km from the proposed plant. It is possible that glimpses of the development may be possible from these; however, distance and intervening natural vegetation is likely to largely screen views of the engine houses and lower sections of infrastructure. It is likely however that views of the higher stacks will be obvious from a number of homesteads.

The majority of affected homesteads are therefore likely to be at a distance in excess of 6km. The sight of stacks above existing vegetation will only affect a limited section of views and it will not change the perception that homesteads are largely surrounded by natural landscape.

The development of the proposed access road involves the surfacing and widening of the existing unsurfaced access road. The access road has the potential to impact visually on three homesteads that are immediately adjacent to the alignment. It is possible that owners of the homesteads could favour this as it is likely to result in an upgraded access road that they might use. It will also mean that there will be an increased volume of traffic visible to the homesteads. This however is likely to be largely during the construction phase.

Kathu Airport is located approximately 11.5km from the proposed plant. Largely due to distance and vegetation, it is highly unlikely that the proposed engine houses and lower elements will be visible from the airport.

The analysis also indicates that the stacks are likely to be visible from the airport. Given the extent of open landscape within and around the airport, It is unlikely that they will be screened to any significant extent.

There is one solar power facility that is significantly closer that is also visible from the airport. The stacks are likely to be visible in the vicinity and behind this project.

It is likely that the proposed plant will be visible from planes on approach and exit from the airport.

High mast security and operational lighting is proposed that could make the project visible to receptors. It is likely that this will be seen in the vicinity of lighting associated with an existing solar power project (Kalahari Solar Power).

There is potential therefore for the project to increase the influence of lighting into an area that would otherwise be relatively dark at night.

6.4 CUMULATIVE IMPACTS

The cumulative impact on general landscape character, impacts on views from roads and from local homesteads due to renewable energy projects in the area is assessed as having a medium significance. The contribution of the proposed project to these cumulative impacts is assessed as low. This is generally due to distance of the project from receptors and the VAC of the landscape.

The possible cumulative effect of glare on Kathu Airport and the cumulative contribution of the proposed project are both assessed as low. This is largely due to the relatively effective mitigation measures that might be employed.

The Cumulative Impact Assessment is detailed in **Appendix IV**.

6.5 CONCLUSION

Identified visual impacts are all assessed as low. Appropriate mitigation measures can also reduce anticipated impacts further.

There is no reason from a landscape and visual impact perspective why the proposed development should not proceed.

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APPENDIX I
ASSESSOR'S BRIEF CURRICULUM VITA

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

Jon qualified as a Landscape Architect (Dip LA) at Cheltenham (UK) in 1979. He has been a chartered member of the Landscape Institute UK since 1986. He is also a Registered Landscape Architect (SACLAP, 2009) and he has extensive experience working as an Environmental Assessment Practitioner in South Africa.

During the early part of his career (1981 - 1990) He worked with Clouston (now RPS) in Hong Kong and Australia. During this period he was called on to undertake visual impact assessment (VIA) input to numerous environmental assessment processes for major infrastructure projects. This work was generally based on photography with line drawing superimposed to illustrate the extent of development visible.

He has worked in the United Kingdom (1990 - 1995) for major supermarket chains including Sainsbury's and prepared CAD based visual impact assessments for public enquiries for new store development. He also prepared the VIA input to the environmental statement for the Cardiff Bay Barrage for consideration by the UK Parliament in the passing of the Barrage Act (1993).

His more recent VIA work (1995 to present) includes a combination of CAD and GIS based work for a new international airport to the north of Durban, new heavy industrial operations, overhead electrical transmission lines, mining operations in West Africa and numerous commercial and residential developments.

VIA work undertaken during the last twelve months includes VIA input for wind energy projects, numerous solar plant projects (CSP and PV), a new coal fired power station as well as electrical infrastructure.

Select List of Visual Impact Assessment Projects

- **Establishment of Upmarket Tourism Accommodation on the Selati Bridge, Kruger National Park** – Assessment of visual implications of providing tourism accommodation in 12 railway carriages on an existing railway bridge at the Skukuza Rest Camp in the Kruger Park.
- **Jozini TX Transmission Tower** – Assessment of visual implications of a proposed MTN transmission tower on the Lebombo ridgeline overlooking the Pongolapoort Nature reserve and dam.
- **Bhangazi Lake Development** – Visual Impact Assessment for a proposed tourism development within the iSimangaliso Wetlend Park World Heritage Site.
- **Palesa Power Station** - VIA for a new 600MW power station near Kwamhlanga in Mpumalanga for a private client.
- **Heuningklip PV Solar Project** – VIA for a solar project in the Western Cape Province for a private client.
- **Kruispad PV Solar Project** – VIA for a solar project in the Western Cape Province for a private client.
- **Doornfontein PV Solar Project** – VIA for a solar project in the Western Cape Province for a private client.
- **Olifantshoek Power Line and Substation** – VIA for a new 10MVA 132/11kV substation and 31km powerline, Northern Cape Province, for Eskom.
- **Noupoort Concentrating Solar Plants -** Scoping and Visual Impact Assessments for two proposed parabolic trough projects.
- **Drakensberg Cable Car –** Preliminary Visual Impact Assessment and draft terms of reference as part of the feasibility study.
- **Paulputs Concentrating Solar Plant (tower technology)** – Visual Impact Assessment for a new CSP project near Pofadder in the Northern Cape.
- **Ilanga Concentrating Solar Plants 1, 2, 3, 4 & 5** – Scoping and Visual Impact Assessments for the proposed extension of five authorised CSP projects including parabolic trough and tower technology within the Karoshoek Solar Valley near Upington in the Northern Cape.
- **Ilanga Concentrating Solar Plants 1, 2, 3, 4 & 5 Shared Infrastructure** –Visual Impact Assessment for the necessary shared infrastructure including power lines, substation, water pipeline and roads for these projects.
- **Ilanga Concentrating Solar Plants 7, 8 & 9** - Scoping and Visual Impact Assessments for three new CSP projects including parabolic trough and tower technology within the Karoshoek Solar Valley near Upington in the Northern Cape.
- **Sol Invictus Solar Plants** - Scoping and Visual Impact Assessments for three new Solar PV projects near Pofadder in the Northern Cape.
- **Gunstfontein Wind Energy Facility** – Scoping and Visual Impact Assessment for a proposed WEF near Sutherland in the Northern Cape.
- **Moorreeesburg Wind Energy Facility** – Visual Impact Assessment for a proposed WEF near Moorreeesburg in the Western Cape.
- **Semonkong Wind Energy Facility** - Visual Impact Assessment for a proposed WEF near Semonkong in Southern Lesotho.
- **Great Karoo Wind Energy Facility** – Addendum report to the Visual Impact Assessment Report for amendment to this authorised WEF that is located near Sutherland in the Northern Cape. Proposed amendments included layout as well as rotor diameter.
- **Perdekraal East Power Line** – Visual Impact Assessment for a proposed power line to evacuate power from a wind energy facility near Sutherland in the Northern Cape.
- **Tshivhaso Power Station** – Scoping and Visual Impact Assessment for a proposed new power station near Lephalale in Limpopo Province.
- **Saldanha Eskom Strengthening** – Scoping and Visual Impact Assessment for the upgrading of strategic Eskom infrastructure near Saldanha in the Western Cape.

- **Eskom Lethabo PV Installation** - Scoping and Visual Impact Assessment for the development of a solar PV plant within Eskom's Lethabo Power Station in the Free State.
- **Eskom Tuthuka PV Installation** - Scoping and Visual Impact Assessment for the development of a solar PV plant within Eskom's Thutuka Power Station in Mpumalanga.
- **Eskom Majuba PV Installation** - Scoping and Visual Impact Assessment for the development of a solar PV plant within Eskom's Majuba Power Station in Mpumalanga.
- **Golden Valley Power Line** - Visual Impact Assessment for a proposed power line to evacuate power from a wind energy facility near Cookhouse in the Eastern Cape.
- **Mpophomeni Shopping Centre** – Visual impact assessment for a proposed new shopping centre close to the southern shore of Midmar Dam in KwaZulu Natal.
- **Rheeboksfontein Power Line** - Addendum report to the Visual Impact Assessment Report for amendment to this authorised power line alignment located near Darling in the Western Cape.
- **Woodhouse Solar Plants** – Scoping and Visual Impact Assessment for two proposed solar PV projects near Vryburg in the North West Province.
- **AngloGold Ashanti, Dokyiwa (Ghana)** – Visual Impact Assessment for proposed new Tailings Storage Facility at a mine site working with SGS as part of their EIA team.
- **Gateway Shopping Centre Extension (Durban)** – Visual Impact Assessment for a proposed shopping centre extension in Umhlanga, Durban.
- **Kouroussa Gold Mine (Guinea)** – Visual impact assessment for a proposed new mine in Guinea working with SGS as part of their EIA team.
- **Mampon Gold Mine (Ghana)** - Visual impact assessment for a proposed new mine in Ghana working with SGS as part of their EIA team.
- **Telkom Towers** – Visual impact assessments for numerous Telkom masts in KwaZulu Natal.
- **Eskom Isundu Substation** – Visual Impact Assessment for a proposed major new Eskom substation near Pietermaritzburg in KwaZulu Natal.
- **Eskom St Faiths Power Line and Substation** – Visual Impact Assessment for a major new substation and associated power lines near Port Shepstone in KwaZulu Natal.
- **Eskom Ficksburg Power Line** – Visual Impact Assessment for a proposed new power line between Ficksburg and Cocolan in the Free State.
- **Eskom Matubatuba to St Lucia Power Line** – Visual Impact Assessment for a proposed new power line between Mtubatuba and St Lucia in KwaZulu Natal.
- **Dube Trade Port, Durban International Airport** – Visual Impact Assessment
- **Sibaya Precinct Plan** – Visual Impact Assessment as part of Environmental Impact Assessment for a major new development area to the north of Durban.
- **Umdloti Housing** – Visual Impact Assessment as part of Environmental Impact Assessment for a residential development beside the Umdloti Lagoon to the north of Durban.
- **Tata Steel Ferrochrome Smelter** - Visual impact assessment of proposed new Ferrochrome Smelter in Richards Bay as part of EIA undertaken by the CSIR.
- **Durban Solid Waste Large Landfill Sites –** Visual Impact Assessment of proposed development sites to the North and South of the Durban Metropolitan Area. The project utilised 3d computer visualisation techniques.
- **Hillside Aluminium Smelter, Richards Bay -** Visual Impact Assessment of proposed extension of the existing smelter. The project utilised 3d computer visualisation techniques.
- **Estuaries of KwaZulu Natal Phase 1 –** Visual character assessment and GIS mapping as part of a review of the condition and development capacity of eight estuary landscapes for the Town and Regional Planning Commission. The project was extended to include all estuaries in KwaZulu Natal.
- **Signage Assessments** – Numerous impact assessments for proposed signage developments for Blast Media.
- **Signage Strategy** – Preparation of an environmental strategy report for a national

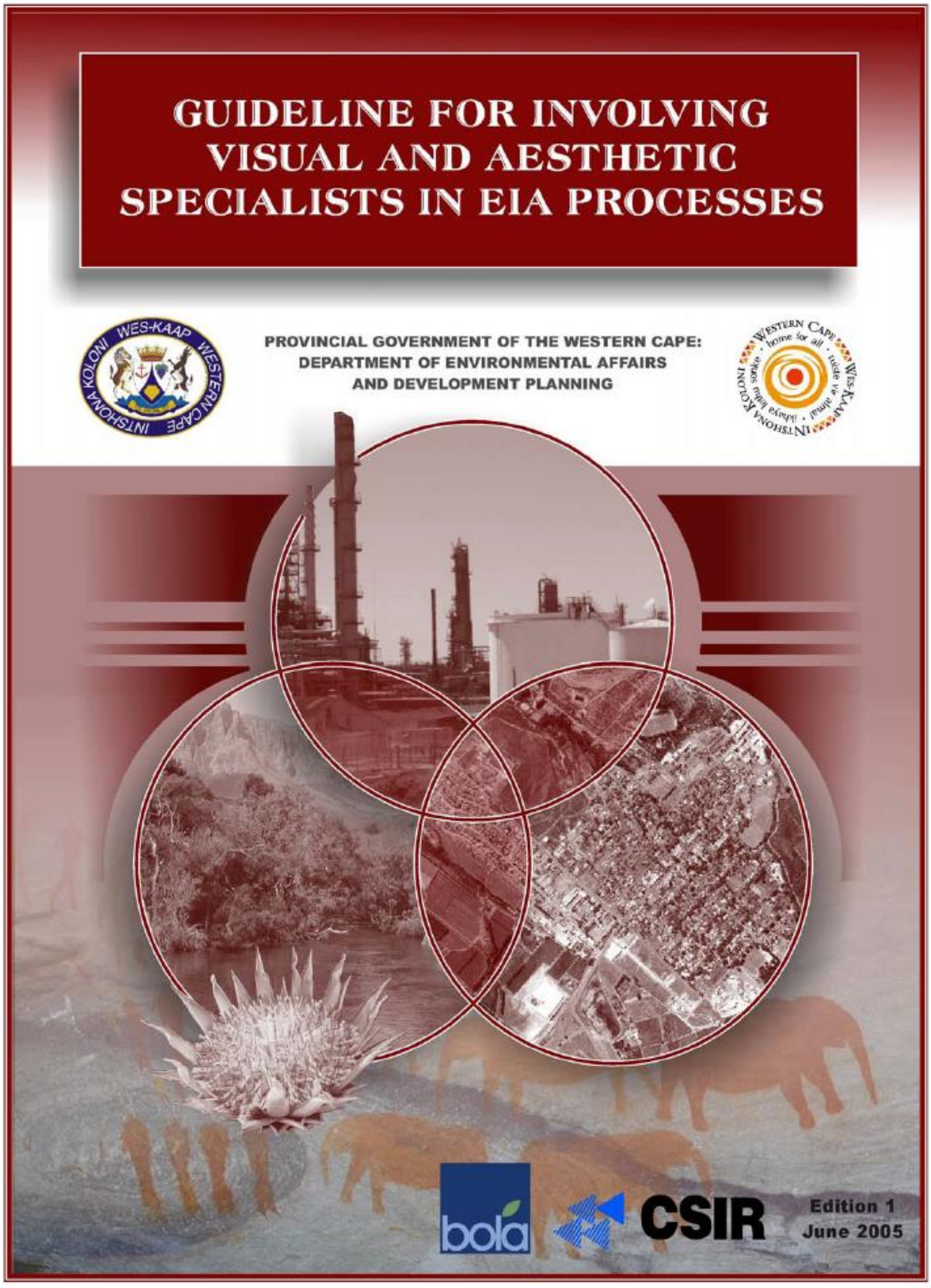
advertising campaign on National Roads for Visual Image Placements.

- **Zeekoegatt, Durban** - Computer aided visual impact assessment. EDP acted as advisor to the Province of KwaZulu Natal in an appeal brought about by a developer to extend a light industrial development within a 60 metre building line from the National N3 Highway.
- **La Lucia Mall Extension** - Visual impact assessment using three dimensional computer modelling / photo realistic rendering and montage techniques for proposed extension to shopping mall for public consultation exercise.
- **Redhill Industrial Development** - Visual impact assessment using three dimensional computer modelling / photo realistic rendering and montage techniques for proposed new industrial area for public consultation exercise.
- **Avondale Reservoir** - Visual impact assessment using three dimensional computer modelling / photo realistic rendering and montage techniques for proposed hilltop reservoir as part of Environmental Impact Assessment for Umgeni Water.
- **Hammersdale Reservoir** - Visual impact assessment using three dimensional computer modelling / photo realistic rendering and montage techniques for proposed hilltop reservoir as part of Environmental Impact Assessment for Umgeni Water.
- **Southgate Industrial Park, Durban** - Computer Aided Visual Impact Assessment and Landscape Design for AECI.
- **Sainsbury's Bryn Rhos** - Computer Aided Visual Impact Assessment/ Planning Application for the development of a new store within the Green Wedge North of Swansea.
- **Ynyston Farm Access** - Computer Aided Impact Assessment of visual intrusion of access road to proposed development of Cardiff for the Land Authority for Wales.
- **Cardiff Bay Barrage** – Preparation of the Visual Impact Statement for inclusion in the Impact Statement for debate by parliament (UK) prior to the passing of the Cardiff Bay Barrage Bill.
- **A470, Cefn Coed to Pentrebach** - Preparation of landscape frameworks for the assessment of the impact of the proposed alignment on the landscape for The Welsh Office.
- **Sparkford to Illchester Bye Pass** - The preparation of the landscape framework and the draft landscape plan for the Department of Transport.
- **Green Island Reclamation Study** - Visual Impact Assessment of building massing, Urban Design Guidelines and Masterplanning for a New Town extension to Hong Kong Island.
- **Route 3** - Visual Impact Assessment for alternative road alignments between Hong Kong Island and the Chinese Border.
- **China Border Link** - Visual Impact Assessment and initial Landscape Design for a new border crossing at Lok Ma Chau.
- **Route 81, Aberdeen Tunnel to Stanley** - Visual Impact Assessment for alternative highway alignments on the South side of Hong Kong Island.

APPENDIX II

GUIDELINES FOR INVOLVING VISUAL AND AESTHETIC SPECIALISTS IN EIA PROCESSES

(Preface, Summary and Contents for full document go to the Provincial Government of the Western Cape, Department of Environmental Affairs and Development Planning web site, http://eadp.westerncape.gov.za/your-resource-library/policies-guidelines)


GUIDELINE FOR INVOLVING VISUAL AND AESTHETIC SPECIALISTS IN EIA PROCESSES
PROVINCIAL GOVERNMENT OF THE WESTERN CAPE:
DEPARTMENT OF ENVIRONMENTAL AFFAIRS
AND DEVELOPMENT PLANNING
bola
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GUIDELINE FOR INVOLVING VISUAL AND AESTHETIC SPECIALISTS IN EIA PROCESSES

Edition 1

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Stakeholders engaged in the guideline development process:

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

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PREFACE

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

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

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

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

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

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

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

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

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

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

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

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

Who is the target audience for these guidelines?

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

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

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

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

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

What will these guidelines not do?

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

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

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

How are these guidelines structured?

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

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

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

SUMMARY

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

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

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

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

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

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

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

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

Part C deals with the choice of an appropriate visual specialist, and the preparation of the terms of reference (TOR) for the visual input. Three types of visual assessment are put forward, each requiring different expertise, namely:
Type A: assessments involving large areas of natural or rural landscape;
Type B: assessments involving local areas of mainly built environment;
Type C: assessments involving smaller scale sites with buildings, or groups of buildings.

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

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

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

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

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

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

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

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

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

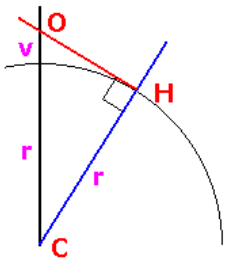
CONTENTS

APPENDIX III
CALCULATION OF VISUAL HORIZON

The Mathematics behind this Calculation

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

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



APPENDIX IV

CUMULATIVE IMPACT ASSESSMENT

This assessment assumes that mitigation measures for the proposed project detailed in the assessment .

1 Landscape Change

Nature:
The proposed project could extend the general influence of development and specifically power generation projects into a relatively natural rural area.

Whilst there are twenty one power generation projects within 30km of the proposed project, seven are located within the ALV of the proposed project.

Other projects could also combine to create this impression but the subject project will not add to this impression.

Due to the relatively low height of the majority of authorised solar projects within the area, projects are likely to be generally viewed in isolation surrounded by relatively natural areas and will create the impression of industrialisation as a stakeholder moves through the area, they are unlikely to create the impression that solar development is the main landcover, in other words, they will appear as industrial elements within a general naturalistic landscape.

The proposed thermal projects will however introduce taller elements in the form of 27m high stacks which are likely to be viewed over a broader area and may be seen at the same time as other power generation projects.

	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Region **(3)**	Region **(3)**
Duration	Long term **(4)**	Long term **(4)**
Magnitude	Minor **(2)**	Moderate **(6)**
Probability	Probable **(3)**	Probable **(3)**
Significance	**Low (27)**	**Medium (39)**
Status (positive or negative)	Negative	Negative
Reversibility	High	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	**Yes** however this will not affect the overall level of impact.	Unknown

Mitigation:
It is the proposed stacks that are likely to have the largest influence on change of landscape character. It is not possible to mitigate views of these elements.

From close views, the loss of vegetation could have an influence on visibility of lower sections of the proposed plant. Minimising loss and disturbance are the key mitigation measures.

Planning:

- Plan development levels to minimise earthworks to ensure that levels are not elevated;
- Plan to maintain the height of structures as low as possible;
- Minimise disturbance of the surrounding landscape and maintain existing vegetation around the development;
- Retain and augment natural vegetation on all sides of the proposed project.

Operations:

- Reinstate any areas of vegetation that have been disturbed during construction;
- Remove all temporary works;
- Monitor rehabilitated areas post-construction and implement remedial actions;

- Minimise disturbance and maintain existing vegetation as far as is possible both within and surrounding the development area.
- Maintain and augment natural vegetation around the proposed project.

Decommissioning:

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

Residual Impacts:
The residual risk relates to the failure to remove infrastructure and loss of natural vegetation cover being obvious on decommissioning of the proposed project. It is therefore critical that infrastructure is removed and effective rehabilitation is undertaken.

2 The proposed development could impact on views from roads including the N14, the R308 and local roads

Nature:
The affected sections of all roads are in excess of 6km from the proposed plant. Due to the flat topography, the distance involved and the natural vegetation which is likely to provide a degree of screening particularly to the engine houses and lower infrastructure. The proposed stacks however are likely to be visible over long sections of the roads.

It is therefore likely that the stacks will be the elements that will largely affect views from these roads. These elements are likely to be viewed over a broader area and may be seen at the same time as other power generation projects.

	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Region, **(3)**	Region, **(3)**
Duration	Long term, **(4)**	Long term, **(4)**
Magnitude	Minor, **(2)**	Low, **(4)**
Probability	Probable **(3)**	Probable, **(3)**
Significance	Low, **(27)**	**Medium, (33)**
Status (positive or negative)	**Negative**	Negative
Reversibility	High	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	No	Unknown

Mitigation:
It is the proposed stacks that are likely to have the largest influence on change of view from roads. It is not possible to mitigate views of these elements.

Residual Impacts:
Residual impacts relate to the loss of indigenous vegetation as well as the failure to remove development and infrastructure on decommissioning.

3 Cumulative impact on local homesteads

Nature:
The proposed project may not be visible from existing homesteads but will be visible from areas surrounding homesteads.

It is likely that other closer projects will be more visible to homesteads and will in fact help screen the proposed development.

Whilst a detailed assessment of the impact of other projects (other than Hyperion 1, 3 & 4) has not been undertaken due to limited information available on these projects, from review of online mapping, it seems possible that other projects will impact negatively on homesteads in the region.

The cumulative impact is therefore also likely to be improbable with a low significance.

	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Region, **(3)**	Regional, **(3)**
Duration	Long term, **(4)**	Long term, **(4)**
Magnitude	Minor, **(2)**	Low, **(4)**
Probability	Probable **(3)**	Probable **(3)**
Significance	**Low**, **(27)**	**Medium, (33)**
Status (positive or negative)	**Negative**	Negative
Reversibility	High	High
Irreplaceable loss of resources?	No irreplaceable loss.	No irreplaceable loss.
Can impacts be mitigated?	Yes	Unknown

Mitigation:

Planning:

- Plan development levels to minimise earthworks to ensure that levels are not elevated;
- Plan to maintain the height of structures as low as possible;
- Minimise disturbance of the surrounding landscape and maintain existing vegetation around the development;
- Retain and augment natural vegetation on all sides of the proposed project.
- Colour the back of panels closest to receptors dark grey (southern-most row). If other projects are developed to the south, this mitigation measure is not necessary.

Operations:

- Reinstate any areas of vegetation that have been disturbed during construction;
- Remove all temporary works;
- Monitor rehabilitated areas post-construction and implement remedial actions;
- Minimise disturbance and maintain existing vegetation as far as is possible both within and surrounding the development area;
- Maintain and augment natural vegetation around the proposed project.

Decommissioning:

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

Residual Impacts:

Residual impacts relate to the loss of indigenous vegetation as well as the failure to remove development and infrastructure on decommissioning,

4 Cumulative impact Kathu Airport.

Nature:

The analysis indicates that the stacks are likely to be visible from the airport. Given the extent of open landscape within and around the airport, It is unlikely that they will be screened to any significant extent.

There is one solar power facility that is significantly closer that is also visible from the airport. The stacks are likely to be visible in the vicinity and behind this project. The proposed project is unlikely therefore to increase the extent of the view that will be affected by industrial development. It will however result in additional industrial elements being visible.

It is also likely that the proposed plant and other power generation projects will be visible from planes on approach and exit from the airport.

	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Region, **(3)**	Regional **(3)**
Duration	Long term, **(4)**	Long term **(4)**

Magnitude	Minor, **(2)**	Low **(4)**
Probability	Probable **(3)**	Probable **(3)**
Significance	Low, **(27)**	Low **(36)**
Status (positive or negative)	**Negative**	**Negative**
Reversibility	High	High
Irreplaceable loss of resources?	No irreplaceable loss.	No irreplaceable loss.
Can impacts be mitigated?	No	
Mitigation: From the ground, it is the proposed stacks that are likely to have the largest influence on change of landscape character. It is not possible to mitigate views of these elements. It will also not be possible to screen views from the air.		
Residual Impacts: The residual risk relates to failure to remove infrastructure making it obvious on decommissioning of the proposed project.		

5 Night Time Lighting Impacts

Nature: Currently lighting in the area is comprised of low level lighting around homesteads and an another solar project (Kalahari Solar) as well as lighting on the N14 to the south. There is a risk that the proposed project will intensify lighting impacts in the area. If additional solar development does occur on other sites, it is highly possible that these developments could also extend lighting impacts. If appropriate mitigation measures are applied as recommended for the subject project then cumulative impacts are anticipated to be low.		
	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Site **(1)**	Regional **(3)**
Duration	Long term **(4)**	Long term **(4)**
Magnitude	Small to minor **(1)**	Small to minor **(1)**
Probability	Improbable **(2)**	Improbable **(3)**
Significance	Low **(12)**	**Low (24)**
Status (positive or negative)	If the lights are generally not visible then the occasional light is unlikely to be seen as negative. **Neutral**	**Neutral**
Reversibility	High	High
Irreplaceable loss of resources?	No irreplaceable loss	No irreplaceable loss
Can impacts be mitigated?	Yes	
Mitigation: 1) Use low key lighting around buildings and operational areas that is triggered only when people are present; 2) Plan to utilise infra-red security systems or motion sensor triggered security lighting; 3) Ensure that lighting is focused on the development with no light spill outside the site; andKeep lighting low, if high mast lighting is required particularly for maintenance, ensure that it is only activated as it is needed.		
Residual Impacts: No residual risk has been identified.		

APPENDIX V
ENVIRONMENTAL MANAGEMENT PLAN

Project component/s	Hyperion Thermal Power Generation Project, Construction, Operation and Decommissioning
Potential Impact	Change in Landscape Character and the nature of stakeholder views: • Extending the influence of development into relatively natural areas; • Changing the nature of views from the N14, the R308, local roads, homesteads and the Kathu Airport;and • Extending lighting impacts into natural areas that are currently dark during the hours of darkness;
Activity/risk source	• Engineered change in landform being obvious against natural contours. • Vegetation clearance and lack of rehabilitation during construction and decommissioning making the development more obvious particularly from a distance. • The development industrialising the outlook for receptors. • Lighting extending into natural areas that are currently dark during the hours of darkness.
Mitigation: Target/Objective	• Plan platforms and earthworks to blend into surrounding natural contours. • Minimise and reinstate vegetation loss. • Maintain and augment exiting surrounding natural vegetation in order to soften views of the development and maintain continuity with the surrounding natural landscape. • Remove structures and rehabilitate site to its natural condition on decommissioning.

Mitigation: Action/control	**Responsibility** Contractor (C) Environmental Officer (EO) Environmental Liaison Officer (ELO)	**Timeframe** Construction Phase (C) Operational Phase (O) Decommissioning Phase (D)
Ensure that the face of panels have the most effective non reflective surface possible at the time of ordering.	C	C
Minimise disturbance and maintain existing vegetation as far as is possible both within and surrounding the development area.	C, EO	C
Reinstate any areas of vegetation that have been disturbed during construction.	C, EO	C
Maintain and augment vegetation within the area surrounding the development.	C, EO	C
Rehabilitate disturbed areas to their natural state on decommissioning.	C, EO	D

Monitor rehabilitated areas post-construction and post-decommissioning and implement remedial actions.	C, EO	C, D
Monitor for impacts of glint and glare affecting Kathu Aerodrome. It will be necessary to liaise with the operator of the aerodrome in order to that he / she can report glare issues that may be experienced by pilots.	EO	O
Remove all temporary works.	C, EO	D
Remove infrastructure not required for the post-decommissioning use of the site.	C, EO	D
Performance Indicators	Natural contours rather than rigid engineered land form. Vegetation presence and density. Visibility of the development from surrounding areas. Presence of unnecessary infrastructure.	
Monitoring	Evaluate vegetation before, during and after construction. Evaluate vegetation growth and reinstatement during decommissioning and for a year thereafter. Take regular time-line photographic evidence. Responsibility: EO and ELO. Prepare regular reports.	