FG EMVELO (PTY) LTD

KAROSHOEK SOLAR VALLEY DEVELOPMENT

PROPOSED ADDITIONAL AREA OF DEVELOPMENT

ILANGA CSP 5

VISUAL IMPACT ASSESSMENT REPORT

APRIL 2016

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ACRONYMS

amsl	above mean sea level
CSP	Concentrating Solar Power
DEA	Department of Environmental Affairs
DoE	Department of Energy
DSG	Direct steam generation
EIA	Environmental Impact Assessment
GIS	Geographical Information System
LCAs	Landscape Character Areas
NEMA	National Environmental Management Act, Act No. 107 of 1998
REDZ7	Renewable Energy Development Zone 7
REIPPP	Renewable Energy Independent Power Producers Procurement Programme
USAA	US Aviation Authority
VAC	Visual Absorption Capacity
VIA	Visual Impact Assessment
ZTV	Zones of Theoretical Visibility

1 INTRODUCTION

1.1 GENERAL

This visual impact assessment (VIA) study forms part of the Scoping and Environmental Impact Assessment (EIA) that is being undertaken by Savannah Environmental (Pty) Ltd. on behalf of FG Emvelo (Pty) Ltd., for a proposed additional area of development, to an approved Concentrating Solar Power (CSP) site, known as Ilanga CSP 5, within the Karoshoek Solar Valley Development.

The authorised development is comprised of a 1 x 100 MW Parabolic Trough development. The proposed additional development area is approximately 200 ha and will include a 1 x 50 MW Parabolic Trough expansion, thus increasing the site's capacity to 150 MW. Associated infrastructure (power line, access road and water pipeline) will form part of an additional area application.

Four other solar sites have been authorised adjacent to Ilanga CSP 5 and additional areas of development to these are also proposed with separate applications underway (Sites Ilanga CSP 1, CSP 2, CSP 3 & CSP 4), also to increase each site's capacity by 50 MW up to a total capacity of 150 MW.

In terms of the EIA Regulations promulgated under the amended National Environmental Management Act (NEMA), Act No. 107 of 1998, the proposed development of the facility requires environmental authorisation from the National Department of Environmental Affairs (DEA). An impact to be assessed comprises the visual impact that the facility will have on surrounding areas.

This VIA report has been prepared for inclusion in the project EIA report following the approval of the Scoping report.

The site investigation was undertaken in March 2016. The key issue regarding the timing of the site investigation is that it is undertaken during clear weather. This enables key landscape features to be identified more easily over the greatest distance and for the assessor to consider the project under the worst case conditions in terms likely maximum impact.

1.2 PROJECT LOCATION AND EXTENT

The proposed project is located 24 km east of Upington

The facility is proposed on Farm Matjesrivier 3/41, immediately to the west of CSP2 and approximately 24.5 km east south east of Upington on Farm Matjesrivier 2/41, within the Khara Hais Local Municipality in the Northern Cape.

The geographic coordinates of the approximate centre point of the site are:

CSP 5 Extension			
LATITUDE (S)	28°	30'	33.88"
LONGITUDE (E)	21°	30'	35.61"

No site alternatives are under consideration due to the requirement for the new sites to be immediately adjacent to the authorised areas.

Availability of relatively level land of sufficient extent can be a restraining factor to CSP development, as the proposed 500 MW solar systems and associated infrastructure requires up to 700 ha of land space. The larger farm portion is approximately 5400ha in extent, of which ~600 ha is allocated for the siting of the proposed Ilanga CSP 5 Project and associated infrastructure. This is aCSP 5pproximately 15 % of the land surface area within the farm portion. The two authorised CSP projects (Site 1.3) located within the same farm portion occupy 1000ha collectively, with 4500 ha remaining for future development. This site is, therefore, considered sufficient for the installation of the Ilanga CSP 5 Project allowing for avoidance of sensitivities within the greater study area.

The authorised extent of development and the proposed full extent of the site including the proposed 50 MW extension are indicated on **Map 1, Site Location**.

1.3 BACKGROUND OF SPECIALIST

Jon Marshall (Pr. LArch, CMLI, EAPSA, Dip LA) qualified as a Landscape Architect in 1978 **(Appendix 1, Specialists brief CV)**. He is also a certified Environmental Impact Assessment Practitioner. 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 (zone of theoretical visibility) and three dimensional modelling to illustrate impact assessments. He has undertaken visual impact assessments for major buildings, mining, industrial development, mining and infrastructure projects and has been involved in the preparation of visual guidelines for large scale developments. Jon is responsible for report writing and visual impact assessment.

1.4 TERMS OF REFERENCE AND RELEVANT GUIDELINES

The brief is to assess the visual impact that the facility 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 local relevant guideline available in South Africa, setting various levels of assessment subject to the nature of the proposed development and surrounding landscape **(Appendix II)**; and

b. The Landscape Institute and Institute of Environmental Management and Assessment (UK) Guidelines for Landscape and Visual Impact Assessment which provides detail of international best practice (UK Guidelines) (Landscape Institute and Institute of Environmental Assessment and Management, 2013).

Based on the predicted visual impacts described in the VIA Scoping Report, and on the basis that the proposed new facilities is unlikely to add significantly to the visual impact of the already authorised projects, it was proposed that if after a site visit no additional significant impacts are likely, then Level 2 Assessment should be undertaken.

From the site visit undertaken during the EIA stage of the project, it is obvious that the proposed development in its entirety will be difficult to see from public roads and because of this the extended area is highly unlikely to be obvious. The recommendation that a Level 2 Assessment should be undertaken is therefore adopted.

In accordance with the Western Cape Guidelines, a Level 2 Assessment requires the following input:

- Verification of issues raised in scoping phase, and site visit;
- Description of the receiving environment and the proposed project;
- Establishment of view catchment area and receptors;
- Brief indication of potential visual impacts, and possible mitigation measures.

1.5 ISSUES IDENTIFIED

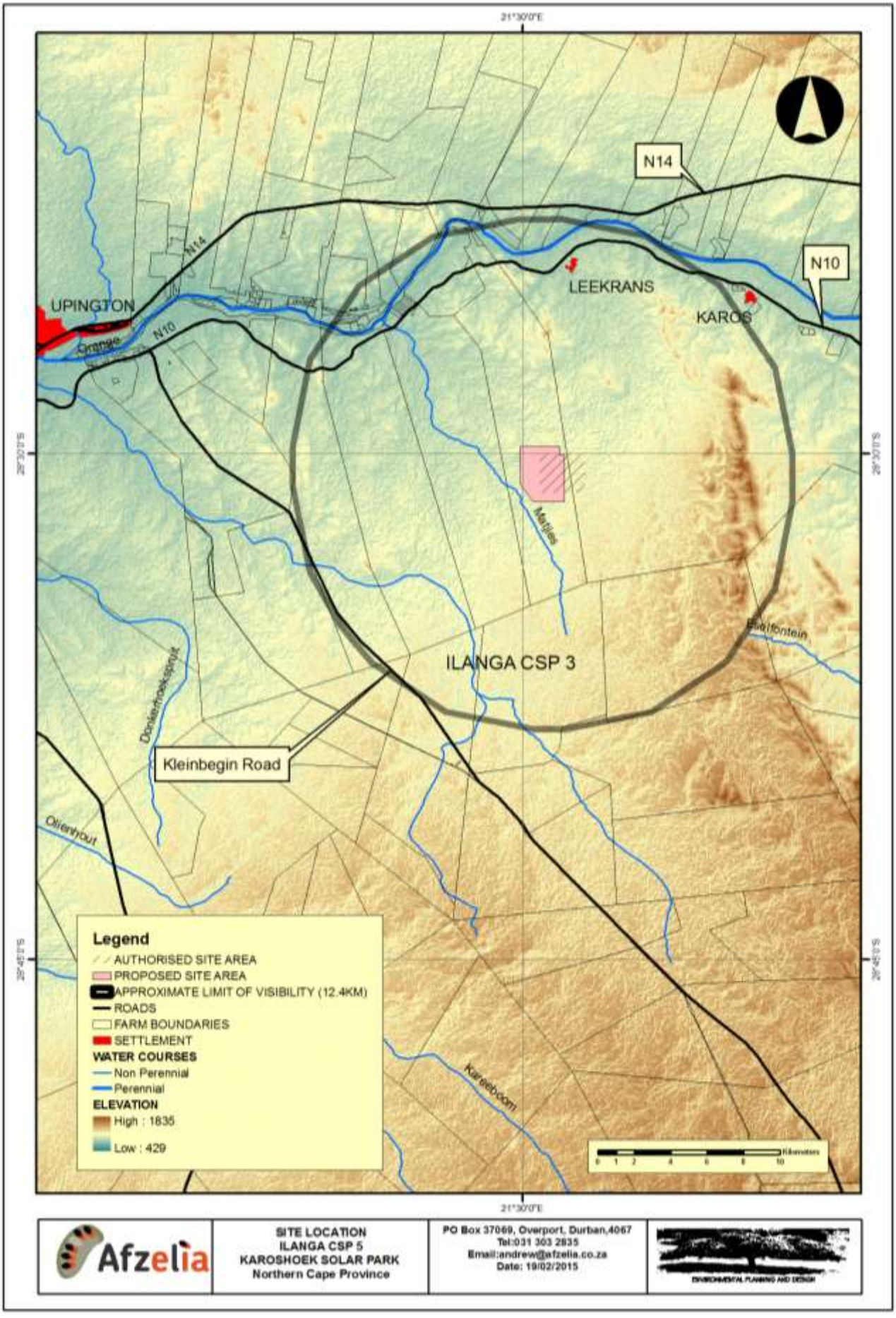
Anticipated issues related to the potential visual impact of the proposed project identified at the scoping stage include the following:

a) Potential visual impact on users of roads in close proximity to the proposed Solar Valley development.
b) Potential visual impact on residents of settlements and homesteads in close proximity to the proposed solar energy facilities.
c) Potential visual impact on sensitive visual receptors within the region.
d) Potential lighting impacts.
e) Potential impacts on general landscape character of the area.
f) Ocular impacts associated with glint and glare.

These issues will be considered in the context of the Landscape Character Areas, visual effects identified and possible cumulative influence of other possible infrastructure projects that are planned in the vicinity.

Possible mitigation measures also need to be identified.

MAP 1: SITE LOCATION



2. PROJECT DESCRIPTION AND CONTEXT

2.1 MOTIVATION

The purpose of the additional development areas of the solar facilities is to facilitate the increase in capacity of the authorised facility from 100 MW to 150 MW in order to meet the generating capacity thresholds specified by the Department of Energy (DoE) in its Expedited Bid Window of the Renewable Energy Independent Power Producers Procurement (REIPPP) Programme (Tender No: DOE/003/13/14 – as amended from time to time).

2.2 PROJECT DESCRIPTION

The proposed project includes an expansion to an authorised parabolic trough Concentrating Solar Power (CSP) project.

Parabolic troughs are curved, mirrored troughs which reflect direct solar radiation onto a glass tube containing a heat transfer fluid (also called a receiver, absorber, or collector) running the length of the trough, and positioned at the focal point of the reflectors **(Plate 1 & 2)**.

The collector continuously tracks the sun to ensure the reflection of the sun rays on the receiver.

Parabolic trough power plants utilize the solar field to heat oil that is used either for water preheating or a steam generator through heat exchangers.

New technology sees direct steam generation (DSG). In DSG, water is circulated through the receiver and converted into steam without the use of heat exchangers. This results in efficiency improvements and reduces the scale of the power block.

The applicant has confirmed that DSG technology will be used for these projects.

Both systems require a steam turbine that is housed in a turbine house and a cooling system that might be in the form of cooling towers or steam condensers (Dry Cooling). Refer to **Figure 1** below for a generic layout and **Figure 2** for the proposed General Site Layout.

The applicant has confirmed that dry cooling technology will be used for this project.

The main visible components of the parabolic trough facilities will therefore include the following features:

- A solar field;
- A power block;
- A cooling system using dry technology;
- An electrical switchyard and substation facility;
- Support buildings (control building and maintenance facilities).

The applicant has confirmed that the maximum height of the listed features will be 12m above ground level.

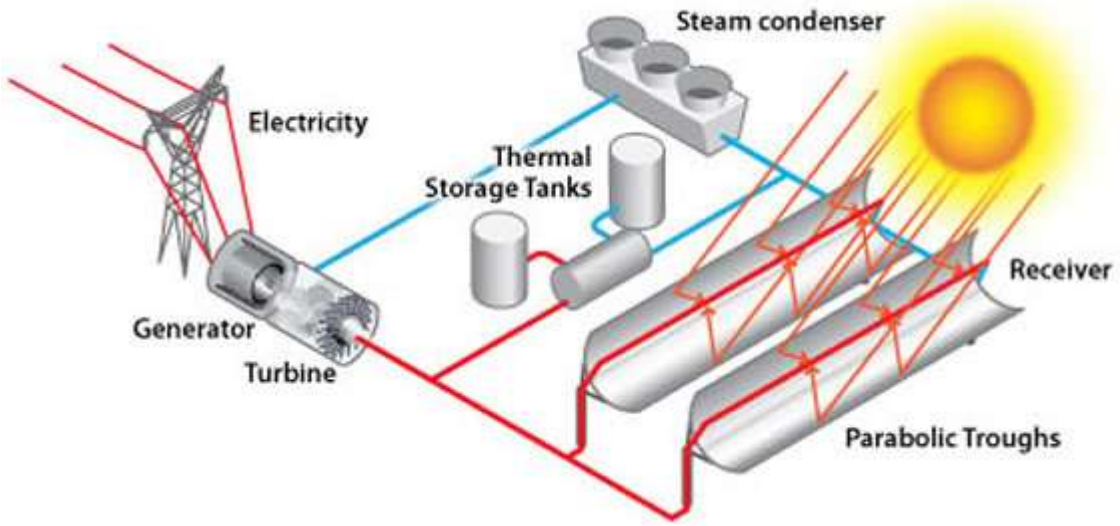
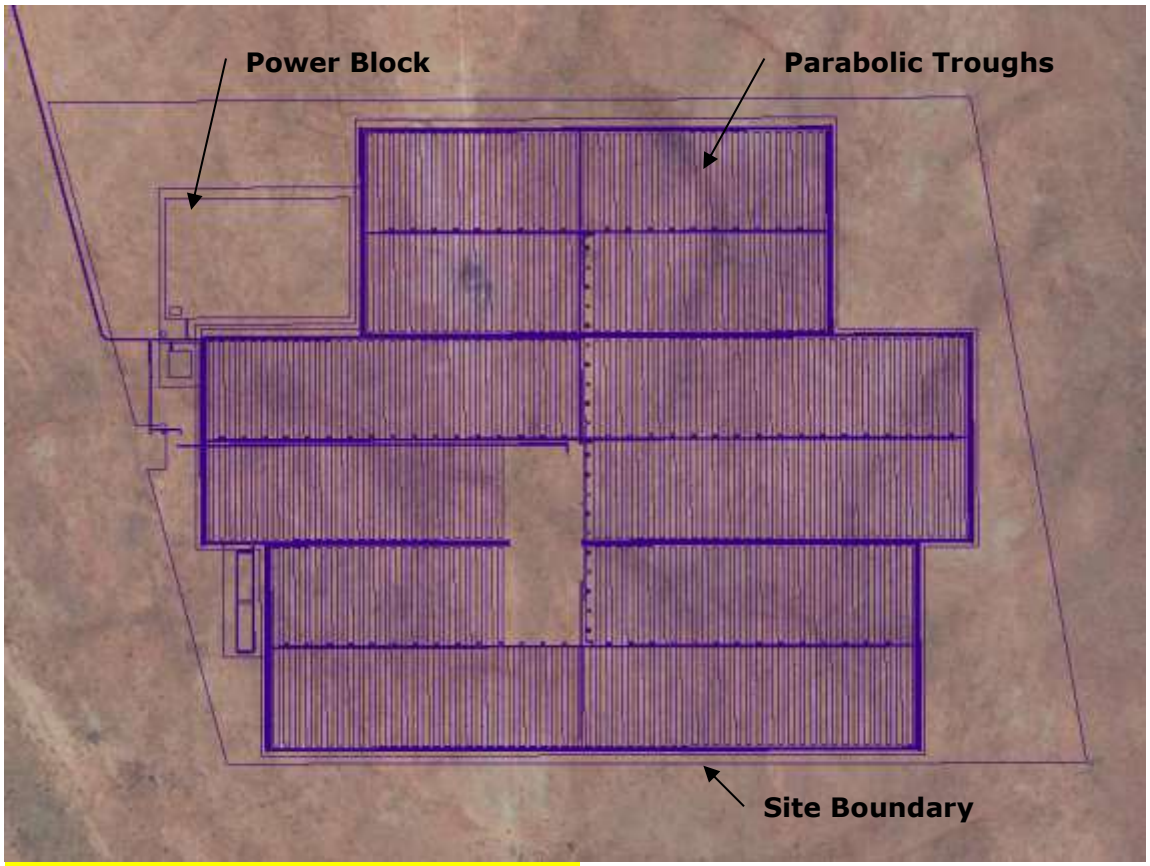


Figure 1, Generic Layout of Parabolic Trough CSP Project (extracted from CSP Website, http://www.cspworld.org/)



NOTE STILL ILANGA CSP4, NEED CSP5

Figure 2, Ilanga CSP 5, Proposed General Site Layout

Plate 1, Existing Parabolic Trough Solar Field. (photograph extracted from solarhomes web site, http://www.jc-solarhomes.com)

Plate 2, Existing 50MW Parabolic Trough CSP Plant in Torre de Miguel Sesmero, Badjoz, Spain. (photograph extracted from PennEnergy Web Site, http://www.pennenergy.com). It should be noted that dry cooling technology is proposed for the projects under consideration in this report so there will be no steam visible from the cooling plant.

2.3 ALTERNATIVES CONSIDERED

2.3.1 Alternative Site

No site alternatives are proposed for this project. The area around Upington has been identified by the Department of Environmental Affairs as a Renewable Energy Development Zone (REDZ 7). These zones have been put forward in order to focus

development and inform planning. In the Upington area this has resulted in numerous renewable energy project applications.

The application is also for the extension to an authorised project, therefore the selection of an alternative site is not feasible.

2.3.2 Alternative Layout

A project area of an additional approximate 200 ha is being considered, within which the development footprint for the facility could be appropriately located.

The site can adequately accommodate a facility with a contracted capacity of an additional 50 MW Parabolic Trough. It is anticipated that the facility and its associated infrastructure can be appropriately positioned to avoid areas of environmental sensitivity. Therefore, the extent of the site allows for the identification of layout design and site-specific alternatives.

2.4 PROJECT CONTEXT, EXISTING AND FUTURE

The descriptions of the associated authorised projects and their proposed additional areas within the Karoshoek Solar Valley Development are as follows:

NEW SITE REF. NO	OLD SITE REF. NO.	SITE AREA	PROJECT NAME & COMPONENTS
Site 1, CSP Tower	Site 3	484 ha Authorised	Karoshoek Tower 1 (1 x 50 MW Tower) Karoshoek Tower 2 (1 x 50 MW Tower)
Äs above	As above	450 ha Additional area	1X100MW Tower replacing one of the approved 50MW Towers.
Site 2, CSP Parabolic Trough	Site 1.3	469 ha, Authorised	Karoshoek PT, 1X100 MW Parabolic Trough
Äs above	Äs above	200 ha Additional area	1X50 MW Parabolic Trough
Site 3, CSP Parabolic Trough	4	484 ha Authorised	Karoeshoek LFTT 1, 1X100 MW Parabolic Trough
Äs above	Äs above	200 ha Additional area	1X50 MW Parabolic Trough
Site 4, CSP Parabolic Trough	5	484 ha Authorised	Karoeshoek LFTT 2, 1X100 MW Parabolic Trough
Äs above	Äs above	200 ha Additional area	1X50 MW Parabolic Trough
Site 5, CSP Parabolic Trough	1.4	474 ha Authorised	Karoshoek LFT2, 1X 100 MW Parabolic Trough
Äs above	Äs above	200 ha Additional area	1X50 MW Parabolic Trough

There are three additional approved sites within the area which include:

SITE REF	PROJECT NAME, COMPONENTS AND DESCRIPTION
Site 2	Karoshoek CPVPD 1 (1 x 25 MW Concentrating photovoltaic or parabolic dish technology project)
	Karoshoek CPVPD 2 (1 x 25 MW Concentrating photovoltaic or parabolic dish technology project)
	Karoshoek CPVPD 3 (1 x 25 MW Concentrating photovoltaic or parabolic dish technology project)
	Karoshoek CPVPD 4 (1 x 25 MW Concentrating photovoltaic or parabolic dish technology project)
Site 1.1	Karoshoek LF 1 (1 x 100 MW Linear Fresnel)
Site 1.2	Ilanga CSP1 (1 x 100 MW Parabolic Trough)
Grid connection	Electricity distribution line(s) which will connect to an on-site substation / switchyard

There are also three additional proposed sites within the area which include:

SITE REF	PROJECT NAME, COMPONENTS AND DESCRIPTION
Site 7, additional area for authorised CSP Tower	150 MW Power Tower Portion 4 of Trooilaps Pan 53 and Portion 2 of Matjiesrivier 41
Site 8, additional area for authorised CSP Tower	150 MW Power Tower Portion 3 of Matjesrivier 41 and Lot 944 Karos Settlement 944
Site 9, additional area for authorised CSP Tower	150 MW Power Tower Portion 4 and 20 of Trooilaps Pan 53

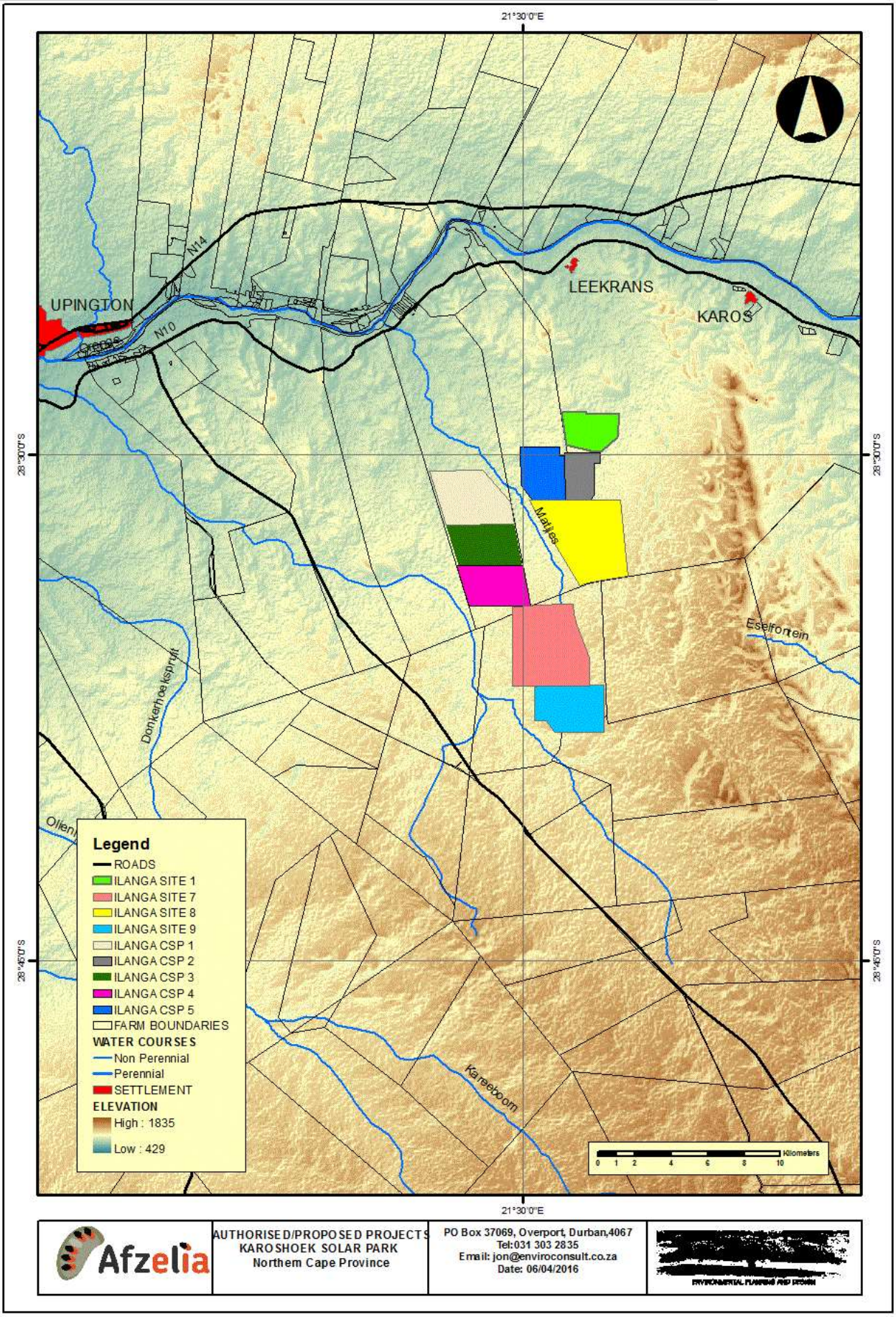
The location of all sites are shown on **Map 2, Authorised and proposed solar projects.**

This VIA report reviews visual implications for the proposed additional area of development associated with CSP 5. It is important however that the additional development area associated with this site is seen in the context of other authorised sites and proposed extensions to authorised sites.

Authorised and proposed projects are likely to visually transform the area within which they are located. They will change sections of the rural landscape into developed, industrialised areas.

It should be noted that the parabolic trough projects are likely to be relatively low and their area of visual influence is likely to be limited when compared with the proposed tower projects. This means that between the individual projects the original rural landscape is still likely to be largely unaffected.

MAP 2: AUTHORISED AND PROPOSED SOLAR PROJECTS



3 DESCRIPTION OF RECEIVING ENVIRONMENT AND POSSIBLE RECEPTORS

3.1 LANDSCAPE CHARACTER

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

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

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

Landscape character was defined from available GIS datasets, online mapping and aerial photography. This will be ground-truthed during the assessment stage.

The region has a strong rural character, interspersed with intensive arable agriculture where water is available for irrigation and settlement.

The region to the north of the proposed site appears to have an agricultural character with large scale irrigated agriculture beside the Orange River. In this area settlement in the form of farmsteads is relatively dense. There are also two small settlements of Karos and Leekrans.

To the south of the Orange River the landscape appears more natural. Low intensity grazing appears to be the main land use. There are also occasional isolated farmsteads located on the farms.

The other notable characteristic is landform with the majority of the area surrounding the site being relatively flat. To the north and east however, the terrain is more rugged with numerous steep ridgelines running in a general north/south direction through the landscape.

Whilst the major landscape characteristics are indicated above, it is also important to understand that a number of solar power projects are planned and authorised in the vicinity of the site. It is also understood that some of these projects have commenced. This is likely to change the character of the landscape at least in the vicinity of the proposed projects.

Detail of the main influencing factors are indicated below:

3.1.1 Landform and Drainage

The study area occurs on land that ranges in elevation from 800 amsl (above mean sea level) (at the Orange River) to 1180 amsl (at the top of the nearby koppies. The terrain surrounding the farm is predominantly flat with an even slope towards the Orange River valley that forms the most distinct hydrological feature in the region (MetroGIS, 2012).

Due to this flat topography, the area, particularly south of the river, is characterised by the occurrence of many non-perennial drainage lines and pans.

The dominant topographical unit or terrain type of the region is relatively homogenous and is described pre-dominantly as *lowlands with hills, dune hills* and *irregular or slightly irregular plains*.

Relatively prominent low hills and koppies occur in the south-east of the study area. Some isolated koppies also occur randomly in the north west of the study area. The Orange River meanders from the south east, and then curves toward the west (MetroGIS, 2012).

3.1.2 Nature of Development and Landuse

The river has, to a large degree, dictated the settlement pattern in this arid region by providing a source of permanent water for the cultivation of grapes. This and the associated production of wine is the primary agricultural activity of this district. Cattle and game farming practises also occur at a less intensive degree (MetroGIS, 2012).

The majority of the study area is sparsely populated (less than 10 people per km^2) and consists of a landscape of wide-open spaces and very little development. The scarcity of water and other natural resources has dictated the settlement patterns of this region.

Tourism is not well-developed within the study area, but some destinations exist along the river and in Upington.

The population distribution is primarily concentrated in and around small towns along the Orange River. Farming homesteads dot the countryside at irregular intervals.

The study area has a rural character with little development outside of Upington. Exceptions occur where power lines traverse the study area. These include the Garona-Gordonia 1 132 kV line to the north east of the site and the Garona-Kleinbegin 1 132kV line to the west of the site.

3.1.3 Vegetation Patterns

Vegetation cover in this semi-desert region is primarily *shrubland, thicket, and bushland* with isolated pockets of *grassland*, and *agricultural fields* occurring along the Orange River where irrigation is possible. There are no formally protected areas within the study area.[1]

3.1.4 Landscape Character Areas and, Visual Absorption Capacity

Landscape Character Areas (LCAs) are defined by the UK Guidelines as, "single unique areas which are the discrete geographical areas of a particular landscape type".

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.

[1] Sources: DEAT (ENPAT Northern Cape), NBI (Vegetation Map of South Africa, Lesotho and Swaziland) and NLC2000 (ARC/CSIR).

The affected landscape can be broadly divided into the following LCAs that are largely defined by vegetation and landform **(Map 3, Landscape character areas)**.

- **The Orange River Corridor** which is generally comprised of open cultivated land that is surrounded in areas by tall woody vegetation. Woody vegetation within and on the edges of this area, often screens views from within the LCA as well as screening views from one side of the river to the other.
- **Undulating Valley Floor.** Gently undulating topography with low intensity grazing / game farming, low level grassland / shrub land, occasional non-perennial streams, occasional farmstead. Limited VAC is provided by gentle undulations and dark patches of woody vegetation which means that low / dark structures are likely to be assimilated into the landscape. However, anything greater than 2-3m high particularly if contrasting in colour could be highly obvious. The VAC for this LCA is dependent on the level of the viewer above the surrounding plain. The VAC is largely provided by the vegetation cover. From low levels the surrounding vegetation combines to provide screening ability for development up to an approximate height of approximately 2-3m. As the viewpoint is elevated above the plain on minor ridgelines and undulations, the screening effect of existing vegetation over short distances reduces drastically as the viewer sees over and between individual woody plants.
- **Steep Ridgelines and Koppies**. This area consists of steep rocky ridgelines that rise almost vertically from the valley floor. It is generally dryer than the valley floor, vegetation is therefore more stunted. This LCA also includes relatively rugged terrain to the south of the Orange River and to the east of the Karoshoek Solar Park. Land uses include low intensity grazing / game farming. There are also occasional farmsteads within the landscape. Ridgelines and koppies have an important screening effect to the degree that views over the site will not be possible past the first minor ridgeline. However, the same ridgeline also provides the possibility of elevating the viewer and increasing visibility over the site area which reduces VAC. The low vegetation that generally covers the area is unlikely to contribute significantly to the VAC of the landscape.

3.2 LANDSCAPE QUALITY AND IMPORTANCE

3.2.1 General

The importance of the study area lies both in its agricultural production capacity as well as its natural features and their ability to attract and provide a backdrop for tourism activities in the area. The latter point is attested by the use of sites along the Orange River for tourism activities.

The area around Upington is also becoming important for solar projects, with a number of projects already under development. This is due to a government initiative that will see the development of strategic infrastructure to link solar power projects into the National Grid. This is likely to result in transformation of sections of the landscape in the near future. This development is of national importance given the need to produce clean energy. In order to maintain existing economic bases rather than replace them, it will be critical that this is done in a manner that minimises impact on existing uses.

3.2.2 Orange River Corridor

This landscape is of prime importance for productive agriculture. The main concern of the majority of users of the corridor is therefore likely to be related to the productivity of the area rather than aesthetic concerns. The area is also a focus for local recreational use and of secondary tourism importance; it is unlikely to be the main reason why visitors are attracted to Upington so there may be concern related to maintaining the quality of views from the corridor from local stakeholders. Due to topography as well as dense tall woody vegetation within and on the edges of the corridor, views from within this LCA largely have an internal focus.

3.2.3 Undulating Valley Floor and Steep Ridgelines and Koppies

These LCAs are currently important for low intensity grazing. Existing natural features also provide a backdrop for eco-tourism related activities. They are also part of the natural outlook from the national roads that carry a high degree of tourism related traffic to and through the area.

The Steep Ridgelines and Koppies provide a dramatic backdrop to the valley floor. They also compartmentalise the landscape providing screening from one area to another.

Figure 3 provides an overview of the development area as seen from the top of a koppie to the north west of the site. From this viewpoint it is obvious that the development occurs within the relatively natural valley floor and that is surrounded by high land to the north and east and that the area surrounding the development is largely unpopulated and because it is comprised of private farm land, there are limited public areas from which views of the development will be possible. It should be noted that the koppie from which this photograph was taken is also on a private farm.

3.3 VISUAL RECEPTORS

3.3.1 Definition

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

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.

3.3.2 Possible visual receptors and sensitivities

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

Area Receptors

Include activity areas that could be sensitive to their outlook such as protected areas or areas that are important for tourism. No area receptors were identified within the previous study undertaken (MetroGIS, 2012).

Linear Receptors

Include routes through the area which are comprised of one gravel local road (Kleinbegin Road) as well as two national routes (N10 and N14 to the north). All routes may to carry a proportion of tourism related traffic.

The N10 its closest and runs approximately 9.0km to the north of the site within the approximate limit of visibility. The N14 runs just outside the approximate limit of visibility approximately 3km to the north of the N10. It is likely that these routes carry a large proportion of visitors to the Upington area as well as tourists on route from South Africa to Namibia and the Kalahari region.

The Kleinbegin Road at its closest, runs approximately 11.9km to the west of the proposed site just inside the approximate limit of visibility. This road is likely to be most important for local traffic.

Point Receptors

Point Receptors include isolated and small groups of homesteads within the approximate limit of visibility that are located within the Undulating Valley Floor LCA and in the Orange River Corridor. Numerous homesteads have been identified within the Orange River Corridor but only five have been identified within the Undulating Valley Floor LCA. From the site visit it can be confirmed that the majority are agricultural homesteads with no obvious secondary use such as tourism.

Possible visual receptors or areas, places and routes that may be sensitive to landscape change are indicated on **Maps 4, 5, and 6** (included under Section 4 of this report) indicating the Zones of Theoretical Visibility of the proposed project extension.

LANDSCAPE CHARACTER AREAS

ORANGE RIVER CORRIDOR LCA

Plate 3, Orange River Corridor LCA. Settlements screened from the development area by steep ridgelines.

Plate 4, Orange River Corridor LCA. The focus within this LCA is on the river which is used for recreation / tourism activities as well as agricultural production.

STEEP RIDGELINES AND KOPPIES LCA

Plate 5, Steep Ridgelines LCA. Steep ridgelines compartmentalise the landscape.

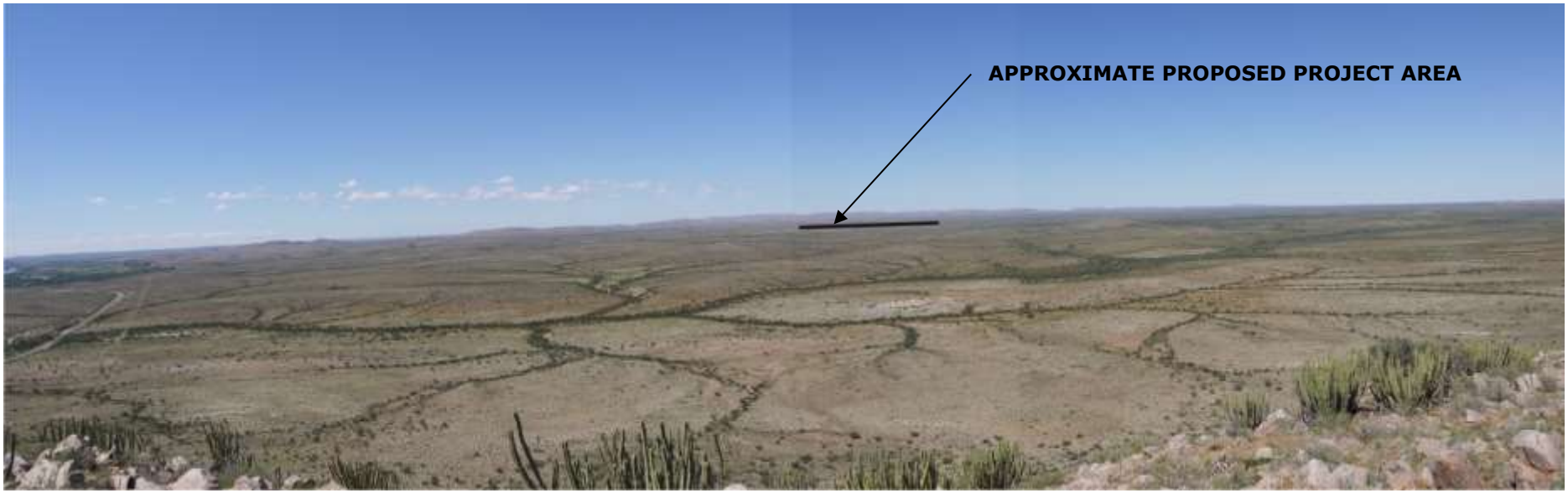
Plate 6, Steep Ridgelines LCA. Steep ridgelines screen N10 from the development area

UNDULATING VALLEY FLOOR LCA

Plate 7, Undulating Valley Floor LCA. This is generally a flat landscape.

Plate 8, Undulating Valley Floor LCA. Minor ridgelines provide a degree of VAC

FIGURE 3: OVERVIEW OF DEVELOPMENT AREA WITH PROJECT AREA INDICATED



Overview of the Karoshoek Valley from the North West Approximately 13km from Ilanga CSP 5
Note – the valley is undeveloped and generally inaccessible to the public. Views into the valley are largely screened by steep ridgelines.

POSSIBLE SENSITIVE RECEPTORS

HOMESTEADS

Plate 9: Homesteads located close to the development could be impacted. Five homesteads have been identified within the approximate limit of visibility and the surrounding Undulating Valley Floor LCA. The closest homestead is approximately 5.0 km to the north east of the proposed development.

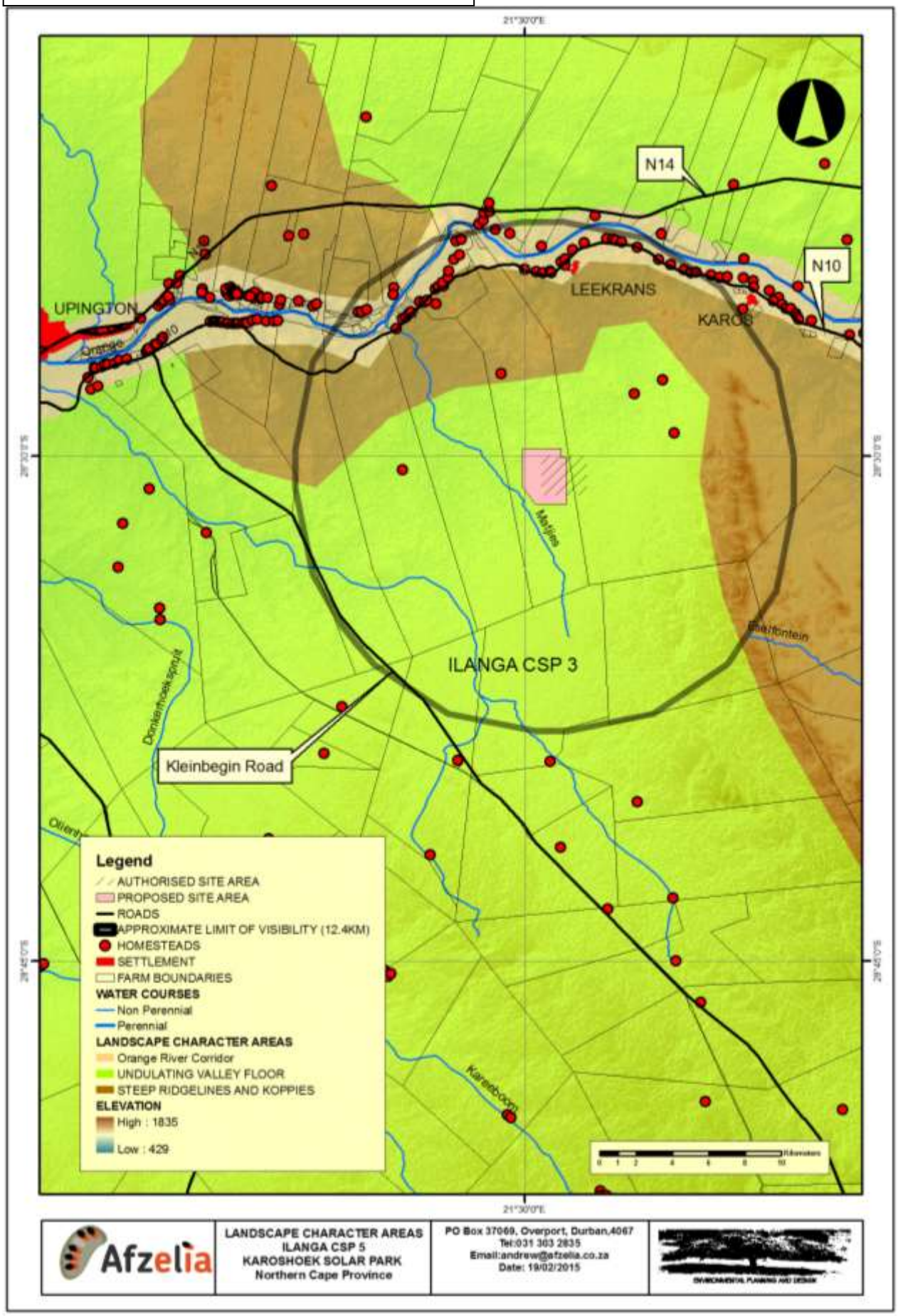
N10

Plate 10: The N10 runs to the north of the project area. The road is outside the limit of approximate visibility art a minimum distance of approximately 9km from the proposed development. This is a busy national road that has tourism importance.

KLEINBEGIN GRAVEL ROAD

Plate 11: The Kleinbegin Road (Gravel Road) runs to the west of the project area. The road. The road is approximately 11km from the project area at its closest. The Kleinbegin Road is used largely by local people. Consequently the road appears to be lightly used.

MAP 3: LANDSCAPE CHARACTER AREAS



4 THE NATURE OF POTENTIAL VISUAL IMPACTS

4.1 GENERAL

Impacts could include general degradation of LCAs due to the development that may detract from the existing character as well as change of view for affected people and/ or activities:

a. Generally, landscape change or degradation is particularly important for protected areas where the landscape character might be deemed to be exceptional or rare. However, it can also be important in non-protected areas particularly where landscape character is critical to a specific broad scale use such as tourism areas or for general enjoyment of an area. This is generally assessed by the breaking down of a landscape into components that make up the overall character and understanding how proposed elements may change the balance of the various elements. The height, mass, form and colour of new elements all help to make new elements more or less obvious as does the structure of an existing landscape which can provide screening ability or texture that helps to assimilate new elements. This effect is known as visual absorption capacity; and
b. Change in specific views within the affected area from which the character of a view may be important for a specific use or enjoyment of the area.
    - Visual intrusion is a change in a view of a landscape that reduces the quality of the view. This can be a highly subjective judgement. Subjectivity has however been removed as far as is possible by classifying the landscape character of each area and providing a description of the change in the landscape that will occur due to the proposed development. The subjective part of the assessment is to define whether the impact is negative or positive. Again to make the assessment as objective as possible, the judgement is based on the level of dependency of the use in question on existing landscape characteristics; and
    - Visual obstruction is the blocking of views or foreshortening of views. This can generally be measured in terms of extent.

    Due to the nature of the proposed development, visual impacts are expected to relate largely to intrusion.

4.2 POSSIBLE IMPLICATIONS FOR LANDSCAPE CHARACTER

Parabolic troughs will be aligned in rows on a north to south access with only sufficient space between the rows to allow access for operation and maintenance. This means that when a facility is viewed from ground level, it will appear as a single row of units However, when viewed from a slightly elevated position, the individual rows combine to increase the visual mass **(Plate 12)**.

The height of the parabolic trough will vary through the day as it tracks the sun meaning that during the late afternoon when the sun is low, it will reach its full height and at mid-day when the sun is highest, the structures will be relatively low.

From close viewpoints the solid hard line is likely to contrast with the natural terrain and vegetation **(Plate 14 & 15).** As the viewer moves away from the development however, this contrast is likely to be less obvious. With distance it is also likely that the cumulative effect of screening provided by relatively thin taller vegetation will increase also softening the hard engineered outline.

When the parabolic trough is aligned facing a viewpoint, light reflecting off the mirrored surfaces is likely to make the structures more obvious. Therefore, it is likely to be most obvious to the east in the morning and to the west in the afternoon.

The parabolic troughs can also reflect the colour of the sky or the surrounding landscape subject to their inclination **(Plate 15)**. The colour of the facility is therefore likely to change as the angle of the sun changes until the viewer sees the back face of the structure when the colour of the finish on the reverse side of the mirror is seen. This side is also likely to be viewed in at least partial shadow.

Where the development is seen from an elevated viewpoint, it is likely that the structures will visually combine providing an impression of an extensive industrial development **(Plate 12)**. Judging from the topography of within the approximate limit of visibility, it seems unlikely that this will occur, however views from upland areas to the east on the edge of the approximate limit of visibility could provide this impression.

Plate 12, View of a parabolic trough CSP project from an elevated, close viewpoint (Renewable Energy Focus.com, http://www.renewableenergyfocus.com). The structures visually combine to give the impression of an extensive industrial development.

Plate 13, view of a parabolic trough CSP project from an elevated position and at a distance (Miracle or mirage web site, http://coyot.es/miracleormirage). The reflection makes the development obvious. This may be similar to the view from higher land to the east of the project.

Plate 14, view of a parabolic trough CSP project from a distance and at a low level (basin and range watch web site http://www.basinandrangewatch.org/Ivanpah-Updates-3). The CSP projects appear as a narrow line in the landscape. They are made obvious by the light reflecting from the mirrored surfaces

Plate 15, view of a parabolic trough CSP project from a close range and at a low level (Bureau of Land Management). The CSP projects appear as an engineered solid line that contrasts with the surrounding natural landscape. With distance and softening with intervening vegetation the contrast is likely to become less obvious. Note, the section indicated with the arrow has had the back of mirrors coloured.

4.3 POSSIBLE IMPLICATIONS FOR VISUAL RECEPTORS

Implications for visual receptors can be divided into:

1) Possible changes in views over the landscape that could affect sensitive users or general enjoyment of views.
2) Glint and / or glare that could cause eye damage or nuisance to receivers.

Linear collectors such as parabolic troughs are known to have the following effects:

- Specular reflections[2] from the mirrors when they are moving to or from stowed position and from specular reflections off the ends of the trough or mirrors when the sun is low and aligned with the mirrors (e.g., reflections from the south end of a north–south field when the sun is low in the northern horizon); and
- Diffuse[3] and specular reflections from receiver tubes and bellows shields (Clifford, 2011).

4.3.1 Possible changes in views over the landscape that could affect sensitive users or general enjoyment of views

The review of possible sensitive receptors in the region highlighted:

The N10 and N14 national roads. The N10 is located to the north of the proposed site and just within the approximate limit of visibility, whilst the N14 is approximately 3 km to the north of the approximate limit of visibility at its closest point on the far side of the Orange river. The ZTV analysis indicates that both of these roads could be impacted over short distances only.

They are also located to the north of the facility which means that they are unlikely to be impacted by glint and / or glare from the proposed development.

[2] Specular reflection is the mirror-like reflection of light (or of other kinds of wave) from a surface, in which light from a single incoming direction (a ray) is reflected into a single outgoing direction

[3] Diffuse *reflection* is the *reflection* of light from a surface such that an incident ray is reflected at many angles.

As these linear receptors are likely to be located close to the limit of visibility and users are unlikely to be affected by reflections from the mirrored surfaces, it is unlikely that the proposed development of the parabolic trough CSP project on CSP 5 would have a significant impact on views from these roads.

The local unsurfaced road to the west (Kleinbegin Road). This road is approximately 12.4 km to the west of the western boundary of site 2. This road is likely to be used mainly by local people accessing the rural areas to the south of the site. The interest of this group is likely to be focused on the productivity of the land rather than aesthetics. The ZTV indicates that the development could be visible from two short sections of this road which are just outside the approximate limit of visibility. This is likely to mean that if the development is visible it is unlikely to be obvious. It is also likely that intervening vegetation and minor landform changes will have a modifying effect on views.

Homesteads located in the landscape surrounding the proposed project. There are a substantial number of these possible receivers within the approximate limit of visibility. The majority of these however are located within the Orange River Corridor and due to topography they are unlikely to be impacted. There are also a small number that are generally located to the north and west of the proposed development area.

With reference to the ZTV analysis, the majority of homesteads that are located outside the Orange River Corridor appear to be in low areas where views of the development are likely to be screened by the landform. This is possibly because homesteads seem to be located at relatively low points in the landscape in areas where water may be more available and where shelter might be provided by both taller vegetation and topography.

4.3.2 Possible Glint and / or Glare

Glint is defined as a momentary flash of light, while glare is defined as a more continuous source of excessive brightness relative to the ambient lighting. Hazards from glint and glare from concentrating solar power plants include the potential for permanent eye injury (e.g., retinal burn) and temporary disability or distractions (e.g., flash blindness), which may impact people working nearby, pilots flying overhead, or motorists driving alongside the site (Clifford, 2009).

Research indicates that glint and glare problems are most likely to occur to the east and south-east of a facility in the morning and to the west and south-west in the afternoon and evening. Glint and glare that is likely to be most problematic is likely to occur in the early morning and late afternoon/ evening as the sun is lowest in the north and light is reflected at a low level along the collector further south.

From review of the locations of possible sensitive receivers, it seems unlikely that identified receptors will be affected.

4.3.3 Possible Mitigation Measures

The US Bureau of Land Management highlights the following mitigation measures in their Best Practices Manual for Reducing Visual Impacts of Renewable Energy Facilities (Bureau of Land Management, 2013).

Vegetation Clearance

Often, vegetation beneath a solar field is completely stripped and the area may be levelled prior to construction; however, depending on the solar technology employed, these procedures may not be necessary. In some cases, grasses and some low shrubs can be left under the parabolic trough field, or shrubs can be trimmed to shorten them to an acceptable height. If vegetation can safely be left beneath the structures and does not interfere with facility construction, operation, or maintenance, strong colour contrasts associated with exposed or eroded soils can be reduced, as can texture contrasts caused by vegetation removal. The visual benefits of leaving vegetation underneath structures varies depending on the height and spacing between solar collectors; it is most effective at reducing visual impacts for more widely spaced and taller collector arrays because there is more space visible underneath and between the collectors. Leaving or replacing vegetation underneath the structures has non-visual benefits as well, such as reduced runoff and erosion, and reduced cost for revegetation at the time of decommissioning.

Colour

Colour-treat trough mirror backs at parabolic trough facility. Colour-treated mirror backs appear as a dark band visible at front left of trough field. Untreated mirror backs appear blue. In this case, the colour treatment used has the added benefit of strengthening the mirrors, and it improves energy production efficiency during low-energy production conditions.

Depending on the component and treatment method, treatments could be subject to fading or flaking, and may require re-treatment to maintain proper coloration.

Fencing / Screening

Where significant offsite glare is unavoidable, fencing with privacy slats, earthen berms, or vegetative screening materials may be employed.

5 VISIBILITY OF THE PROPOSED DEVELOPMENT

5.1 ZONES OF THEORETICAL VISIBILITY

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

ZVTs of the proposed development have been assessed using Arc Spatial Analyst, Geographical Information System (GIS).

The assessment is based on terrain data that has been derived from satellite imagery. This data was originally prepared by NASSA 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 an online mapping programme.

Whilst the ZTV has been calculated from terrain data only, given the nature of the surrounding landscape, existing vegetation and development is unlikely to have a significant modifying effect on the areas indicated.

5.2 ASSESSMENT LIMIT

The GIS based assessment of ZTV's does not take the curvature of the earth or reduction in scale due to distance into account. In order to provide an indication of the likely limit of visibility due to this effect a universally accepted navigational calculation (**Appendix III**) has been used to calculate the likely distance that the proposed structures might be visible over. This indicates that in a flat landscape a parabolic trough at its vertical position, including a generator house, all at a maximum height of 12 m, could be visible at a distance of approximately 12.4 km. However, at this distance limitations of the human eye will not be able to distinguish elements of the project from other landscape features.

It is noted that the landscape within this distance from the proposed site is relatively flat and so this approximate limit of visibility is considered appropriate. However, to the north and east, just outside this distance the terrain is more rugged and rises in a series of small ridgelines. It is likely that in these directions the limit of visibility will extend by 2 – 3 km to the top of these ridgelines.

In reality visibility could be reduced by;

- Weather conditions that limit visibility. This would 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.

5.3 APPROACH TO THE ASSESSMENT

The detailed location of the proposed parabolic trough units has been provided **(Figure 2)**. From this information, it is obvious that development is proposed practically to all four site boundaries with the Power Plant located in the north western quadrant of the site.

In order to generate the ZTV for the proposed development, it has been assumed that the entire area of development as indicated will be set at a uniform maximum height

of 12m. Points have been set at each change in direction of the development footprint plus additional points within the development particularly at high points in the site for generation of the ZTV using the Viewshed option in Arc Spatial Analyst GIS.

5.4 VISIBILITY OF DEVELOPMENT

Map 4 indicates the ZTV of the proposed development of Ilanga CSP 5 (considering the full extent of the site – i.e. the authorised facility as well as the proposed new development area).

Maps 5 indicates the ZTV of the authorised area of development of Ilanga CSP 5.

From reference to these maps and the ZTVs identified in the VIA undertaken for the Karoshoek Solar Valley Development (MetroGIS, 2012) it is clear that the proposed extension of the site will not affect additional areas of the landscape than those considered in the VIA for the original application.

Map 6 indicates the cumulative area that will be affected by the proposed extended Ilanga CSP 5 project with the additional Ilanga CSP parabolic trough projects on which similar expansions are proposed. From comparison with the Cumulative ZTV indicated within the Original VIA it is obvious that a similar area is likely to be affected than was originally anticipated.

The ZTV for 12m high development on these sites is focused within a band approximately 15km measured east to west and 25km measured north to south (approximately 360km^2). Intermittent views are possible to the west past the main focus area. To the east there is a visibility shadow between the main 5km focus area and the edge of the approximate limit of visibility where it becomes visible again from ridgelines.

5.5 VISUAL ABSORPTION CAPACITY (VAC) OF THE LANDSCAPE

The VAC for the area surrounding the site is dependent on the level of the viewer relative to the site. The VAC is largely provided by the vegetation cover and low ridgelines that bisect the valley floor.

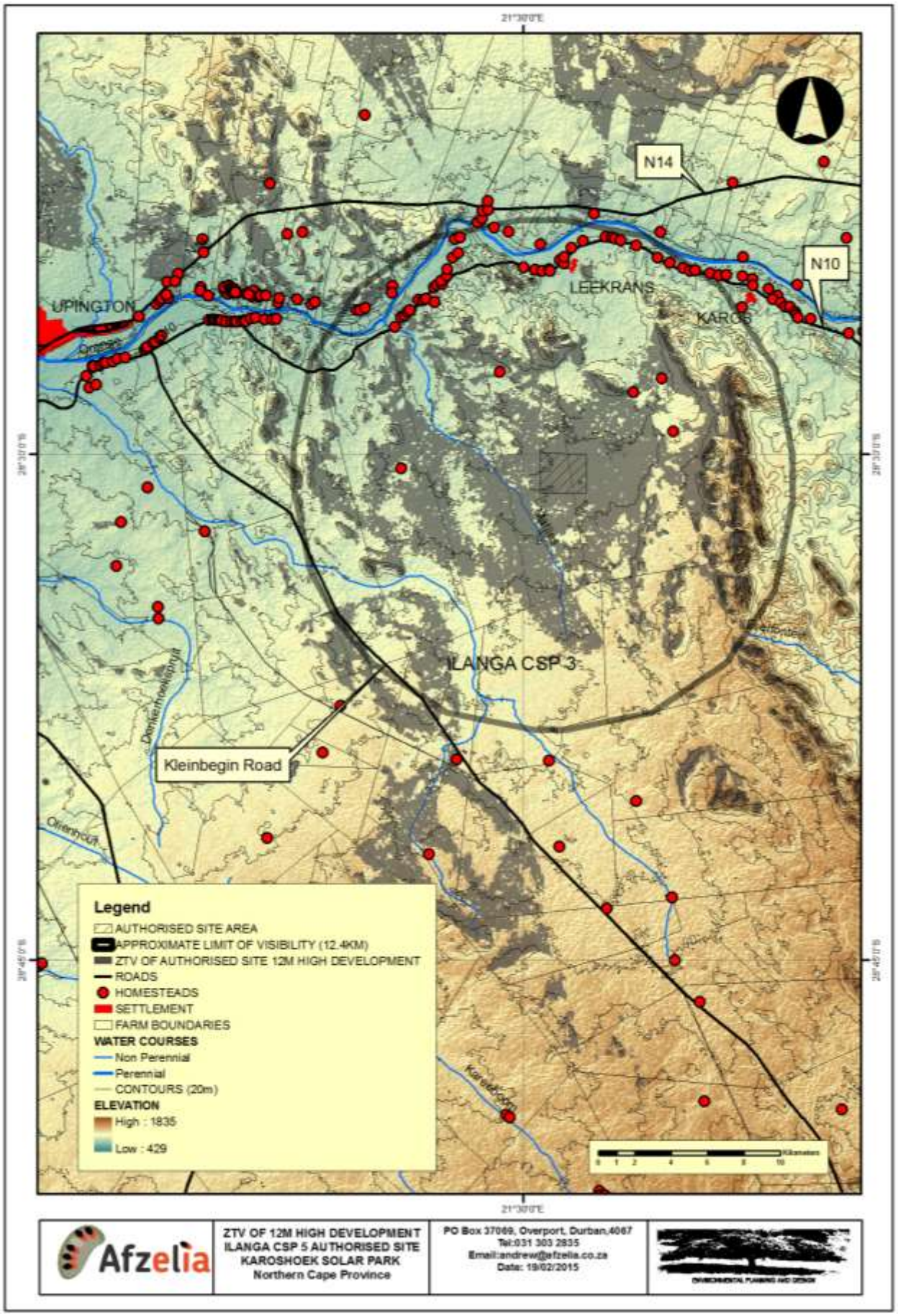
From low levels the surrounding vegetation combines to provide screening ability for development up to an approximate height of approximately 2-3m. As the viewpoint is elevated above the plain on minor ridgelines and undulations, the screening effect of existing vegetation over short distances reduces drastically as the viewer sees over and between individual woody plants.

Given that the development will largely be viewed from a similar level as the site, the minor ridgelines combined with vegetation cover to provide significant VAC. The closest possible viewpoint accessible to the public from which the development might be viewed is just over 10.5km from the site and located on the N10 to the north west of the development. **Figure 4** indicates a view from this viewpoint onto which the extent of the proposed development has been indicated. From the site visit this was considered to be the viewpoint from which the greatest extent of the development will be visible. It is obvious from the image that minor ridgelines and vegetation combine to screen a large proportion of the proposed development.

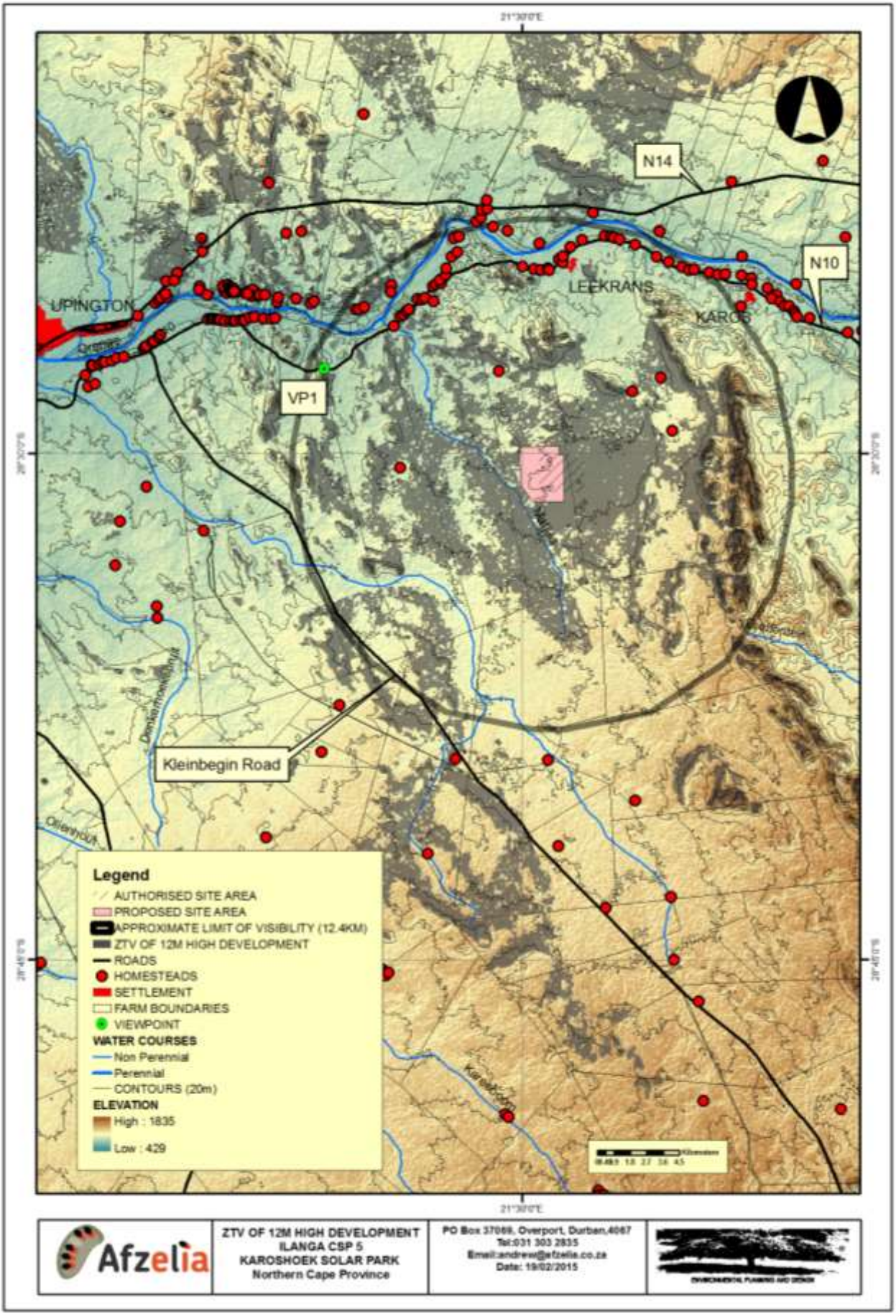
5.6 KEY VIEWPOINTS

As indicated in 5.5, **Figure 4** provides a view from viewpoint VP1 on the N10 which is the closest area from which the development is likely to be visible from (indicated on ZTV mapping). The proposed development is indicated as possibly being visible from two sections of this road, the other being approximately 4.5km further east, however, from teh site visit, views from the second point are unlikely. It was adjudged that the selected viewpoint as indicated as VP1 will be the area from which the greatest impact is likely.

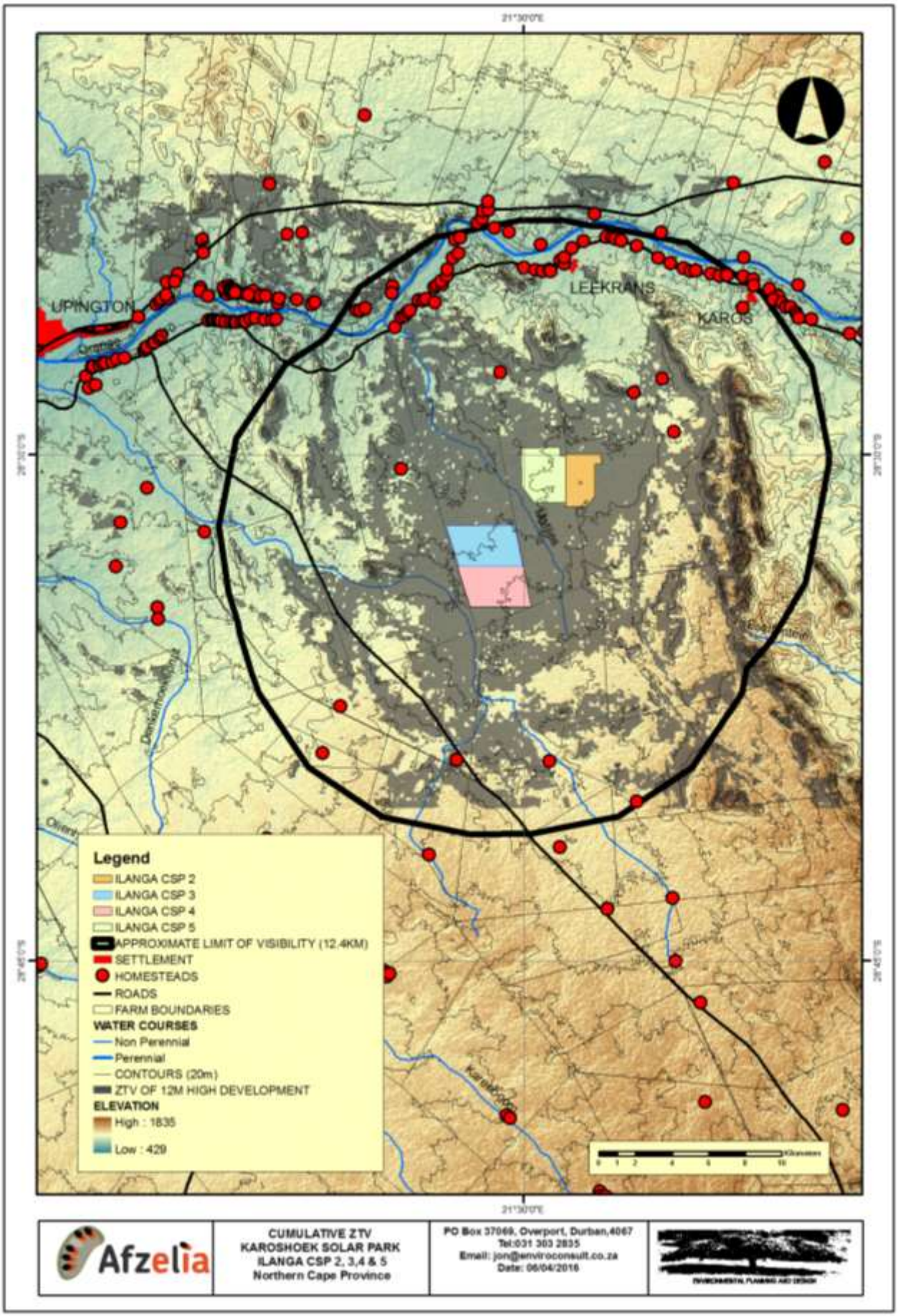
MAP 4: ZTV OF 12 M HIGH DEVELOPMENT ON AUTHORISED ILANGA CSP 4



MAP 5: ZTV OF 12 M HIGH DEVELOPMENT ON PROPOSED ILANGA CSP 4



MAP 6: CUMULATIVE ZTV OF CSP TROUGH PROJECTS



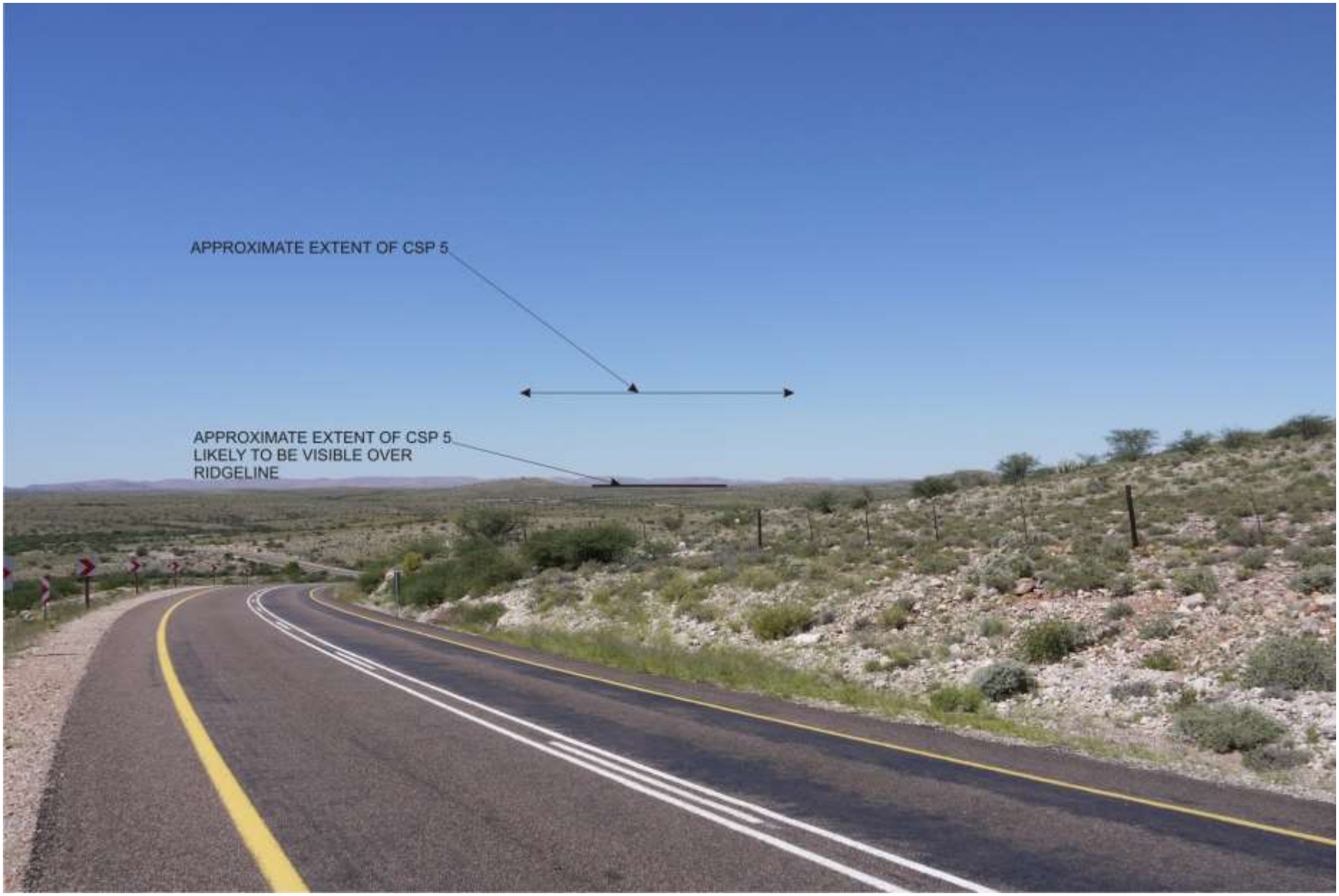


FIGURE 4; EXTENT OF DEVELOPMENT LIKELY TO BE VISIBLE FROM VP1 (N10)

6 VISUAL IMPACT ASSESSMENT

6.1 ASSESSMENT METHODOLOGY

The previous section of the report identified specific areas where visual impacts may occur. This section will quantify these impacts in their respective geographical locations and in terms of the identified issues (see Section 1.5).

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).

6.2 ASSESSMENT

The following assessment focuses first on general landscape change that will occur due to the proposed development which provides context for the assessment of impacts on identified sensitive receptors.

6.2.1 Impact of the Proposed Development on General Landscape Character

Nature of impact:
Industrialisation of general landscape character.

The assessment indicates that the proposed extension of the authorised development could be visible from and therefore affect the character of the rural landscape surrounding it over an area of approximately 20 km measured east to west and 17 km measured north to south (approximately 340 km^2).

Views into the site from local roads and homesteads are relatively limited and where possible the proposed development will largely be seen in elevation or from a slightly higher elevation. The minimum distance between receptors and the proposed development is greater than 5km. This means that whilst the character of the landscape surrounding the proposed development will undoubtedly change. This change is unlikely to be highly obvious to receptors.

Also given that the rural landscape character is likely to be changed to a similar extent by currently authorised development and given that there do not appear to be any affected protected areas or sensitive uses, this character change is unlikely to be significant and is assessed as low with a local impact.

	Without mitigation	**With mitigation**
Extent	Site and immediate surroundings, **(2)**	Site and immediate surroundings, **(2)**
Duration	Long term, **(4)**	Long term, **(4)**
Magnitude	Low, **(4)**	Minor, **(2)**
Probability	Highly probable **(4)**	Probable, **(3)**
Significance	Medium, **(40)**	Low, **(24)**
Status	The character of the rural landscape will be modified. For those people that are attracted to the area for its natural attributes and those travelling through the area for recreational and tourism reasons, it is likely that	**negative**

	development of natural areas will be seen as a **negative impact**.	
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:

Planning:

- Plan 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;

Operations:

- Reinstate any areas of vegetation that have been disturbed during construction;
- Remove all temporary works;
- Monitor rehabilitated areas post-decommissioning and implement remedial actions;
- Minimise disturbance and maintain existing vegetation as far as is possible both within and surrounding the development area;
- Colouring of mirror backs;

Decommissioning:

- Remove infrastructure not required for the post-decommissioning use of the site;
- Return all affected areas to productive agricultural use;
- Monitor rehabilitated areas post-decommissioning and implement remedial actions.

Cumulative Impacts:

The area around Upington has been identified by the Department of Environmental Affairs as a Renewable Energy Development Zone (REDZ 7). These zones have been put forward in order to focus development and inform planning. In the Upington area this has resulted in numerous renewable energy project applications. This focus is likely to transform the general landscape character of the area.

The development of the proposed additional capacity of Ilanga CSP 4 within the Karoshoek Solar Valley Development will not significantly alter the visual impact associated with the development of parabolic trough facilities on already authorized sites. The visibility of proposed extended capacity of Ilanga CSP 5 will fall within the extent of impact associated with currently authorised sites. As receptors are some distance from the facility (minimum 5km) and because partial views of the facility are only likely to be possible, the additional impact associated with the proposed additional capacity is unlikely to significantly add to cumulative visual impacts.

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 existing vegetation is maintained and protected and that effective rehabilitation is undertaken during and after construction as well as on closure of the plant.

6.2.2 Impact of the Proposed Development on Identified Sensitive Receptors

Potential visual impacts on sensitive receptors that have been identified through scoping and the site visit include:

a) The visibility of the facility to, and potential visual impact on homesteads that have been identified as potentially being impacted;
b) The visibility of the facility to, and potential visual impact on users of roads in close proximity;
c) The visibility of the facility to, and potential visual impact on sensitive receptors;
d) Visual impacts associated with construction of the proposed project;
e) Possible impact of glint and glare; and
f) The possible impact of lighting associated with night time operation, and security lights.

a) Potential visual impact on Homesteads.

Nature of impact:

Industrialisation of a natural landscape as seen from local homesteads.

It is possible that mirror backs could be obvious in the landscape due to colour changes in early to mid-morning from the west and late to mid-afternoon from the east.

The Orange River Corridor has the largest concentration of homesteads within the study area. Ilanga CSP 5 is approximately 10km away from the Orange River Corridor and a range of small hills separates the site from this area. This means that possible receptors in this area will be unaffected.

Five agricultural homesteads have been identified within the approximate visual limit of CSP 5. All of the homesteads are definitely in low area and will be screened from the development by landform.

Views into the site from local homesteads therefore will be very limited and where possible the proposed development will largely be seen in elevation. This means that whilst the character of the landscape surrounding the proposed development will undoubtedly change due to authorised development, this change is unlikely to be exacerbated by the proposed extension to CSP 5.

	Without mitigation	**With mitigation**
Extent	Site and immediate surroundings **(2)**	**(2)**
Duration	Long term **(4)**	**(4)**
Magnitude	Small to minor **(2)**	Small **(0)**
Probability	Probable **(3)**	Improbable **(2)**
Significance	Low **(24)**	Low **(12)**
Status	The character of the rural landscape will be modified. It is possible that a proportion of receptors, particularly those that may benefit from this or similar projects in the area, will view the development as a positive addition to the local landscape. For those people that are attracted to the area for its natural attributes, it is likely	**Negative**

	that development of natural areas will be seen as a **negative impact**.	
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?	Mitigation is may not be necessary.	

Mitigation / Management:

Planning:

- Plan 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;

Operations:

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

Decommissioning:

- Remove infrastructure not required for the post-decommissioning use of the site;
- Return all affected areas to productive agricultural use; and
- Monitor rehabilitated areas post-decommissioning and implement remedial actions.

Cumulative Impacts:

The area around Upington has been identified by the Department of Environmental Affairs as a Renewable Energy Development Zone (REDZ 7). These zones have been put forward in order to focus development and inform planning. In the Upington area this has resulted in numerous renewable energy project applications. This focus is likely to transform the landscape character of the area.

The development of the proposed additional capacity of Ilanga CSP 5 within the Karoshoek Solar Valley Development will not significantly alter the visual impact experienced from local homesteads associated with the development of parabolic trough facilities on the authorised sites.

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.

b) The visibility of the facility to, and potential visual impact on users of roads in close proximity.

Nature of impact:

Industrialisation of a natural landscape as seen from the local Kleinbegin Road to the west and the N10 and N14 to the north.

The N10 and N14 are located on the northern side of a range of small hills that separate the Orange River Corridor from the proposed Karoshoek Solar Valley development area. This means that views from these roads into the development area are limited to an isolated, small section of the N10 which is approximately 10.5km from the site.

The assessment also indicates that proposed extension of Ilanga CSP 5 could be visible from a short section of the local Kleinbegin road, approximately 11.3km to the west of the site. This is a gravel road that has infrequent traffic and is used mainly by the local agricultural community.

Given the distance and the relatively flat topography, it is highly unlikely that reflection form the facility will make the development obvious from these sections of road.

The site visit has confirmed that minor ridgelines and undulations in the valley floor will play a significant role in screening views of the development from the identified roads. Where the development will be visible it will be seen largely in elevation and the landform is likely to provide partial screening.

Because of the above, it is highly unlikely that the proposed expansion of the Parabolic Trough development within Ilanga CSP 5 will significantly increase the impact associated with the currently authorised site.

	Without mitigation	**With mitigation**
Extent	Site and immediate surroundings, **(2)**	**(2)**
Duration	Long term, **(4)**	**(4)**
Magnitude	Low **(4)**	Minor, **(2)**
Probability	Probable, **(3)**	Improbable, **(2)**
Significance	Medium, **(30)**	Low, **(16)**
Status	**negative**	**negative**
Irreplaceable loss	The proposed development can be dismantled. There will therefore be no irreplaceable loss. However, given the long-term nature of the project, it is likely that a proportion of stakeholders will consider the loss of natural character as irreplaceable.	**No irreplaceable loss.**
Can impacts be mitigated	Yes	Yes

Mitigation:

Planning:

- Plan 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;

Operations:

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

Decommissioning:

- Remove infrastructure not required for the post-decommissioning use of the

site; and
- Return all affected areas to productive agricultural use;

Monitor rehabilitated areas post-decommissioning and implement remedial actions.

Cumulative Impacts:
The area around Upington has been identified by the Department of Environmental Affairs as a Renewable Energy Development Zone (REDZ 7). These zones have been put forward in order to focus development and inform planning. In the Upington area this has resulted in numerous renewable energy project applications. This focus is likely to transform the landscape character of the area.

The development of the proposed additional capacity within Ilanga CSP 5 is unlikely to significantly extend the impact of this authorized site. It is therefore unlikely to result in increase in cumulative impacts associated with authorized development within the Karoshoek Valley.

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.

c) The visibility of the facility to, and potential visual impact on sensitive receptors

Nature of impact:
Industrialisation of a natural landscape as seen from sensitive uses.

The assessment indicates that sensitive visual receptors are likely to largely include roads and homesteads as evaluated in a) and b) above.

From the site visit and knowledge of the area there do not appear to be any other receptors within the approximate limit of visibility that are likely to be sensitive to changes of view associated with the proposed extension of Ilanga CSP 5.

	Without mitigation	**With mitigation**
Extent	Regional **(3)**	Regional **(3)**
Duration	Long term **(4)**	Long term **(4)**
Magnitude	Small **(0)**	Small **(0)**
Probability	Very improbable **(1)**	Very improbable **(1)**
Significance	**Low (7)**	**Low (7)**
Status	**Negative**	**Negative**
Irreplaceable loss	No irreplaceable loss.	No irreplaceable loss.
Can impacts be mitigated?	yes	NA

Mitigation:
Planning:
- Plan levels to minimise earthworks to ensure that levels are not elevated; and
- Plan to maintain the height of structures as low as possible.

Cumulative Impacts:
The area around Upington has been identified by the Department of Environmental Affairs as a Renewable Energy Development Zone (REDZ 7). These zones have been put forward in order to focus development and inform planning. In the Upington area this has resulted in numerous renewable energy project applications. This focus is likely to transform the landscape character of the area.

The development of the proposed additional capacity of Ilanga CSP 5 within the

Karoshoek Solar Valley Development will not significantly alter the visual impact associated with the development of parabolic trough facilities on already authorized sites. The visibility will be similar in extent to the visibility of existing authorised development.

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.

d) Visual impacts associated with construction of the proposed project.

Nature of impact:
Construction will be comprised of:

- Clearance of site;
- Construction of associated infrastructure;
- laying of concrete bases for parabolic troughs and power plant;
- Erection and fixing of parabolic troughs and power plant; and
- Laying of cable runs and connections.

This work is relatively minor and is likely to be completed in six months.
As the site is relatively flat, an overview of the construction work is unlikely. Activity on site is likely to be obvious from vehicles and plant. Once ground work and concrete bases are complete, the parabolic trough supports, parabolic trough fixing and power plant structures are likely to progress rapidly.
Interim impacts are likely to include dust from site operations once the site has been cleared, storage areas which may be as high as the final development and delivery trucks using local roads.
It is also possible that waste-blow could be problematic.
From the assessment of impacts of the final development as experienced by local receptors, it is obvious that the site and proposed development is unlikely to be obvious. Waste blow, delivery vehicles on local roads and dust could make the development obvious during construction. All of these issues will apply to the originally proposed development however, the proposed additional extent of development is unlikely to change the risk of these issues making the development obvious in the landscape.

	Without mitigation	**With mitigation**
Extent	Site and immediate surroundings, **(2)**	**Local, (1)**
Duration	Very short duration, **(1)**	**(1)**
Magnitude	Minor **(2)**	Small **(0)**
Probability	Probable, **(3)**	Possible, **(2)**
Significance	Low, **(15)**	Low, **(4)**
Status	Negative	Negative
Irreplaceable loss	There will be no irreplaceable loss.	There will be no irreplaceable loss.
Can impacts be mitigated?	Yes	NA

Mitigation:

- Minimise clearance of vegetation;
- undertake dust prevention measures;
- Maintain stockpiles to less than 3 m high; and
- Manage waste effectively and prevent waste blowing around and off site.

Cumulative Impact:
It is possible that a number of construction projects will occur at any one time. This could create the impression that extensive areas of natural landscape are subject to

development. Dust and plant may be visible; however, it is not likely to be highly obvious.
The proposed extension of Ilanga CSP 5 is unlikely to significantly increase the cumulative visual impact of construction of projects in the Karoshoek Valley.

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.

e) Possible impact of glint and glare.

Nature of impact:
Impacts of glint and glare can vary from permanent eye injury, persistence of vision that could make driving on local roads dangerous to low level nuisance. This assessment focuses on the likelihood of glint and glare making the proposed development obvious in the landscape. It does not assess the likelihood of injury or danger / nuisance to motorists.

Typically, the main risk of glint and glare associated with linear collectors such as parabolic troughs occur from:
- Specular reflections from the mirrors when they are moving from stowed to tracking;
- Specular reflections off the ends of the trough or mirrors when the sun has a low elevation angle (e.g., reflections from the north end of a north-south field when the sun is low in the southern horizon); and
- Diffuse and specular reflections from receiver tubes.

In the southern hemisphere typically these impacts are most likely to occur to the east, west and south of a facility during early morning and late afternoon when the sun is relatively low.

It also has to be understood that the angle of reflection matches the angle of incidence which means that even when the sun is low, reflections unless diffuse will affect receptors above the level of the facility . In a perfectly flat landscape therefore glint and glare are generally directed over the heads of surrounding receptors. Also, the further that a receptor is located away from the facility then the lower the likelihood is of a receptor being impacted.

In order for there to be a problem it is necessary for the facility to be visible to receivers.

Given the distance and the possible screening effect of vegetation and minor land form, it is highly unlikely that either glint or glare associated with the proposed expansion of the extent of Parabolic Trough development on Ilanga CSP 5 will be significant.

	Without mitigation	**With mitigation**
Extent	Site and immediate surroundings **(2)**	**(2)**
Duration	Long term **(4)**	**(4)**
Magnitude	Small **(0)**	**(0)**
Probability	Very improbable **(1)**	**(1)**
Significance	Low **(6)**	**(6)**
Status	Negative	Negative
Irreplaceable	There will be no irreplaceable	There will be no irreplaceable

loss	loss.	loss.
Can impacts be mitigated?	Yes.	N/A

Mitigation:

- Screening with opaque fencing / earth berms; and
- Careful siting and operation of solar collectors turning mirrors away from the sun during time periods when glare impacts are significantly adverse may substantially reduce or avoid visual impacts from offsite glare.

Cumulative Impact:

The development of the proposed additional capacity of Ilanga CSP 5 within the Karoshoek Solar Valley Development will not significantly alter the risk of glint and glare associated with already authorized sites.

Residual Risks:

No residual risk has been identified.

f) The possible impact of lighting associated with night time operation, and security lights.

Nature of impact:

Industrialisation of a natural landscape as seen at night. This could include the lighting up of the power plant at night which would make it obvious within what is currently a dark rural area at night.

It is likely that operational lighting will be required at buildings and security lighting may be required within the trough field.

It must be understood that authorised projects within the greater Karoshoek Valley are extensive and pose a more major risk to the transformation of the night time landscape. The extent of this transformation is not known.

If flood lighting is deemed necessary for each plant throughout the hours of darkness then impacts are likely to be significant. However if low level operational lighting is required at buildings then it is likely that each plant will not appear significantly different than the farmsteads that are scattered through the landscape.

If the former approach is adopted then floodlighting an additional 200ha of the plant is likely to be noticeable. If however only low level lighting around buildings is required then the additional proposed capacity expansion of Ilanga CSP 5 is likely to have negligible impact on the night time landscape.

	Without mitigation	**With mitigation**
Extent	Site and immediate surroundings **(2)**	Local, **(1)**
Duration	Long term **(4)**	**(4)**
Magnitude	Minor **(2)**	Small, **(0)**
Probability	Probable **(3)**	Improbable **(2)**
Significance	Low **(24)**	**Low (10)**
Status	The appearance of a large lit area in an otherwise dark, natural landscape is likely to be seen as a **negative** factor particularly by people wanting to experience the natural landscape.	If the lights are generally not visible then the occasional light is unlikely to be seen as negative.
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

Can impacts be mitigated?	Yes

Mitigation / Management:

Planning:

- Plan to utilise infra-red security systems or motion sensor triggered lighting;
- Ensure that lighting is focused on the development with no light spillage outside the site; and
- Keep lighting low, no tall mast lighting should be used.

Residual Risks:

No residual risk has been identified.

Cumulative Impact:

The area around Upington has been identified by the Department of Environmental Affairs as a Renewable Energy Development Zone (REDZ 7). These zones have been put forward in order to focus development and inform planning. In the Upington area this has resulted in numerous renewable energy project applications. This focus is likely to transform the landscape character of the area.

The development of the proposed additional capacity at Ilanga CSP 5 within the Karoshoek Solar Valley Development is unlikely to significantly alter the night time visual impact associated with already authorized sites as it has to be assumed that they will all be lit to a similar level.

The detailed Cumulative Impact Assessment is attached as **Appendix IV**.

7 IMPACT STATEMENT

7.1 GENERAL

The assessment indicates that the development of the additional area on Ilanga CSP 5 is likely to have minimal additional visual impact over and above that associated with the authorised site.

7.2 LANDSCAPE CHARACTER AND IMPORTANCE

The importance of the study area lies both in its agricultural production capacity as well as its natural features and their ability to attract and provide a backdrop for tourism activities in the area. The latter point is attested by the use of sites along the Orange River for tourism activities.

The area around Upington is also becoming important for solar projects, with a number of projects already under development. This is due to a government initiative that will see the development of strategic infrastructure to link solar power projects into the National Grid. This is likely to result in transformation of sections of the landscape in the near future. This development is of national importance given the need to produce clean energy. In order to maintain existing economic bases rather than replace them, it will be critical that this is done in a manner that minimises impact on existing uses.

The landscape is compartmentalised to a large degree by a series of steep ridgelines and koppies. these upland areas effectively separate the Orange River corridor from the rural agricultural valley floor on which the Karoshoek Solar facilities are being developed. The undulating valley floor is sparsely populated and appears largely natural. Minor ridgelines and valleys bisect the valley floor providing a degree of visual absorption capacity particularly for relatively low development such as the subject project.

7.2 FUTURE DEVELOPMENT

There are a number of solar projects authorised within the Karoshoek Valley as indicated in section 2.4. These will transform this area by introducing an industrial character into the area. However, from review of these projects as well as a site visit, a substantial area of relatively natural landscape will remain between public access areas such as the Kleinbegin Road, the N10 and N14 and the developed areas. This will soften the impact of the industrial elements. The steep ridgelines and koppies will also help to contain the impact ensuring that surrounding areas are relatively unaffected.

7.3 AREAS AND NATURE OF VISUAL IMPACT

Possible visual receptors that have been identified include:

- A small number of homesteads that occur within the approximate limit of visibility;
- A local road to the west (Kleinbegin Road); and
- The N10 and N14 to the north.

The assessment indicates that the proposed extension to the authorised development is likely to be largely screened from most residents of all identified homesteads. This is due to the fact that homesteads appear to be largely located within the minor valleys bisecting the area.

The assessment indicates that the proposed extension to the authorised development will not be visible to the N10 which is located close to the approximate limit of visibility to the north of the site.

The proposed extension to the authorised development will be visible to two sections of a local Kleinbegin road to the west of the site. However, distance, existing vegetation and minor ridgelines will help to at least part screen views of the development extension. The extent of the proposed development that will be visible will be similar to the extent of the authorised development that will be visible. With mitigation it is likely that neither the authorised development nor the proposed extension will be obvious from the road.

Given the relative elevation of receptors and their distance from the development, glint and glare are unlikely to make the development more obvious in the landscape.

7.4 CUMULATIVE IMPACT

The assessment indicated that the proposed additional area on Ilanga CSP 5 will not increase cumulative visual impacts associated with currently authorised projects.

7.5 MITIGATION POTENTIAL

The affected landscape has a degree of visual absorption capacity due to occasional head height shrubs particularly in valley lines as well as the minor ridgelines that bisect the valley floor.

The project will almost always be viewed from a similar level as the development meaning that it will largely be seen in elevation. This will mean that overviews of the full extent of development will not be possible from public access areas.

Mitigation should therefore be focused on maintaining natural vegetation which will provide a degree of screening and ensuring that development levels are not elevated above the natural landform.

7.7 CONCLUSION

The proposed extension to the authorised project will therefore not result in visual impacts that were not considered in the original application for authorisation. Because of this, there is no reason on visual grounds why the proposed extension to the currently authorised project should not be authorised.

REFERENCES

Clifford, K.H., Ghanbari, C.M. & Diver, R.B. 2009. Hazard analysis of glint and glare from concentrating solar power plants. *Proceedings of the SolarPACES Conference*. 15-18 September 2009. Berlin, Germany.

Clifford, H.H., Ghanbari, C.M. & Diver, R.B. 2011. Methodology to assess potential glint and glare hazards from concentrating solar power plants: analytical models and experimental validation. *Journal of Solar Engineering Science*. 133: 1-9.

Landscape Institute and Institute of Environmental Management Assessment. 2013. *Guidelines for landscape and visual impact assessment*. Oxon, UK:Routledge

Oberholzer, B., 2005. *Guidelines for involving visual and aesthetic specialists in EIA processes*: Edition 1. (CSIR Report No. ENV-S-C 2005 053 F). Cape Town, South Africa: Provincial Department of the Western Cape, Department of Environmental Affairs & Development Planning.

United States Department of Interior. 2013. *Best management practices for reducing visual impacts of renewable energy facilities on BLM-administered lands*. Wyoming, United Stated of America: Bureau of Land Management.

MetroGIS, 2012. Visual Impact Assessment, Proposed Karoshoek Solar Valley Development near Upington in the Northern Cape Province. MetroGIS (Pty) Ltd.

APPENDIX I

SPECIALIST'S BRIEF CV

Name	JONATHAN MARSHALL
Nationality	British
Year of Birth	1956
Specialisation	Landscape Architecture / Landscape & Visual Impact Assessment / Environmental Planning / Environmental Impact Assessment.

Qualifications

Education	Diploma in Landscape Architecture, Gloucestershire College of Art and Design, UK (1979) Environmental Law, University of KZN (1997)
Professional	Registered Professional Landscape Architect (South Africa) Chartered Member of the Landscape Institute (UK) Certified Environmental Assessment Practitioner of South Africa. Member of the International Association of Impact Assessment, South Africa

Languages	English	-	Speaking	- Excellent
		-	Reading	- Excellent
		-	Writing	- Excellent

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Key Experience

Jon qualified as a Landscape Architect (Dip LA) at Cheltenham (UK) in 1979. He has also been a Certified Environmental Assessment Practitioner of South Africa since 2009.

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 a major supermarket chain and prepared CAD based visual impact assessments for public enquiries for new green field store development. He also prepared the VIA input to the environmental statement for the Cardiff Bay Barrage for consideration by the UK Parliament in the passing of the Barrage Bill.

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 eighteen months includes assessments for proposed new mine developments in Ghana and Guinea, numerous solar plant projects for Eskom and private clients, proposed wind farm development and a proposed tourism development within the Isimangaliso Wetland Park World Heritage Site.

Jon has also had direct experience of working with UNESCO representatives on a candidate World Heritage Site and has undertaken VIAs within and adjacent to other World Heritage Sites.

Relevant Visual Impact Assessment Projects

1. **Isundu Sub- Station Development -** Visual impact assessment for a new major sub – station in KwaZulu-Natal for Eskom.
2. **Bhangazi Lake Tourism Development** – Visual impact assessment for a proposed lodge development within the Isimangaliso Wetland Park World Heritage Site. This work is ongoing.
3. **Quarry Development for the Upgrade of Sani Pass –** Visual Impact Assessments for two proposed quarry developments on the edge of the uKhalamba-Drakensburg World Heritage Site.
4. **Mtubatuba to St Lucia Overhead Power Line** – Visual Impact Assessment for a proposed power line bordering on the Isimangaliiso Wetland Park World Heritage Site for Eskom.
5. **St Faiths 400/132 kV Sub-Station and Associated Power Lines** - Visual Impact Assessment for a proposed new major sub-station and approximately 15 km of overhead power line for Eskom.
6. **Clocolan to Ficksburg Overhead Power Line** – Visual Impact Assessment for a proposed power line for Eskom.
7. **Solar Plant Projects including Photovoltaic and Concentrating Solar Power Plants** – Numerous projects for Eskom and private clients in the Northern Cape, Limpopo, Mpumalanga and the Free State.
8. **Moorreesburg Wind Farm.** Visual impact assessment for a proposed new wind farm in the Western Cape.
9. **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.
10. **Camperdown Industrial Development** - Visual Impact Assessment for proposed new light industrial area to the north o Camperdown for a private client.
11. **Wild Coast N2 Toll Highway** – Peer review of VIA undertaken by another consultant.
12. **Gamma to Grass Ridge 765kv transmission line** – Peer review of VIA undertaken by another consultant.
13. **Gateway Shopping Centre Extension (Durban)** – Visual Impact Assessment for a proposed shopping centre extension in Umhlanga, Durban.
14. **Kouroussa Gold Mine (Guinea)** – Visual impact assessment for a proposed new mine in Guinea working with SGS as part of their EIA team.
15. **Mampon Gold Mine (Ghana)** - Visual impact assessment for a proposed new mine in Ghana working with SGS as part of their EIA team.
16. **Telkom Towers** – Visual impact assessments for numerous Telkom masts in KwaZulu-Natal
17. **Dube Trade Port, Durban International Airport** – Visual Impact Assessment for a new international airport.
18. **Sibaya Precinct Plan** – Visual Impact Assessment as part of Environmental Impact Assessment for a major new development area to the north of Durban.

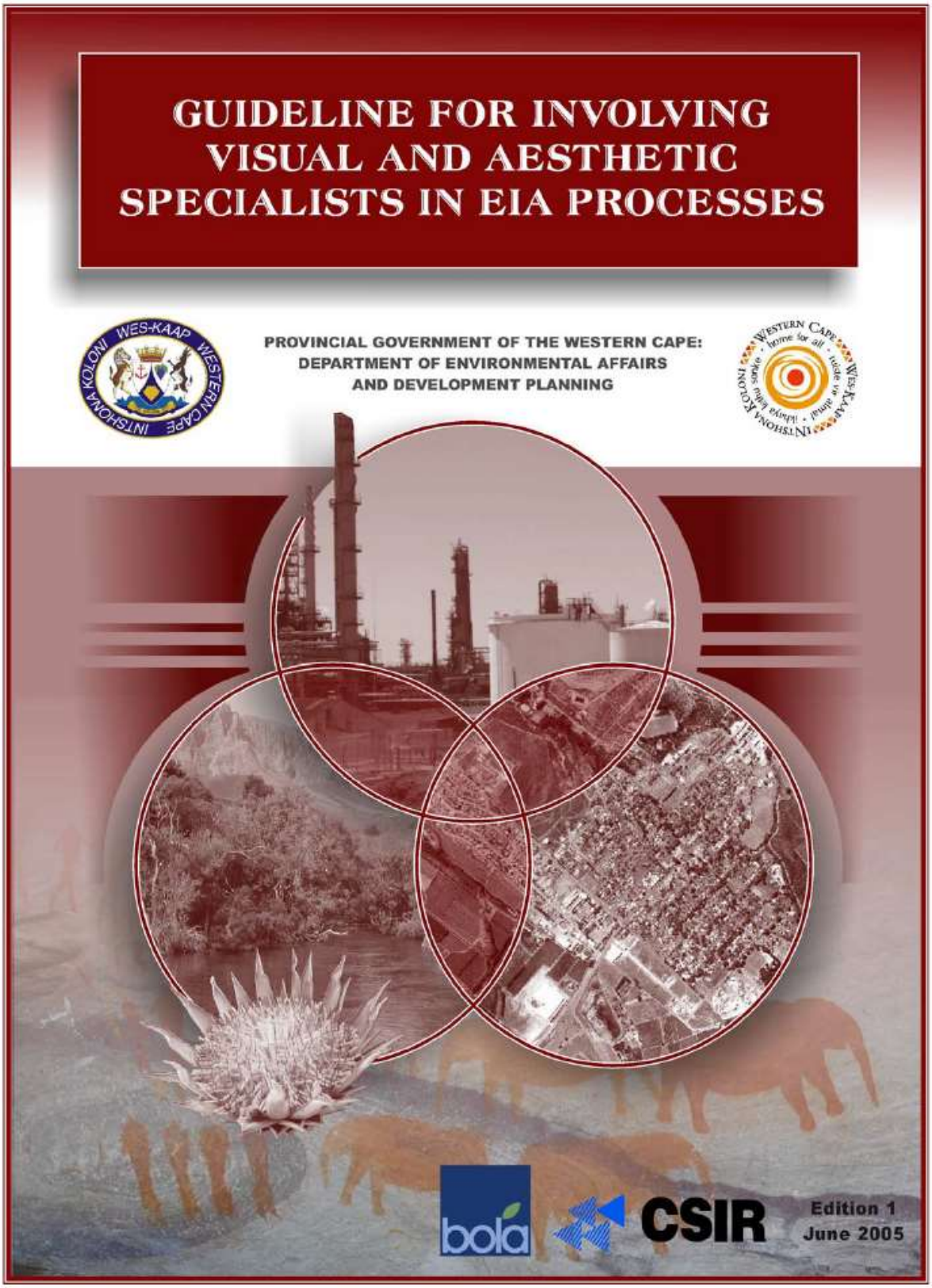
19. **Umdloti Housing** – Visual Impact Assessment as part of Environmental Impact Assessment for a residential development beside the Umdloti Lagoon to the north of Durban.
20. **Tata Steel Ferrochrome Smelter** - Visual impact assessment of proposed new Ferrochrome Smelter in Richards Bay as part of EIA undertaken by the CSIR.
21. **Diamond Mine at Rooipoort Nature Reserve near Kimberley** – Visual impact assessment for a proposed diamond mine within an existing nature reserve for De Beers.
22. **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.
23. **Hillside Aluminium Smelter, Richards Bay -** Visual Impact Assessment of proposed extension of the existing smelter. The project utilised 3d computer visualisation techniques.
24. **Estuaries of KwaZulu Natal Phase 1 and Phase 2 –** 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.
25. **Signage Assessments** – Numerous impact assessments for proposed signage developments for Blast Media.
26. **Signage Strategy** – Preparation of an environmental strategy report for a national advertising campaign on National Roads for Visual Image Placements.
27. **Zeekoegatt, Durban** - Computer aided visual impact assessment. 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.
28. **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.
29. **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.
30. **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.
31. **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.
32. **Southgate Industrial Park, Durban** - Computer Aided Visual Impact Assessment and Landscape Design for AECI.
33. **Sainsbury's Bryn Rhos (UK)** - Computer Aided Visual Impact Assessment/ Planning Application for the development of a new store within the Green Wedge North of Swansea.
34. **Ynyston Farm Access (UK)** - Computer Aided Impact Assessment of visual intrusion of access road to proposed development in Cardiff for the Land Authority for Wales.

35. **Cardiff Bay Barrage (UK)** - Concept Design, Detail Design, Documentation, and Visual Input to Environmental Statement for consideration by Parliament in the debate prior to the passing of the Cardiff Bay Barrage Bill. The work was undertaken for Cardiff Bay Development Corporation.
36. **A470, Cefn Coed to Pentrebach (UK)** - Preparation of frameworks for the assessment of the impact of the proposed alignment on the landscape for The Welsh Office.
37. **Sparkford to Illchester Bye Pass (UK)** - The preparation of the landscape framework and the draft landscape plan for the Department of Transport.
38. **Green Island Reclamation Study (Hong Kong)** - Visual Impact Assessment of building massing, Urban Design Guidelines and Masterplanning for a New Town extension to Hong Kong Island.
39. **Route 3 (Hong Kong)** - Visual Impact Assessment for alternative road alignments between Hong Kong Island and the Chinese Border.
40. **China Border Link (Hong Kong)** - Visual Impact Assessment and initial Landscape Design for a new border crossing at Lok Ma Chau.
41. **Route 81, Aberdeen Tunnel to Stanley (Hong Kong)** - Visual Impact Assessment for alternative highway alignments on the South side of Hong Kong Island.

APPENDIX II

GUIDELINES FOR INVOLVING VISUAL AND AESTHETIC SPECIALISTS IN EIA PROCESSES

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


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

Edition 1

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Stakeholders engaged in the guideline development process:

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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Finalisation of report figures and formatting:

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PREFACE

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

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

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

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

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

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

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

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

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

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

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

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

Who is the target audience for these guidelines?

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

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

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

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

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

What will these guidelines not do?

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

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

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

How are these guidelines structured?

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

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

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

SUMMARY

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

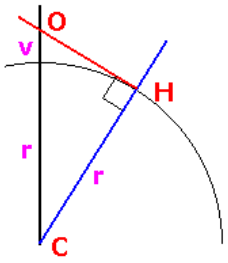
CONTENTS

APPENDIX II1

FORMULA FOR DERIVING THE APPROXIMATE VISUAL HORIZON

The Mathematics behind this Calculation

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



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

APPENDIX IV

CUMULATIVE IMPACT ASSESSMENT

1 Landscape Change

Nature:
Adding to the industrialisation of landscape character associated with the authorised project as well as other authorised projects in the Karoshoek Valley.

The assessment has shown that the proposed extension to capacity of the authorised project is unlikely to result in a significant increase in visibility of the project within the landscape. This is in due to;

- The extent of natural area that will remain between receptors and the project;
- The distance between receptors and the project;
- Because the project where visible will be viewed in elevation; and
- The fact that minor ridgelines and undulations in the valley floor will help to screen views of the development for receptors.

	Without mitigation	**With mitigation**
Extent	Site and surroundings, (2)	(2)
Duration	Long term (4)	Long term (4)
Magnitude	Minor (2)	Small (0)
Probability	Probable (3)	Probable (3)
Significance	**Low (24)**	**Low (18)**
Status (positive or negative)	Negative	Negative
Reversibility	High	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	NA

Mitigation:
Planning:

- Plan 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;

Operations:

- Reinstate any areas of vegetation that have been disturbed during construction;
- Remove all temporary works;
- Monitor rehabilitated areas post-decommissioning and implement remedial actions;
- Minimise disturbance and maintain existing vegetation as far as is possible both within and surrounding the development area;
- Colouring of mirror backs;

Decommissioning:

- Remove infrastructure not required for the post-decommissioning use of the site;
- Return all affected areas to productive agricultural use;
- Monitor rehabilitated areas post-decommissioning and implement remedial actions.

2 Impact on Local Homesteads

Nature:
Industrialisation of a natural landscape as seen from local homesteads.

It is possible that mirror backs could be obvious in the landscape due to colour changes in early to mid-morning from the west and late to mid-afternoon from the east.

The Orange River Corridor has the largest concentration of homesteads within the study area. Ilanga CSP 2 is approximately 11.4km away from the Orange River Corridor and a range of small hills separates the site from this area. This means that possible receptors in this area will be unaffected.

Six agricultural homesteads have been identified both within the approximate visual limit and within the valley floor surrounding the proposed development CSP2. All of the homesteads are definitely in low areas and are likely to be screened from the development by landform.

Views into the site from local homesteads therefore will be very limited and where possible the proposed development will largely be seen in elevation. This means that whilst the character of the landscape surrounding the proposed development will undoubtedly change due to authorised development, this change is unlikely to be exacerbated by the proposed extension to CSP 5.

	Without mitigation	**With mitigation**
Extent	Local, **(1)**	**(1)**
Duration	Long term, **(4)**	**(4)**
Magnitude	Small, **(0)**	**(0)**
Probability	Very improbable, **(1)**	**(1)**
Significance	**Low, (5)**	**(5)**
Status (positive or negative)	Negative	Negative
Reversibility	High	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	NA

Mitigation:
Planning:

- Plan 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;

Operations:

- Reinstate any areas of vegetation that have been disturbed during construction;
- Remove all temporary works;
- Monitor rehabilitated areas post-decommissioning and implement remedial actions;
- Minimise disturbance and maintain existing vegetation as far as is possible

both within and surrounding the development area;

Decommissioning:

- Remove infrastructure not required for the post-decommissioning use of the site;
- Return all affected areas to productive agricultural use; and
- Monitor rehabilitated areas post-decommissioning and implement remedial actions.

3 The visibility of the facility to, and potential visual impact on users of roads in close proximity

Nature:

Proposed Solar projects within the Karoshoek Valley will add industrial elements to an otherwise natural landscape. Industrialisation of a natural landscape as seen from the local Kleinbegin road to the west and the N10 and N14 to the north.

The assessment has shown that;

- Ilanga CSP 5 including the proposed additional capacity is highly unlikely to be obvious from the N10 or the N14.
- It is likely that the proposed extension areas could be visible from short sections of this road. However, given the distance, it is unlikely that the development will be obvious in the landscape.
- It is highly unlikely that the proposed expansion of Parabolic Trough development within Ilanga CSP 5 will significantly increase the impact associated with the currently authorised site.

The proposed expansion of capacity of the Ilanga CSP 5 plant will therefore not add significantly to the cumulative impact of solar projects within the Karoshoek Valley.

	Without mitigation	**With mitigation**
Extent	Local, **(1)**	**(1)**
Duration	Long term, **(4)**	**(4)**
Magnitude	Small, **(0)**	**(0)**
Probability	Improbable **(2)**	Very Improbable **(1)**
Significance	**Low, (10)**	**Low, (5)**
Status (positive or negative)	Negative	Negative
Reversibility	High	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	NA

Mitigation:

Planning:

- Plan 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;

Operations:

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

Decommissioning:

- Remove infrastructure not required for the post-decommissioning use of the site; and
- Return all affected areas to productive agricultural use;
- Monitor rehabilitated areas post-decommissioning and implement remedial actions.

4 The visibility of the facility to, and potential visual impact on sensitive receptors

Nature:
Proposed Solar projects within the Karoshoek Valley will add industrial elements to an otherwise natural landscape. Industrialisation of a natural landscape as seen by other sensitive receptors other than roads and homesteads. This might include tourism operations.

From the site visit and knowledge of the area there do not appear to be any other receptors within the approximate limit of visibility that are likely to be sensitive to changes of view associated with the proposed extension of Ilanga CSP 5.

The proposed development is therefore highly unlikely to increase the cumulative impact associated with other authorised projects in the area.

	Without mitigation	**With mitigation**
Extent	Local, **(1)**	**(1)**
Duration	Long term, **(4)**	**(4)**
Magnitude	Small, **(0)**	**(0)**
Probability	Very improbable, **(1)**	**(1)**
Significance	**Low, (7)**	**(7)**
Status (positive or negative)	Negative	Negative
Reversibility	High	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	NA

Mitigation:
Planning:

- Plan 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;

Operations:

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

Decommissioning:

- Remove infrastructure not required for the post-decommissioning use of the site; and
- Return all affected areas to productive agricultural use;

Monitor rehabilitated areas post-decommissioning and implement remedial actions.

5 Visual impacts associated with construction of the proposed project.

Nature:

There are numerous solar projects authorised and planned for the Karoshoek Valley. The cumulative impact of construction sites associated with alternative energy projects.

It is possible that a number of construction projects will occur at any one time. This could create the impression that extensive areas of natural landscape are subject to development. Dust and plant may be visible; however, it is not likely to be highly obvious.

Construction will be comprised of:

- Clearance of site;
- Construction of associated infrastructure;
- laying of concrete bases for parabolic troughs and power plant;
- Erection and fixing of parabolic troughs and power plant; and
- Laying of cable runs and connections.

This work is relatively minor and each project is likely to be completed in six months.

Construction work associated with Ilanga CSP 5 is unlikely to be highly visible however the following impacts could make it obvious to receptors;

- Additional delivery trucks on local roads
- Additional dust rising from an extended site area
- Additional waste blow affecting surrounding areas.

These issues could exacerbate the general impact of construction.

	Without mitigation	**With mitigation**
Extent	Site and surrounds, **(2)**	Local, **(1)**

Duration	Very short term, **(1)**	**(1)**
Magnitude	Minor **(2)**	Small, **(0)**
Probability	Probable, **(3)**	Possible, **(2)**
Significance	Low, **(15)**	Low, **(4)**
Status (positive or negative)	Negative	Negative
Reversibility	High	High
Irreplaceable loss of resources?	There will be no irreplaceable loss.	There will be no irreplaceable loss.
Can impacts be mitigated?	Yes	NA

Mitigation:

- Minimise clearance of vegetation;
- undertake dust prevention measures;
- Maintain stockpiles to less than 3 m high; and

Manage waste effectively and prevent waste blowing around and off site.

6 Possible impact of glint and glare.

Nature:
The cumulative impact of the project on glint and glare associated with solar projects in the area.

The assessment indicates that the proposed extension of capacity of Ilanga CSP 5 is unlikely to create glint and glare impacts. It is therefore also unlikely to contribute to glint and glare associated with solar projects in the area.

	Without mitigation	**With mitigation**
Extent	Local **(1)**	NA
Duration	Long term (4)	NA
Magnitude	Small **(0)**	NA
Probability	Very improbable **(1)**	NA
Significance	**Low (5)**	**NA**
Status (positive or negative)	Negligible	NA
Reversibility	High	NA
Irreplaceable loss of resources?	No	NA
Can impacts be mitigated?	NA	NA

Mitigation:
Mitigation is not necessary as no impact is anticipated.

7 Night Time Lighting Impacts

Nature:
The cumulative impact of the lighting associated with other solar energy projects in the area.

Currently lighting in the area is comprised of occasional low level lights associated with isolated homesteads. The project is therefore seen in a relatively dark area during night time hours.

There is potential for security lighting and operational lighting associated with solar energy projects to transform the night time landscape in the area.

The extent of lighting associated with solar projects in the area is not known. The assessment found that;

- If full security floodlighting of facilities is required then, the proposed extension of Ilanga CSP 5 capacity will add slightly to impacts associated with this project;
- If full security floodlighting is not required and only low level lighting of operational areas (buildings), then the proposed extension will add negligible additional impact to the authorised project.

In the former case, the proposed extension will add slightly to cumulative impacts.

In the latter case, the proposed extension will not add to cumulative impacts.

	Without mitigation	**With mitigation**
Extent	Site and immediate surroundings **(2)**	Local **(1)**
Duration	Long term **(4)**	Long term **(4)**
Magnitude	Low **(4)**	Small **(0)**
Probability	Definite **(5)**	Improbable **(2)**
Significance	**Medium (50)**	**Low (10)**
Status (positive or negative)	Negative	Negative
Reversibility	High	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	NA

Mitigation:

1) Use of motion sensors to turn on security lights when needed.
2) Use of infrared security systems.
3) Preventing light spill through careful design.