THE PROPOSED BLOEMSMOND 5 SOLAR PROJECT, NORTHERN CAPE PROVINCE, SOUTH AFRICA

Final Visual Impact Basic Assessment Report

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Document prepared for Cape EAPrac (Pty) Ltd

On behalf of Bloemsmond Solar 5 (Pty) Ltd

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LIST OF ACRONYMS

APHP	Association of Professional Heritage Practitioners
BLM	Bureau of Land Management (United States)
BOO	Build, Own, and Operate
BPEO	Best Practicable Environmental Option
CALP	Collaborative for Advanced Landscape Planning
CFPS	Coal Fired Power Station
DEM	Digital Elevation Model
DEA&DP	Department of Environmental Affairs & Development Planning
DoC	Degree of Contrast
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
NTC	NTC (Pty) Ltd
ESIA	Environmental and Social Impact Assessment
GIS	Geographic Information System
GPS	Global Positioning System
I&APs	Interested and Affected Parties
IDP	Integrated Development Plan
IEMA	Institute of Environmental Management and Assessment (United Kingdom)
IEMP	Integrated Environmental Management Plan
KOP	Key Observation Point
LVIA	Landscape and Visual Impact Assessment
MAMSL	Metres above mean sea level
NELPAG	New England Light Pollution Advisory Group
NHCC	National Heritage Conservation (Zambia)
PP	Public participation
PSDF	Provincial Spatial Development Framework
SDF	Spatial Development Framework
SEA	Strategic Environmental Assessment
ToR	Terms of Reference
VAC	Visual Absorption Capacity
VIA	Visual Impact Assessment
VRM	Visual Resource Management
VRMA	Visual Resource Management Africa
ZVI	Zone of Visual Influence

GLOSSARY OF TECHNICAL TERMS

Technical Terms	**Definition** (Oberholzer, 2005)
Degree of Contrast	The measure in terms of the form, line, colour and texture of the existing landscape in relation to the proposed landscape modification in relation to the defined visual resource management objectives.
Visual intrusion	Issues are concerns related to the proposed development, generally phrased as questions, taking the form of "what will the impact of some activity be on some element of the visual, aesthetic or scenic environment".
Receptors	Individuals, groups or communities who would be subject to the visual influence of a particular project.
Sense of place	The unique quality or character of a place, whether natural, rural or urban.
Scenic corridor	A linear geographic area that contains scenic resources, usually, but not necessarily, defined by a route.
Viewshed	The outer boundary defining a view catchment area, usually along crests and ridgelines. Similar to a watershed. This reflects the area, or the extent thereof, where the landscape modification would probably be seen.
Visual Absorption Capacity	The potential of the landscape to conceal the proposed project.

Technical Term	**Definition** (USDI., 2004)
Key Observation Point	Receptors refer to the people located in the most critical locations, or key observation points, surrounding the landscape modification, who make consistent use of the views associated with the site where the landscape modifications are proposed. KOPs can either be a single point of view that an observer/evaluator uses to rate an area or panorama, or a linear view along a roadway, trail, or river corridor.
Visual Resource Management	A map based landscape and visual impact assessment method development by the Bureau of Land Management (USA).
Zone of Visual Influence	The ZVI is defined as 'the area within which a proposed development may have an influence or effect on visual amenity.'

1 INTRODUCTION

1.1 Terms of Reference

Visual Resource Management Africa CC (VRMA) was appointed by Cape EAPrac (Pty) Ltd, on behalf of Bloemsmond 3 (Pty) Ltd, to undertake a ***Visual Impact Assessment*** for the proposed development located in the North Cape Province, South Africa. The process that VRM Africa follows when undertaking a VIA is based on the United States Bureau of Land Management's (BLM) Visual Resource Management method (USDI., 2004). This mapping and GIS-based method of assessing landscape modifications allows for increased objectivity and consistency by using standard assessment criteria.

The scope of this study is to cover the entire proposed project area. The broad terms of reference for the study are as follows:

- Collate and analyse all available secondary data relevant to the affected proposed project area. This includes a site visit of the full site extent, as well as of areas where potential impacts may occur beyond the site boundaries.
- Specific attention is to be given to the following:
    - Quantifying and assessing existing scenic resources/visual characteristics on, and around, the proposed site;
    - Evaluation and classification of the landscape in terms of sensitivity to a changing land use;
    - Determining viewsheds, view corridors and important viewpoints in order to assess the visual impacts of the proposed project;
    - Determining visual issues, including those identified in the public participation process;
    - Reviewing the legal framework that may have implications for visual/scenic resources;
    - Assessing the significance of potential visual impacts resulting from the proposed project for the construction, operation and decommissioning phases of the proposed project;
    - Assessing the potential cumulative impacts associated with the visual impact;
    - Generate photomontages of the proposed landscape modification;
    - Identifying possible mitigation measures to reduce negative visual impacts for inclusion into the proposed project design, including input into the Environmental Management Programme (EMPr).

1.2 Study Team

Contributors to this study are summarised in Table 1 below.

Table 1: Authors and Contributors to this Report.

Aspect	Person	Organisation / Company	Qualifications
Landscape and Visual Assessment (author of this report)	Stephen Stead B.A (Hons) Human Geography, 1991 (UKZN, Pietermaritzburg)	VRMA	• Accredited with the Association of Professional Heritage Practitioner and • 16 years of experience in visual assessments including renewable energy, powerlines, roads, dams across southern Africa.
Contrast rating and editing.	Lisa Schultz B.A Fine Art 1989 (UKZN, Pietermaritzburg)	VRMA	• 12 years of experience in contrast ratings.

1.3 Visual Assessment Approach

The following approach was used in understanding the landscape processes and informing the magnitude of the impacts of the proposed landscape modification. The table below lists a number of standardised procedures recommended as a component of best international practice.

Table 2: Methodology Summary Table

Action	*Description*
Site Survey	The identification of existing scenic resources and sensitive receptors in and around the study area in order to understand the context of the proposed development within its surroundings. This is to ensure that the intactness of the landscape and the prevailing sense of place are taken into consideration.
Project Description	Provide a description of the expected project, and the components that will make up the landscape modification.
Reviewing the Legal Framework	The legal, policy and planning framework that may have implications for visual aspects of the proposed development. Heritage legislation tends to be pertinent in relation to natural and cultural landscapes, while Strategic Environmental Assessments (SEAs) for renewable energy provide a guideline at the regional scale.
Determining the Zone of Visual Influence	This includes mapping of viewsheds and view corridors in relation to the proposed project elements, in order to assess the zone of visual influence of the proposed project. Based on the topography of the landscape as represented by a Digital Elevation Model, an approximate area is defined which provides an expected area where the landscape modification has the potential to influence landscapes (or landscape processes) or receptor viewpoints.
Identifying Visual Issues and Visual Resources	Visual issues are identified during the public participation process, which is being carried out by other specialists. The visual, social or heritage specialists may also identify visual issues. The significance and proposed mitigation of the visual issues are addressed as part of the visual assessment.

Assessing Potential Visual Impacts	An assessment is made of the significance of potential visual impacts resulting from the proposed project for the construction, operational and decommissioning phases of the project. The rating of visual significance is based on the methodology provided by the Environmental Assessment Practitioner (EAP), in this case NTC Environmental, to ensure consistency across the various specialist studies.
Formulating Mitigation Measures	Possible mitigation measures are identified to avoid or minimise negative visual impacts of the proposed project. The intention is that these would be included in the project design, the Environmental Management programme (EMPr) and the authorisation conditions.

The above table makes reference to the DEA&DP Visual and Aesthetic Guideline (Oberholzer, 2005)

1.4 Assumptions and Uncertainties

- Digital Elevation Models (DEM) and viewsheds were generated using ASTER elevation data (NASA, 2009). Although every effort to maintain accuracy was undertaken, as a result of the DEM being generated from satellite imagery and not being a true representation of the earth's surface, the viewshed mapping is approximate and may not represent an exact visibility incidence. Thus specific features identified from the DEM and derive contours (such as peaks and conical hills) would need to be verified once a detailed survey of the project area took place.
- The use of open source satellite imagery was utilised for base maps in the report;
- Some of the mapping in this document was created using Bing Maps, Open Source Map, ArcGIS Online and Google Earth Satellite imagery.
- The project deliverables, including electronic copies of reports, maps, data, shape files and photographs are based on the author's professional knowledge, as well as available information.
- VRM Africa reserves the right to modify aspects of the project deliverables if and when new/additional information may become available from research or further work in the applicable field of practice, or pertaining to this study.
- Due to limited accessibility of the area, northwest portions of the site could not be accessed but high points were gained in order to allow viewing of most of these areas.

2 PROJECT DESCRIPTION

The following text and tables outline the client's project description. The preferred layout plan, project examples and project alternatives can be viewed in the following Figures:

Figure 14: Proposed site layout plan for the preferred development option (Bloemsmond PV 5)

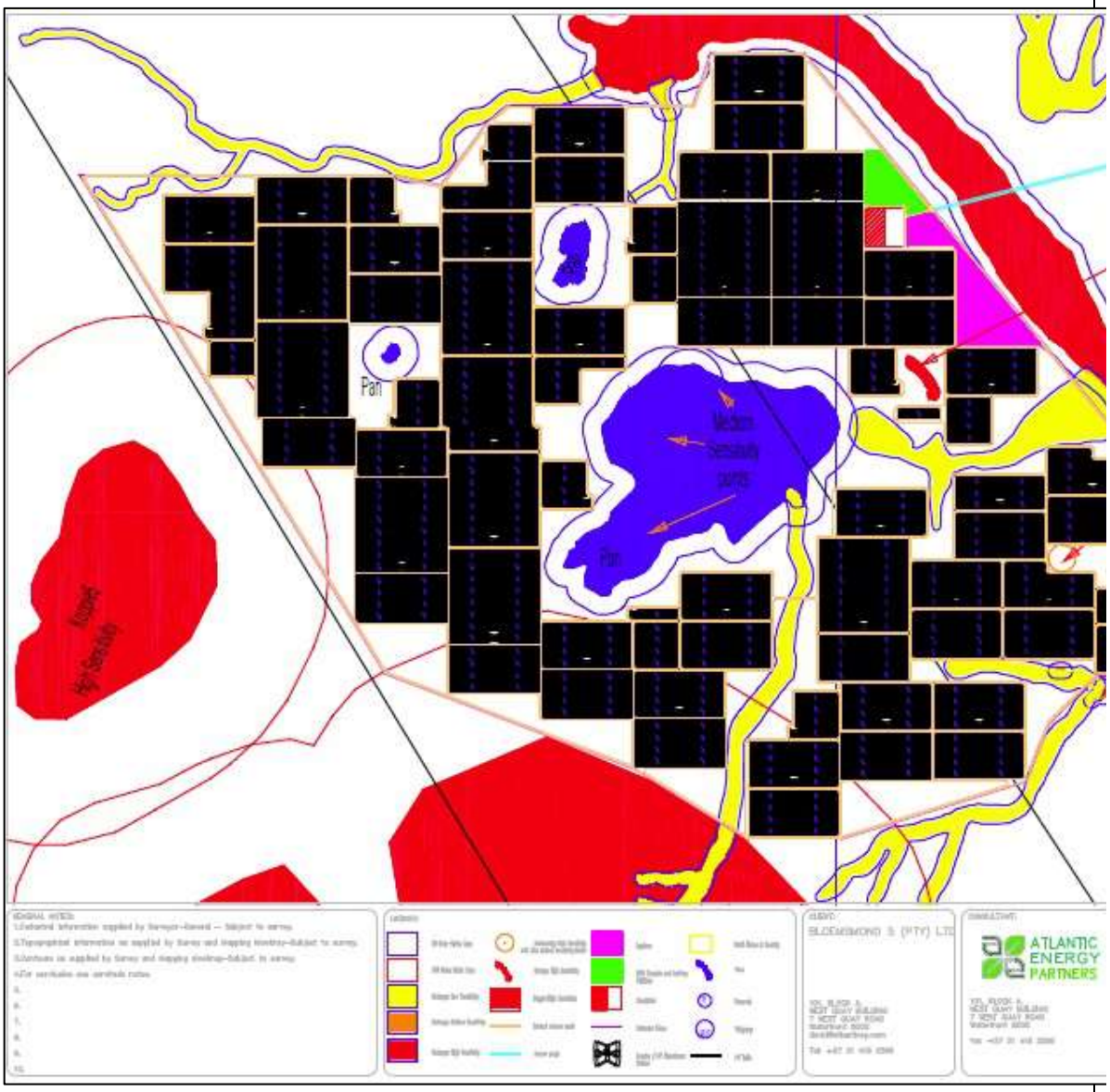

Figure 14: Proposed site layout

Figure 15: Proposed project PV and Road Access Alternatives mapping overlay onto Google Earth satellite imagery (filled polygons represent authorised, un-built PV projects).

Figure 16: Photographic example of standard Solar PV panels and a generic 3D graphic indicating typical fixed installation structure.

2.1.1 Project Description Provided by the client

The PV energy facility is to consist of solar photovoltaic (PV) technology, fixed-tilt-, single-axis tracking or dual-axis tracking mounting structures, with a net generating capacity of 100 MW as well as associated infrastructure, which will include:

- On-site switching-station / substation;
- Auxiliary buildings (gate-house and security, control centre, office, warehouse, canteen & visitors centre, staff lockers etc.);
- Inverter-stations, transformers and internal electrical reticulation (underground cabling);
- Access and internal road network;
- Laydown area;
- Upington MTS (400/132 kV), via the 132kV Bloemsmond Collector Substation (either of, or a combination of, the approved Bloemsmond 1 and 2 Substations). In all cases above, Bloemsmond 3, 4 & 5 will connect at 132kV to the Upington MTS, via the 132kV Bloemsmond Collector Substation.
- Rainwater tanks; and
- Perimeter fencing and security infrastructure.

Table 3: Project Details Table

Applicant Details		
Applicant Name:	Bloemsmond Solar 5 (Pty) Ltd	
Company Registration Number:	2019 / 217700 / 07	
BBBEE Status:	n/a	
Project Name:	Bloemsmond 5	
Site Details		
Size of the property	Description and Size in hectares of the affected property.	**PV Site**: Portion 5 and Portion 14 of the Farm Bloemsmond 455. Total Property Size: 4829.8239 ha
Size of the study area	Size in ha of initial study area.	520ha
Development Footprint	This includes the total footprint of PV panels, auxiliary buildings, onsite substation, inverter stations and internal roads.	Approximately 320ha
Technology Details		
Capacity of the facility	Capacity of facility (in MW)	Net generating capacity 100MW
Solar Technology selection	Type of technology	Solar photovoltaic (PV) with either of fixed-tilt-, single-axis tracking or dual-axis tracking mounting structures.

	Structure height	Solar panels a maximum of ± 3.5m from ground level
	Surface area to be covered (including associated infrastructure such as roads)	Approximately 355ha
	Structure orientation	Fixed-tilt: north-facing at a defined angle of tilt Single-axis: horizontal axis tracking from east to west
	Laydown area dimensions	Approximately 2-5ha of laydown area will be required (the laydown areas will not exceed 5ha and will be situated within the assessed footprint).

Component	Description/ Dimensions
Location of the site	Approximately 25km West of Upington along the N14
PV Panel area	A maximum of 250ha with a total project footprint of approximately 310ha
SG Codes	C02800000000045500014 C02800000000045500005
Preferred Site access	Via the same entrance as the Bloemsmond Phases 1 & 2 off the N14.
Export capacity	100 MW
Proposed technology	PV with fixed-tilt-, single-axis tracking- or dual-axis tracking-mounting structures.
Height of installed panels from ground level	Solar panels a maximum of ± 3.5m from ground level
Width and length of internal roads	Roads - width: up to 8m, length: up to 15km

2.1.2 Project Alternatives

Two project footprints are proposed. The Bloemsmond PV 5 is the preferred project alternative. The area is located north of the authorised Bloemsmond PV 1 & 2 projects that are currently unbuilt. The alternative project site is Bloemsmond Alternative 2 site which is located to the north of the property and is approximatley 10km north of the authorised Bloemsmond PV 1 & 2 projects.

Two road access alternatives are also proposed, access from two points off the N14 National Road. The preferred routing is the western road access which follows the western farm cadastral, cutting across to the various PV footprint areas. The alternative road access is aligned with the eastern farm cadastral. The southern portion of the

western access route, and access off the N14 National Road, has already been authorised as part of the Bloemsmond PV 1 & 2 projects.

3 LEGAL FRAMEWORK

In order to comply with the Visual Resource Management requirements, it is necessary to relate the proposed landscape modification in terms of International Best Practice in understanding landscapes and landscape processes. The proposed project also needs to be evaluated in terms of 'policy fit'. This requires a review of National and Regional policy and planning for the area to ensure that the scale, density and nature of activities or developments are harmonious and in keeping with the planned sense of place and character of the area. The following maps provides the spatial context to the provincial and local governments:

As can be see in the National and Regional locality map, the property is located in the Kai !Garib Local Municipality in the ZF Mgcawu District which is located within the Northern Cape Province.

3.1 Guidelines for International and National Good Practice

For cultural landscapes, the following documentation provides good practice guidelines, specifically:

- United Kingdom Guidelines for Landscape and Visual Impact Assessment (GLVIA), Second Edition;
- DEA&DP Visual and Aesthetic Guideline;
- DEA&DP Hills and Ridges Guideline.

3.1.1 Guidelines for Landscape and Visual Impact Assessment, Second Edition

The Landscape Institute and the Institute of Environmental Management and Assessment (United Kingdom) have compiled a book outlining best practice in landscape and visual impact assessment. This has become a key guideline for LVIA in the United Kingdom. "The principal aim of the guideline is to encourage high standards for the scope and context of landscape and visual impact assessments, based on the collegiate opinion and practice of the members of the Landscape Institute and the Institute of Environmental Management and Assessment. The guidelines also seek to establish certain principles and will help to achieve consistency, credibility and effectiveness in landscape and visual impact assessment, when carried out as part of an EIA" (The Landscape Institute, 2003);

In the introduction, the guideline states that 'Landscape encompasses the whole of our external environment, whether within village, towns, cities or in the countryside. The nature and pattern of buildings, streets, open spaces and trees – and their interrelationships within the built environment – are an equally important part of our

landscape heritage" (The Landscape Institute, 2003: Pg. 9). The guideline identifies the following reasons why landscape is important in both urban and rural contexts, in that it is:

- An essential part of our natural resource base;
- A reservoir of archaeological and historical evidence;
- An environment for plants and animals (including humans);
- A resource that evokes sensual, cultural and spiritual responses and contributes to our urban and rural quality of life;
- A valuable recreation resource. (The Landscape Institute, 2003);

Comment

The proposed development is not sited in an area that forms an essential part of the natural resource base or in an area of archaeological and historical significance. No recreation resources were identified on site or in the immediate surrounds.

3.1.2 DEA&DP Visual and Aesthetic Guidelines

Reference to the Western Cape Department of Environmental Affairs and Development Planning (DEA&DP) Guideline for involving visual and aesthetic specialists in EIA processes is provided in terms of southern African best practice in Visual Impact Assessment. The report compiled by Oberholzer states that the Best Practicable Environmental Option (BPEO) should address the following:

- Ensure that the scale, density and nature of activities or developments are harmonious and in keeping with the sense of place and character of the area. The BPEO must also ensure that development must be located to prevent structures from being a visual intrusion (i.e. to retain open views and vistas).
- Long term protection of important scenic resources and heritage sites.
- Minimisation of visual intrusion in scenic areas.
- Retention of wilderness or special areas intact as far as possible.
- Responsiveness to the area's uniqueness, or sense of place. (Oberholzer, 2005)

Comment

While the site is flat and has no unique landscape resources, the areas to the west depict some unique land forms which includes dune-scape and, rocky outcrops which when combined with the Nama-karoo landscape and remoteness of the locality, do create opportunities for eco-tourism. To date, these scenic resources have not been taken up, other than for the use of game farming in the area.

3.1.3 DEA&DP Guideline for the Management of Development on Mountains, Hills and Ridges in the Western Cape.

The following environmental characteristics will serve as key indicators of environmental sensitivity for the directorates. As such they will serve as critical factors in the Directorate's decision-making process when determining whether to authorise or refuse a development application made in terms of the EIA Regulations:

- Development on steep slopes (i.e. steeper than 1:4) will be strongly discouraged as such areas are subject to erosion and instability. Slope steepness will be evaluated for the area of the site where development is being proposed and not for

the site as a whole. As a principle, development should be located on lower-lying or gently sloping portions of a site;
- Development on the crest of a mountain, hill or ridge will be strongly discouraged;
- Development in an area, which has been declared a mountain catchment area in terms of the Mountain Catchment Areas Act, Act 63 of 1970 will be strongly discouraged. (Western Cape Government, 2002)

Comment
There are no prominent hills or ridgelines on the property.

3.2 Local Government Legislation and Planning

No IDP or Spatial Planning documentation could be found in the Kai !Garib website, however, tourism is strongly emphasised. As the property falls within the REDZ7 strategic area, and many other solar renewable energy projects are located in the area, it is likely that solar energy projects are supported at a District and Local Municipal planning level. Care would need to be undertaken to ensure that the visual resources that could allow for eco-tourism in the area, are not degraded by renewable energy development.

4 METHODOLOGY

The process that VRMA follows when determining landscape significance is based on the United States Bureau of Land Management's (BLM) Visual Resource Management method (USDI., 2004). This mapping and GIS-based method of assessing landscape modifications allows for increased objectivity and consistency by using standard assessment criteria. The following key factors determine the suitability of landscape change:

- *"Different levels of scenic values require different levels of management. For example, management of an area with high scenic value might be focused on preserving the existing character of the landscape, and management of an area with little scenic value might allow for major modifications to the landscape. Determining how an area should be managed first requires an assessment of the area's scenic values".*
- *"Assessing scenic values and determining visual impacts can be a subjective process. Objectivity and consistency can be greatly increased by using the basic design elements of form, line, colour, and texture, which have often been used to describe and evaluate landscapes, to also describe proposed projects. Projects that repeat these design elements are usually in harmony with their surroundings; those that don't create contrast. By adjusting project designs so the elements are repeated, visual impacts can be minimized"* (USDI., 2004).

The assessment comprises two main sections: firstly, the ***Baseline Stage*** to identify the visual resources and key observation locations within the project zone of visual influence; and secondly, the ***Assessment Stage*** which determines the visual impacts and significance of the proposed landscape modifications.

4.1 Site Investigation

A field survey was undertaken to inform the landscape and visual impact assessment. During the site visit, photographs were taken from each viewpoint, and the view direction and GPS location captured. The main land-use was documented as well as the nature of the dominant landscape in the vista. In order to represent views of the proposed landscape modification by means of photomontages for assessment purposes, panoramic photographs were also taken from key viewpoints. A photograph from each of the sample points is documented in Annexure A: Field Survey Photograph and Comments, and mapped in the following figure:

Figure 19: Field Survey Point and Track Map

Table 4: List of Sampling Sites where Landscape and Aesthetic Survey was Conducted.

Point ID	X	Y	Landscape
1	21.06809791	-28.63181399	Road infrastructure (N14 National Road)
2	21.08118076	-28.61986542	Road infrastructure (N14 National Road)
3	21.06386464	-28.62277003	Viticulture, Rural Agriculture
4	21.05358564	-28.60894178	Rural agriculture, arid dry land
5	21.06752109	-28.60243001	Rural agriculture, arid dry land
6	21.03957331	-28.59016814	Proposed PV Project (authorised, un-built)
7	21.01861716	-28.5859351	Rocky outcrop
8	21.02181191	-28.56613816	Rural agriculture, arid dry land
9	21.03132577	-28.56138116	Rural agriculture, arid dry land
10	21.02325047	-28.54757488	Rural agriculture, arid dry land
11	20.99165433	-28.54660894	Rocky outcrop
12	20.99912679	-28.53595322	Pan, arid dry land
13	20.98045678	-28.51139125	Rural agriculture, arid dry land

Survey Date: 21 May 2019
Survey Conditions: Clear.
Atmospheric Conditions: Clear

4.2 Baseline Analysis Stage

In terms of VRM methodology, landscape character is derived from a combination of ***scenic quality***, ***receptor sensitivity*** to landscape change and ***distance*** from the proposed landscape change. The objective of the analysis is to compile a mapped inventory of the visual resources found in the receiving landscape, and to derive a mapped Visual Resource sensitivity layer from which to evaluate the suitability of the landscape change.

4.2.1 Scenic Quality

The scenic quality is determined making use of the VRM Scenic Quality Checklist (refer to Table 14 Annexure). Seven scenic quality criteria area scored on a 1 (low) to 5 (high) scale. The scores are totalled and assigned a A (High), B (Moderate) or C (low) based on the following split:
A= scenic quality rating of ≥19;
B = rating of 12 – 18,
C= rating of ≤11

The seven scenic quality criteria are defined below:

- **Land Form:** Topography becomes more of a factor as it becomes steeper, or more severely sculptured.
- **Vegetation:** Primary consideration given to the variety of patterns, forms, and textures created by plant life.
- **Water:** That ingredient which adds movement or serenity to a scene. The degree to which water dominates the scene is the primary consideration.
- **Colour:** The overall colour(s) of the basic components of the landscape (e.g., soil, rock, vegetation, etc.) are considered as they appear during seasons or periods of high use.
- **Scarcity:** This factor provides an opportunity to give added importance to one, or all, of the scenic features that appear to be relatively unique or rare within one physiographic region.
- **Adjacent Land Use:** Degree to which scenery and distance enhance, or start to influence, the overall impression of the scenery within the rating unit.
- **Cultural Modifications:** Cultural modifications should be considered, and may detract from the scenery or complement or improve the scenic quality of an area.

4.2.2 Receptor Sensitivity

Receptor Sensitivity levels are a measure of public concern for scenic quality and assessed making use of the Sensitivity Checklist (refer to Table 15 in the Annexure). Receptor sensitivity to landscape change is determined by rating the following factors in terms of Low to High:

- **Type of Users:** Visual sensitivity will vary with the type of users, e.g. recreational sightseers may be highly sensitive to any changes in visual quality, whereas workers who pass through the area on a regular basis may not be as sensitive to change.

- **Amount of Use:** Areas seen or used by large numbers of people are potentially more sensitive.
- **Public Interest:** The visual quality of an area may be of concern to local, or regional, groups. Indicators of this concern are usually expressed via public controversy created in response to proposed activities.
- **Adjacent Land Uses:** The interrelationship with land uses in adjacent lands. For example, an area within the viewshed of a residential area may be very sensitive, whereas an area surrounded by commercially developed lands may not be as visually sensitive.
- **Special Areas:** Management objectives for special areas such as Natural Areas, Wilderness Areas or Wilderness Study Areas, Wild and Scenic Rivers, Scenic Areas, Scenic Roads or Trails, and Critical Biodiversity Areas frequently require special consideration for the protection of their visual values.
- **Other Factors:** Consider any other information such as research or studies that include indicators of visual sensitivity.

4.2.3 Distance

Distance from a landscape modification influences the size and clarity of the landscape modification viewing. The Bureau of Land Management defines three distance categories:

i. ***Foreground / Middle ground***, up to approximately 6km, which is where there is potential for the sense of place to change;
ii. ***Background areas***, from 6km to 24km, where there is some potential for change in the sense of place, but where change would only occur in the case of very large landscape modifications; and
iii. ***Seldom seen areas***, which fall within the Foreground / Middle ground area but, as a result of no receptors, are not viewed or are seldom viewed.

4.2.4 Visual Resource Management Classes

These findings are then submitted to a VRM Matrix in Table 7 below. The VRM Classes are not prescriptive and are used as a guideline to determine the carrying capacity of a visually preferred landscape as a basis for assessing the suitability of the landscape change associated with the proposed project.

Table 5: VRM Class Matrix Table

		VISUAL SENSITIVITY LEVELS								
		High			Medium			Low		
SCENIC QUALITY	A (High)	II	II	II	II	II	II	II	II	II
	B (Medium)	II	III	III/ IV *	III	IV	IV	IV	IV	IV
	C (Low)	III	IV	IV	IV	IV	IV	IV	IV	IV
DISTANCE ZONES		Fore/middle ground	Background	Seldom seen	Fore/middle ground	Background	Seldom seen	Fore/middle ground	Background	Seldom seen

* If adjacent areas are **Class III** or lower, assign **Class III**, if higher, assign **Class IV**

The visual objectives of each of the classes are listed below:

- The Class I objective is to preserve the existing character of the landscape, the level of change to the characteristic landscape should be very low, and must not attract attention. Class I is assigned when a decision is made to maintain a natural landscape;
- The Class II objective is to retain the existing character of the landscape and the level of change to the characteristic landscape should be low. The proposed development may be seen, but should not attract the attention of the casual observer, and should repeat the basic elements of form, line, colour and texture found in the predominant natural features of the characteristic landscape;
- The Class III objective is to partially retain the existing character of the landscape, where the level of change to the characteristic landscape should be moderate. The proposed development may attract attention, but should not dominate the view of the casual observer, and changes should repeat the basic elements found in the predominant natural features of the characteristic landscape; and
- The Class IV objective is to provide for management activities that require major modifications of the existing character of the landscape. The level of change to the landscape can be high, and the proposed development may dominate the view and be the major focus of the viewer's (s') attention without significantly degrading the local landscape character.

4.2.5 Key Observation Points

During the Baseline Inventory Stage, Key Observation Points (KOPs) are identified. KOPs are defined by the Bureau of Land Management as the people (receptors) located in strategic locations surrounding the property that make consistent use of the views associated with the site where the landscape modifications are proposed. These locations are important in terms of the VRM methodology, which requires that the Degree of Contrast (DoC) that the proposed landscape modifications will make to the existing landscape be measured from these most critical locations, or receptors, surrounding the

property. To define the KOPs, potential receptor locations were identified in the viewshed analysis, and screened, based on the following criteria:

- Angle of observation;
- Number of viewers;
- Length of time the project is in view;
- Relative project size;
- Season of use;
- Critical viewpoints, e.g. views from communities, road crossings; and
- Distance from property.

4.3 Assessment and Impact Stage

The analysis stage involves determining whether the potential visual impacts from proposed surface-disturbing activities or developments will meet the management objectives established for the area, or whether design adjustments will be required. This requires a contrast rating to assess the expected Degree of Contrast the proposed landscape modifications would generate within the receiving landscape in order to define the Magnitude of the impact.

4.3.1 Contrast Rating

The contrast rating is undertaken to determine if the VRM Class Objectives are met. The suitability of landscape modification is assessed by comparing and contrasting existing receiving landscape to the expected contrast that the proposed landscape change will generate. This is done by evaluating the level of change to the existing landscape by assessing the line, colour, texture and form, in relation to the visual objectives defined for the area. The following criteria are utilised in defining the DoC:

- **None**: The element contrast is not visible or perceived.
- **Weak**: The element contrast can be seen but does not attract attention.
- **Moderate**: The element contrast begins to attract attention and begins to dominate the characteristic landscape.
- **Strong**: The element contrast demands attention, will not be overlooked, and is dominant in the landscape.

As an example, in a Class I area, the visual objective is to preserve the existing character of the landscape, and the resultant contrast to the existing landscape should not be notable to the casual observer and cannot attract attention. In a Class IV area example, the objective is to provide for proposed landscape activities that allow for major modifications of the existing character of the landscape. Based on whether the VRM objectives are met, mitigations, if required, are defined to avoid, reduce or mitigate the proposed landscape modifications so that the visual impact does not detract from the surrounding landscape sense of place.

Based on the findings of the contrast rating, the Magnitude of the Landscape and Visual Impact Assessment is determined.

4.3.2 Photo Montages

As a component in this contrast rating process, visual representation, such as photo montages are vital in large-scale modifications, as this serves to inform Interested & Affected Parties and decision-making authorities of the nature and extent of the impact associated with the proposed project/development. There is an ethical obligation in this process, as visualisation can be misleading if not undertaken ethically. In terms of adhering to standards for ethical representation of landscape modifications, VRMA subscribes to the Proposed Interim Code of Ethics for Landscape Visualisation developed by the Collaborative for Advanced Landscape Planning (CALP). (Sheppard D. S., 2000) This code states that professional presenters of realistic landscape visualisations are responsible for promoting full understanding of proposed landscape changes, providing an honest and neutral visual representation of the expected landscape, by seeking to avoid bias in responses and demonstrating the legitimacy of the visualisation process. Presenters of landscape visualisations should adhere to the principles of:

- Access to Information
- Accuracy
- Legitimacy
- Representativeness
- Visual Clarity and Interest

The Code of Ethical Conduct states that the presenter should:

- Demonstrate an appropriate level of qualification and experience.
- Use visualisation tools and media that are appropriate to the purpose.
- Choose the appropriate level of realism.
- Identify, collect and document supporting visual data available for, or used in, the visualisation process.
- Conduct an on-site visual analysis to determine important issues and views.
- Seek community input on viewpoints and landscape issues to address in the visualisations.
- Provide the viewer with a reasonable choice of viewpoints, view directions, view angles, viewing conditions and timeframes appropriate to the area being visualised.
- Estimate and disclose the expected degree of uncertainty, indicating areas and possible visual consequences of the uncertainties.
- Use more than one appropriate presentation mode and means of access for the affected public.
- Present important non-visual information at the same time as the visual presentation, using a neutral delivery.
- Avoid the use, or the appearance of, ‘sales’ techniques or special effects.
- Avoid seeking a particular response from the audience.
- Provide information describing how the visualisation process was conducted and how key decisions were taken (Sheppard D. S., 2000)

4.3.3 Impact Assessment Criteria

Visual impact significance impacts were defined making use of the DEA&DP Guideline for involving Visual and Aesthetic Specialists in EIA processes (Oberholzer, 2005)

Table 6: Visual Impact Assessment Criteria Table

Extent	**Geographical area of influence.** **Site Related (S):** *extending only as far as the activity* **Local (L):** limited to i*mmediate surroundings.* **Regional (R):** *affecting a larger metropolitan or regional area* **National (N):** *affecting large parts of the country* **International (I):** *affecting areas across international boundaries*
Duration	**Predicted lifespan** **Short term (S):** *duration of the construction phase.* **Medium term (M):** *duration for screening vegetation to mature.* **Long term (L):** *lifespan of the project.* **Permanent (P):** *where time will not mitigate the visual impact.*
Magnitude	**Magnitude of impact on views, scenic or cultural resources** **Low (L):** *where visual and scenic resources are not affected.* **Moderate (M)**: *where visual and scenic resources are affected* **High (H)**: *where scenic and cultural resources are significantly affected.*
Probability	**Degree of possible visual impact:** **Improbable (I):** *possibility of the impact occurring is very low.* **Probable (P):** *distinct possibility that the impact will occur.* **Highly probable (HP):** *most likely that the impact will occur.* **Definite (D):** *impact will occur regardless of any prevention measures.*
Significance	**A synthesis of nature, duration, intensity, extent and probability** **Low (L):** will not have an influence on the decision. **Moderate (M):** should have an influence on the decision unless it is mitigated. **High (H):** would influence the decision regardless of any possible mitigation.

5 BASELINE VISUAL INVENTORY ASSESSMENT

Landscape character is defined by the U.K. Institute of Environmental Management and Assessment (IEMA) as the 'distinct and recognisable pattern of elements that occurs consistently in a particular type of landscape, and how this is perceived by people. It reflects particular combinations of geology, landform, soils, vegetation, land use and human settlement'. It creates the specific sense of place or essential character and 'spirit of the place' (IEMA, 2002). This section of the VIA identified the main landscape features that define the landscape character, as well as the key receptors that make use of the visual resources created by the landscape.

5.1 Landscape Context

The following key landmarks, falling within the proposed project viewshed, were identified during the desktop assessment:

- Rural agricultural / viticultural landscape associated with the Orange River Valley.
- The N14 National Road.
- The Khi Solar One Concentrated Solar Power facility.
- Sand dune features and rocky hills.

The main landscape feature in the area is the Orange River. This landscape includes the river and residential and agricultural developments along the valley. Landform is fairly undulating and hilly, with rocky outcrops scattered along the banks where the river has eroded down creating a slight valley. Due to the proximity to water, vegetation is more prolific along the riverbank and is predominantly associated with cultivated vineyards and small-scale agriculture, although there are some larger residential developments that do detract from the overall landscape character. The cultural landscapes of this area are primarily associated with agricultural activities and vineyards on the more fertile lands along the Orange River and they add value to the overall vista. The types of receptors making use of the Orange River visual resources are mostly related to agriculture, tourism and residential. It is likely that maintaining the existing sense of place would be important to these receptors. The area is also strongly associated with the 'vineyard' cultural landscape and hence attractive to landscape based tourism.

In addition, the surrounding areas of topographic visual resources and rocky outcrops enhance the regional landscape character. Located to the west of the property is a long northwest to southeast aligned sand dune that creates an interesting linear landscape feature and should be regarded as an important local landscape feature. The arid Nama-karoo landscape that contrasts with the cultivated areas along the Orange River, significantly add value to the regional landscape character. As a result of this, the area along the Orange River is also important as a tourist destination.

The main access route in the area is the N14, which cuts through the southern section of the proposed development property. This road is an important tourist view corridor linking Upington in the northeast, to Springbok in the southwest. The route is also used to access the Augrabies Falls National Park, located approximately 60km to the west of the property. For these reason, consideration of scenic resources within the project ZVI that could add local tourist value, should be protected.

A factor that is increasingly influencing the regional landscape character is the recognition of the area around Upington as an important solar renewable energy location. The property is situated within visual proximity to the Khi Solar One Concentrated Solar Power (CSP) tower project, located 6km to the east of the property. This creates a large vertical feature in the landscape. It is likely that the area will become a solar energy hub as this area falls within the REDZ 7 renewable energy development zone. Other Solar PV projects are also located to the east of the property, as well as on the southern portions of the property.

5.1.1 Protected Areas

No protected areas are located within the Foreground / Mid-ground areas which is the expected Zone of Visual Influence of the project. The nearest protected area being Augrabies National Park located approximately 60km to the west of the property.

5.1.2 Topography

Topography is a crucial factor in determining the landscape as the fall of the land often defines mountain and river features. To better understand the topography, a regional Digital Elevation Model (DEM) was generated using NASA ASTER 90m DEM data (NASA, 2009). The data is generalised, and although will not reflect smaller topographic features, it is useful in understanding the broader topographical landscape character. A regional Digital Elevation Map is also useful to determine general drainage of the site. To assist in the understanding of the elevation map, a graphical representation of the terrain was also implemented with lines running through the study area. These maps can be viewed in:

Figure 20: Bloemsmond PV 5 Regional Steep Slopes, Scenic Resources and Elevation Profile Locality Map.
Figure 21: Bloemsmond PV Alternative 2 Regional Steep Slopes, Scenic Resources and Elevation Profile Locality Map.
Figure 22: Bloemsmond PV 5 Regional topographic profile graphs.
Figure 23: Bloemsmond PV Alternative 2 Regional topographic profile graphs.

<u>Bloemsmond PV 5</u>

The east to west profile depicts a predominantly flat terrain, with high elevations to the west in the within close proximity to the proposed site which include low hills and rocky outcrops. While this does reduce expansion to the areas west of the property, these rocky outcrops and low hills to the west increase scenic quality. The south to north profile also confirms a predominately flat terrain, with the proposed footprint located in low lying ground. This is confirmed on site where one large, two small pans, were found. The pans were devoid of water, but Google Earth satellite imagery does depict the pans fills with water after seasonal rains. Outside of the foreground areas, the gradual undulation is likely to facilitate topographic screening as the PV panel height is restricted to 3.5m above ground. Aspect and drainage from the site is likely to be to the southeast.

<u>Bloemsmond Alternative 2</u>

The west to east profile depicts the project area lying in a shallow depression, with high ground to the west providing topographic screening at the foreground distance zone. To the east, the terrain depicts a marginal reduction in elevation, with undulating terrain likely to provide topographic screening for the 3.5m high PV panels. The south to north profile, reflects a similar flat terrain with the exception of a small hill located to the south of the proposed site, within the two kilometre high exposure distance zone. As with the west to east profile, the gentle undulation of the terrain is likely to generate sufficient topographic screening to reduce visual intrusion of the PV panels to within the Foreground / Mid-ground areas surround the site.

At a regional level, steep slope areas were identified within the project zone of visual influence, which are part of the low hills / rocky outcrops located to the west of the property. These hill areas, which include rocky outcrops, do constitute scenic resources and as such they were mapped using Google Earth satellite imagery, and included in the scenic resource-mapping layer for further assessment.

5.1.3 Steep Slopes

Steep slope areas can add to the significant of the topographic features in the landscape in terms of relief, mountain and hill areas, and vegetation variety. Steep slopes can also pose adverse risks in terms of soil erosion and excessive cut and fills required for new road access. A slopes analysis was undertaken to determine steep slopes within the project area. The Global Mapper software analysis makes use of ASTER DEM data. The terrain is categorised into low gradient areas (0 to 12 degrees), moderate gradient (12 – 14 degrees), and steep gradients above 14 degrees.

The slopes analysis undertaken for the assessment found that no steep slope areas were located on either of the proposed development footprints.

5.1.4 Landuse and Land Cover

Landuse and land cover are crucial factors in determining landscape character, especially regarding the Visual Absorption Capacity (VAC) of the landscapes. Oberholzer defines VAC as the potential of the landscape to conceal the proposed project (Oberholzer, 2005). A key landuse in the region is that of renewable energy projects. The following map depicts the proposed Bloemsmond solar projects, as well as the surrounding solar projects (authorised unbuilt, authorised under construction and existing development).

Figure 26: Renewable Energy Cumulative Projects maps.

According to the South African National Biodiversity Institute (SANBI) National Vegetation Website, Mucina & Rutherford (2006) one main vegetation type on the site, Bushmanland Arid Grassland has been identified. The botanical significance of this would need to be defined, with any areas of botanical importance included as visually sensitive areas. The lack of vegetation in this arid region landscape, reduces the visual absorption capacity to some degree. However, the built nature of the existing, proposed PV and Concentrated As indicated in the regional landscape character description, Solar Power projects (authorised and currently under construction), are likely to change the landscape character of the portions of the property to the east, which are in close visual proximity to the existing solar projects.

Other land uses within the region are agricultural in nature, and include viticulture along the Orange River, dry-land grazing of cattle and goats, as well as game farming which is taking place on the property..

5.2 Project Zone of Visual Influence

The visible extent, or viewshed, is “the outer boundary defining a view catchment area, usually along crests and ridgelines” (Oberholzer, 2005). The viewshed analysis is undertaken to determine the extent to which the proposed landscape change would be visible to the surrounding areas. This mapping exercise is used to determine the human receptors located within the project zone of visual influence, as well as to define the significant visual resources that could be influenced by the proposed landscape modification.

A viewshed analysis was undertaken from the proposed site at a specified height above ground level to define the extent of the possible visual influence of the proposed landscape modification (Refer to Table 9 below). A Digital Elevation Model was generated, making use of open source NASA ASTER Digital Elevation Model data (NASA, 2009). The extent of the viewshed analysis is restricted to a defined distance as the project ZVI is unlikely to extend beyond this distance due to atmospheric influences. The maps are informative only as visibility tends to diminish exponentially with distance, which is well recognised in visual analysis literature (Hull & Bishop, 1988).

Table 7: Proposed Project Heights Table

Proposed Activity	Approx. Maximum Height above ground level (m)	Viewshed Extent (km)
PV Structures	3.5	12

It is important to note that the terrain model ***excludes vegetation and structural screening*** which could influence the extent of the visibility. The receptor height value was set at 1.5m above ground to represent best international practice for receptor height. The approximate viewshed/s are depicted in the following maps:

Figure 24: Bloemsmond PV 5 Viewshed Map
Figure 25: Bloemsmond PV Alternative 2 Viewshed Map

Bloemsmond PV 5

The viewshed generated from the project footprint is fairly localised and appears to be mainly contained to within the foreground and mid-ground area (approximately 6km) surrounding the site. The viewshed extends mainly to the north and east but is scattered and fragmented beyond the two-kilometre high exposure distance zone. The viewshed does expand to the west into the adjacent property into the areas where scenic resources are identified, but topographic screening of the low hills to the west, effectively restrict the project ZVI beyond the foreground distance zone. The ZVI is thus defined as Localised.

Bloemsmond Alternative 2

The viewshed generated by the area where the Bloemsmond Alternative 2 is proposed, is more locally contained, indicating that the site is fairly low-lying. Some expansion of the viewshed takes place to the north and west, but at 12km and 6km distance, the effect of the landscape change is unlikely to influence the sense of place at these locations. The ZVI is thus also defined as Localised.

5.3 Receptors and Key Observation Points

As defined in the methodology, KOPs are defined by the Bureau of Land Management as the people (receptors) located in strategic locations surrounding the property that make consistent use of the views associated with the site where the landscape modifications are proposed.

As identified in the viewshed mapping exercise, neither of the proposed development zones of visual influence include sensitive receptors. This is due to the remoteness of the site, as well as the slight undulation of the terrain that topographically screens the 3.5m high PV panels. However, the zone of visual influence does include low hills and rocky outcrops, and low dune-landscape features to the west of the property, which have been identified as scenic resources that add to the local sense of place. Although these areas do not have any receptors, they could be used for tourism in the future and as such, would need to be taken into consideration in the assessment of landscape impacts.

6 VISUAL RESOURCE MANAGEMENT

In terms of the VRM methodology, landscape character is derived from a combination of scenic quality, receptor sensitivity to landscape change, and distance of the proposed landscape modification from key receptor points. Making use of the key landscape elements defined in the landscape contextualisation sections above, landscape units are defined which are then rated to derive their intrinsic scenic value, as well as how sensitive people living in the area would be to changes taking place in these landscapes.

6.1 Physiographic Rating Units

The Physiographic Rating Units are the areas within the project development area that reflect specific physical and graphic elements that define a particular landscape character. These unique landscapes within the project development areas are rated to assess the scenic quality and receptor sensitivity to landscape change, which is then used to define a Visual Resource Management Class for each of the site's unique landscape/s. The exception are Class I areas, where the rating is determined based on national and international policy / best practice and landscape significance and as such are not rated for scenic quality and receptor sensitivity to landscape change. The mapping of the portions of the property visible from sensitive receptors, and associated Physiographic Rating Units can be viewed in the following maps:

Figure 27: Bloemsmond PV 5 Physiographic Rating Units Map
Figure 28: Bloemsmond PV Alternative 2 Physiographic Rating Units Map

The landscape character of the proposed project site was surveyed to identify areas of similar land use and landscape character (Physiographic Rating Units). The current land use is agricultural, with no man made features other than agricultural fences and reservoirs associated with low intensity grassland cattle farming.

Bloemsmond PV 5

During the site visit, three main broad-brush landscapes were identified, these being Bushmanland Arid Grassland, low-lying pans and the Shallow Drainage Lines. The majority of the proposed development site is flat and covered with Bushmanland Grassland. A small, northern portion of the proposed development area comprises a shallow drainage line which could be ecologically / or hierologically significant. Due to their potential significance, these areas are defined as Class I (Subject to Ecological / surface Water Hydrology specialists findings). The low-lying pans are likely to be of some ecological significance, and do constitute a scenic resource in its own right, and as such, this area would need to be considered as a Class I Visual Resource.

Bloemsmond Alternative 2

A similar landscape setting was found for the Bloemsmond Alternative 2 site, but with the potential drainage line being more extensive and running through the proposed site with a northwest to southeast alignment.

Although not confirmed, both of the sites could also include sensitive vegetation areas that would be identified during the ecological assessment. Any areas identified by the Ecological Specialist need to be recognised as Class I visual resources.

Table 8: Site 2 & Site 3 Scenic Quality and Receptor Sensitivity Rating Table.

Site Alt.	Landscape Rating Units	Scenic Quality									Receptor Sensitivity						VRM	
		A= scenic quality rating of ≥19; B = rating of 12 – 18, C= rating of ≤11									H = High; M = Medium; L = Low							
	Type	**Landform**	**Vegetation**	**Water**	**Colour**	**Scarcity**	**Adjacent Landscape**	**Cultural Modifications**	**Sum**	**Rating**	**Type of Users**	**Amount of Use**	**Public Interest**	**Adjacent Land Uses**	**Special Areas**	**Rating**	**Inventory Class**	**Management Class**
PV 5	Drainage lines Low-lying Pans	**(Class I is not rated)**																**I**
Alt 2	Drainage lines																	
PV 5	Bushmanland Arid Grassland	1	2	4	3	2	4	1	17	**B**	L	L	L	M	L	**L**	**IV**	**III**
Alt 2	Bushmanland Arid Grassland	1	2	0	3	2	4	1	13	**B**	L	L	L	M	L	**ML**	**IV**	**III**

The ***Scenic Quality*** scores are totalled and assigned an A (High scenic quality), B (Moderate scenic quality) or C (Low scenic quality) category based on the following split: *A= scenic quality rating of ≥19; B = rating of 12 – 18, C= rating of ≤11* (USDI., 2004).

Receptor Sensitivity levels are a measure of public concern for scenic quality. Receptor sensitivity to landscape change is determined by rating the key factors relating to the perception of landscape change in terms of Low to High.

6.2 Scenic Quality Assessment

For the ***Bushmanland Arid Grassland*** on both the sites, the landform is rated *Low* because of its predominantly flat nature with few interesting landscape features. Vegetation is mainly grasslands type and rated *Medium to Low. T*here is little variety or contrast with no evidence of water on the Bloemsmond Alt 2 site, but the low lying areas within the Bloemsmond PV 5 site are likely to be flooded after seasonal rains. This increase the scenic value of the areas adjacent to the pans. There are some interesting colours provided by the grasses contrasting with red sands and reddish background hills. Colour as an element is defined as *Medium*. Adjacent scenery to the west of the property adds value due to the "Rooikoppe" (small hill features) in the background. Scarcity factor is rated *Low*, as this type of scenery is fairly widespread in the area and cultural modifications introduce no discordant elements into the vista, and add to the rural agricultural sense of place. The overall scenic quality score is 13, and a VRM category B scenic quality rating was defined for this site.

6.3 Receptor Sensitivity Assessment

For the ***Bushmanland Arid Grassland*** on both the sites, sensitivity of the type of users (agricultural farmers) is likely to be *Low*, as the area is seldom seen and isolated, with the amount of use defined as *Low*. This type of area is fairly common within the region and is not formally protected as a conservation area, hence public interest is likely to be *Low*. The importance of the maintenance of visual quality to adjacent land users would be *Moderate* as the property to the west of the site does have scenic resources that could be used for tourism, but there are currently no tourist-type activities taking place. The overall sensitivity rating was defined as *Moderate to Low.*

6.4 Visual Resources Management Classes

The BLM methodology defines four Classes that represent the relative value of the visual resources of an area and are defined making use of the VRM Matrix (

Table 5):

i. **Classes I and II** are the most valued
ii. **Class III** represent a moderate value
iii. **Class IV** is of least value

The Classes are not prescriptive and are utilised as a guideline to determine the carrying capacity of a visually preferred landscape that is utilised to assess the suitability of the landscape change associated with the proposed project. The Visual Inventory Classes are defined using the matrix below and with motivation, can be adjusted to Visual Resource Management Classes which take zoning and regional planning into consideration if applicable. The VRM ratings summary is provided in Table 8.

6.4.1 VRM Class I

The following physiographic landscapes were assigned a Class I Visual Objective:

Drainage Lines (Subject to Ecological / surface Water Hydrology specialists findings)
Low-lying Pans (Subject to Ecological / surface Water Hydrology specialists findings)
Significant vegetation (Subject to Ecological / surface Water Hydrology specialist's findings)

The Class I objective is to preserve the existing character of the landscape, the level of change to the characteristic landscape should be very low, and must not attract attention. Class I is assigned when a decision is made to maintain a natural landscape.

These areas should be excluded from the development footprint, should they be defined by the Ecological / surface Water Hydrology Specialist as significant.

6.4.2 VRM Class II

Not applicable

Due to the presence of existing solar projects, including CSP tower structures, as well as the fairly uniformity of the landscape, no Class II areas were defined on site.

6.4.3 VRM Class III

Bushmanland Arid Grassland in the Bloemsmond PV 5 areas.
Bushmanland Arid Grassland in the Bloemsmond Alt 2 areas.

Due to the presence of the pans, the scenic quality of the area is increased. Although the area is remote, and located in the REDZ7, the area does have potential for game faarming which could incrase potential of eco-toursim in the area. As such, the area does require mitigaiton to ensure that these scenic resources are retained and the inventory Class IV is therefore amended to Class III.

The Class III objective is to partially retain the existing character of the landscape, where the level of change to the characteristic landscape should be moderate. The proposed development may attract attention, but should not dominate the view of the casual

observer, and changes should repeat the basic elements found in the predominant natural features of the characteristic landscape

6.4.4 VRM Class IV

Not applicable

The area is zoned as agricultural and although other solar projects are visible, these landscape modifications are in the background which increase the wilderness sense of place. For this reason, a Class IV is not assigned to the area. Large structures would need to be positioned away from the low lying pans, and power line infrastructure needs to be carefully placed to ensure that landscape degradation does not take place.

7 IMPACT ASSESSMENT

As indicated in the methodology, the contrast rating is undertaken to determine if the VRM Class Objectives are met. This informs the impact ratings for Visual Impacts. The suitability of landscape modification is assessed by comparing and contrasting existing receiving landscape to the expected contrast that the proposed landscape change will generate. This is done by evaluating the level of change to the existing landscape by assessing the line, colour, texture and form, in relation to the visual objectives defined for the area. Due to the remoteness of the locality, no significant receptors were identified within the project Zone of Visual Influence. As such, a contrast rating exercise was not undertaken, and ***only Landscape impacts will be assessed***.

7.1 PV Landscape and Visual Impacts

The following landscape impacts were identified as having a likelihood of occurring during the construction and operation of the proposed SEF project.

- Construction Phase
  - Loss of site landscape character from the removal of vegetation and the construction of the PV structures and associated infrastructure;
  - Wind-blown dust due to the removal of large areas of vegetation;
  - Possible soil erosion from temporary roads crossing drainage lines;
  - Windblown litter from the laydown and construction sites.
- Operation Phase
  - Light spillage making a glow effect that would be clearly noticeable to the surrounding dark sky night landscapes to the north of the proposed site;
  - Massing effect on the landscape from a large-scale modification;
  - On-going soil erosion;
  - On-going windblown dust.
- Decommissioning Phase
  - Movement of vehicles and associated dust;
  - Windblown dust from the disturbance of cover vegetation / gravel.
- Cumulative Impacts
  - A long-term change in land use setting a precedent for other similar types of solar and wind energy projects.
  - Loss of scenic resources located on the adjacent property to the west that could influence future eco-tourism opportunities in this area.

Table 9: Bloemsmond PV 5 Impacts Ratings Table

Nature: Change of local and surrounds visual resources due to the construction and operation of the proposed **(**3.5m high) PV structures, and buildings.		
	Without mitigation	**With mitigation**
Extent	Local	Local
Duration	Long-term	Long-term
Magnitude	Medium to High	Medium to High
Probability	Probable	Probable
Significance	**High**	**Medium to High**

Status (positive or negative)	Negative	Negative
Reversibility	Possible	Possible
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	Yes

Impact Motivation

- The proposed PV development is located in the REDZ7, where other solar renewable energy have been developed, or are being developed. However, the site does into low-lying areas that form shallow pans after seasonal rains. The pans, in relation to the close proximity to the western scenic resources, increases the potential for game farming / eco-tourism in the area (subject to Socio-Economic Assessment findings). Fencing off this area from game access could reduce the viability of game farming already taking place on the property. Without positional shifts to the layout to open up the access (not close in the pan), local scenic resources could be degraded (subject to Ecological / Hydrological Assessment findings).
- Although the already authorized Bloemsmond PV 1 & 2, are located on the property, the area is approximately 6km to the northwest of the nearest PV project, and as the area is located outside of the Foreground / Mid-ground area, the wilderness sense of place is apparent.

Mitigation:

- Light spillage reduction management should be implemented (refer to Annexure E).
- Dust management during the lifetime of the project.
- Colour mitigaiton for structures which should not be placed near the low-lying pan.

Cumulative impacts:

- Excessive lights at night could reduce the current dark sky sense of place that could detract from tourism opportunities in the area.
- From a cumulative perspective, locating power line and road access to the west in close proximity to the western scenic resources, could reduce the potential for future eco-toursim opportunties in this area. Given that there is game farming taking place in the area, this is a possibility.

Residual Risks:

- Should the mitigations be implemented, the residual risks to the dark sky sense of place would be similar to the solar PV precedent of the adjacent eastern projects (currently under construction), and with mitigation, would be similar to the nighttime lighting precedents of the cultivated areas along the Orange River.
- With the associated power line and vehicle access located away from the western scenic resources, the low profile and prominence of the PV panels would result in a low intensity landscape impact and are not likely to degrade the scenic resource.
- The intensity of the development would essentially limit the potential for eco-

tourism on the site.

- On decommissioning, the limited earthworks required for the construction of the PV panels, would allow for effective rehabilitation of the impacted area back to the current agricultural land use and associated rural sense of place.
- However, enclosure of the pan by fencing and PV panels, would detract from the potential for using the higher scenic resources apparent on the site for eco-tourism opportunities. Given that game farming is already taking place on the property, this factor should be considered (subject to Socio-economic Assessment findings).

Table 10: Bloemsmond PV Alternative 2 Impacts Ratings Table

Nature: Change of local and surrounds visual resources due to the construction and operation of the proposed **(**3.5m high) PV structures, and buildings.		
	Without mitigation	**With mitigation**
Extent	Local	Local
Duration	Long-term	Long-term
Magnitude	High	High
Probability	Probable	Probable
Significance	**Medium to High**	**Medium to High**
Status (positive or negative)	Negative	Negative
Reversibility	Possible	Possible
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	Yes
Impact Motivation • The proposed PV development footprint area does not contain any significant visual resources or topographic prominence. • The area is remote with limited receptors and is located adjacent to the already authorized Bloemsmond PV 1 & 2. • Visual intrusion is likely to be into the northern areas. In addition, the area is remote and would require long infrastructure access, which would expand the semi-industrial context of the PV projects to the north. However, this area is also located within the REDZ7, and expansion of PV projects to this area could take place in the future.		
Mitigation: • The laydown area should be sited away from the N14 road as well as the viticulture areas, and preferably not located on portions of the site that have local prominence. • Light spillage reduction management should be implemented (refer to Annexure E). • Dust management during the lifetime of the project. • Develope the northern portion of the and retain the pan as an open access area.		

Cumulative impacts:

- Excessive lights at night could reduce the current dark sky sense of place that could detract from tourism opportunities in the area.
- From a cumulative perspective, locating power line and road access to the west in close proximity to the western scenic resources, could reduce the potential for future eco-tourism opportunties in this area. Given that there is game farming taking place in the area, this is a possibility.

Residual Risks:

- Should the mitigations be implemented, the residual risks to the dark sky sense of place would be similar to the solar PV precedent of the adjacent eastern projects (currently under construction), and with mitigation, would be similar to the nighttime lighting precedents of the cultivated areas along the Orange River.
- With the associated power line and vehicle access located away from the western scenic resources, the low profile and prominence of the PV panels would result in a low intensity landscape impact and which is not likely to degrade the scenic resource.
- On decommissioning, the limited earthworks required for the construction of the PV panels, would allow for effective rehabilitation of the impacted area back to the current agricultural land use and associated rural sense of place.

7.2 Road Access Landscape and Visual Impacts

Table 11: Western Road Access Impacts Ratings Table

Nature: Change of local and surrounds visual resources due to the construction and operation of the proposed road access.		
	Without mitigation	**With mitigation**
Extent	Local	Local
Duration	Long-term	Long-term
Magnitude	Medium to High	Medium
Probability	Probable	Probable
Significance	**High**	**Medium**
Status (positive or negative)	Negative	Negative
Reversibility	Possible	Possible
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	Yes
Impact Motivation • Without mitigation, the routing along the western cadastral crosses over low rocky outcrops that are locally prominent, creating visual intrusion to areas west of the property with scenic resources that could potentially be used for eco-tourism. • The preference is to have the power line routings aligned along the eastern road access. This reduces construction and maintenance impacts associated with		

creating new roads for the power line construction and long-term maintenance. If the power line and the road were to be aligned along the western property cadastral, a strong visual presence would be created that would degrade the western scenic resources.
Mitigation: • Mitigation would require routing around these low rocky outcrops, preferably diverting the access to a more central position on low ground protecting the western scenic resources. • Dust management during the lifetime of the project.
Cumulative impacts: • From a cumulative perspective, locating the power line and road access to the west in close proximity to the western scenic resources, could reduce the potential for future eco-tourism opportunties in this area. Given that there is game farming taking place in the area, this is a possibility.
Residual Risks: • If the associated power line and vehicle access is located away from the western scenic resources, a low intensity landscape impact is more likely, posing less threat of the degradation of the western scenic resources. • On decommissioning, the limited footprint required for the construction of the roads, would allow for effective rehabilitation of the impacted area back to the current agricultural land use and associated rural sense of place.

Table 12: Eastern Road Access Impacts Ratings Table

Nature: Change of local and surrounds visual resources due to the construction and operation of the proposed road access.		
	Without mitigation	**With mitigation**
Extent	Local	Local
Duration	Long-term	Long-term
Magnitude	Medium	Low
Probability	Probable	Probable
Significance	**Medium to Low**	**Low**
Status (positive or negative)	Negative	Negative
Reversibility	Possible	Possible
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	Yes
Impact Motivation • The eastern access route is routed over low lying ground, and in closer proximity to the existing PV and CSP projects located to the east of the property. • The preference is to have the power line routings aligned with the eastern road access. This would reduce construction and maintenance impacts associated with creating new roads for the power line construction and long-term		

maintenance. Aligning the power line and the road along the eastern property cadastral would protect the western scenic resources. The preferred road access from the N14 National Road could still be used, diverting to the east to connect with the eastern cadastral boundary along an existing access road.
Mitigation: • Dust management during the lifetime of the project. • Careful management of long-term impacts where the route passes over shallow drainage lines.
Cumulative impacts: • From a cumulative perspective, the location of the power line and road access to the east would reduce exposure to western scenic resources that have the potential for future eco-toursim opportunties. Given that there is game farming taking place in the area, this is a possibility.
Residual Risks: • If the associated power line and vehicle access is located away from the western scenic resources, a low intensity landscape impact is more likely, posing less threat of the degradation of the western scenic resources.. • On decommissioning, the limited footprint required for the construction of the roads, would allow for effective rehabilitation of the impacted area back to the current agricultural land use and associated rural sense of place.

8 ENVIRONMENTAL MANAGEMENT PLAN RECOMMENDATIONS

8.1 Construction Phase

During the construction phase heavy vehicles, components, equipment and construction crews will frequent the area and may cause, at the very least, a cumulative visual nuisance to landowners and residents in the area as well as to road users. The proposed project is semi-industrial in nature and would be located in an agricultural area with limited man made infrastructure. The following actions should be implemented during the construction phase:

- Adopt responsible construction practices aimed at containing the construction activities to specifically demarcated areas thereby limiting the removal of natural vegetation to the minimum.
- Limit access to the construction site to existing access roads.
- Rehabilitate all disturbed areas to acceptable visual standards as soon as possible after construction is complete in each area.
- Construction should not take place at night-time.
- The laydown area should be sited away from the N14 road and preferably not located on areas that are prominent.
- Topsoil from the footprints of the road and structures should be stockpiled for rehabilitation and restoration purposes.

- If very dry conditions prevail and dust becomes a nuisance, water should be sprayed on the road surface (or implement another suitable mitigation to reduce wind-blown dust).
- Strict litter control.
- Temporary roads should be well marked and should only cross drainage lines on areas identified as permanent road features where erosion and soil loss management can be contained.
- Signage on the N14 should be moderated.
- All buildings should be painted a grey-brown colour.
- Fencing should be simple, diamond shaped (to catch wind-blown litter) and be transparent in appearance. The fences should be checked on a monthly basis for the collection of litter caught on the fence.

8.2 Construction Phase

During the operation phase movement of vehicles frequenting the area may cause, at the very least, a cumulative visual nuisance to landowners and residents in the area as well as to road users. The proposed project is semi-industrial in nature and is located in an agricultural area with limited man made infrastructure.

The following actions should be implemented during operation phase:

- If very dry conditions prevail and dust becomes a nuisance, water should be sprayed on the gravel road surface.
- Strict litter control.
- Continued erosion control and management of dust by ensuring that soil is covered.

8.3 Deconstruction Phase

During the de-construction phase heavy vehicles, components, equipment and construction crews will frequent the area and may cause, at the very least, a cumulative visual nuisance to landowners and residents in the area as well as to road users. The following actions should be implemented during construction phase:

- Adopt responsible de-construction practices aimed at containing the activities to impacted areas only.
- Rehabilitate all disturbed areas to acceptable visual standards as soon as possible after de-construction is complete in an area.
- De-construction should not take place at night-time.
- If very dry conditions prevail and dust becomes a nuisance, water should be sprayed on the road surface (or implement another suitable mitigation to reduce wind-blown dust).
- Strict litter control.
- Signage on the N14 should be removed.
- All PV panels and structures need to be removed from site and adequately processed in accordance with national legislation.
- All buildings should be broken down and the rubble and the foundations removed and dumped in accordance with national legislation.

- Fencing should be removed and preferably re-used / recycled.

9 CONCLUSION

Due to the relative remoteness of the locality and some topographic screening, no sensitive receptors were identified for the site, and as such Visual Exposure and Sensitivity to landscape change for both PV sites is defined as ***Low***. Based on the VRM methodology, the Scenic Quality of the area is defined as ***Medium***. However, scenic resources that include low hills, rocky outcrops and long red dunes were identified to the west of the property and these scenic resources would fall within the project Zone of Visual Influence. These landscape features do add value to the regional landscape context and have potential for eco-tourism, adding value to the existing game farming taking place in the area. As such, there is a need to protect these resources from higher levels of visual intrusion.

There is a good policy fit for the PV project (located within the REDZ7), and the low profile of the PV panels, and southern location of the PV panels would be accommodated by the higher VAC levels created by the adjacent, authorised Bloemsmond 1 & 2 projects once they are constructed. The only landscape concern associated with the project relates to the alignment of the proposed access road up the western property boundary. The road would route over rocky outcrops, and the movement of vehicles along this corridor is likely to degrade the western scenic resources. With a possible further power line routing added to this corridor, the combined visual effects would result in landscape cluttering, degrading the western scenic resources. ***For this reason, it is recommended that road and power line routings are located away from the western scenic resources, and the Eastern Road Access Alternatives (and Power Line Routing) are preferred***.

In terms of the PV alternative assessment, there is also a marginal landscape preference for the Bloemsmond PV 5 Alternative as this location is located further away from the central scenic resources and the low-lying pan. However, the existing solar PV and CSP projects are still clearly in view, and with the further development of the area as a renewable energy node, the current wilderness landscape is likely to be altered. As the property does fall within the REDZ7 area, and will not degrade significant visual resources, the project should be authorised with mitigation.

10 BIBLIOGRAPHY

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Sheppard, D. S. (2000). *Guidance for crystal ball gazers: Developing a code of ethics for landscape visualization.* Department of Forest Resources Management and Landscape Architecture Program, University of British Columbia, Vancouver, Canada .

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11 ANNEXURE A: FIELD SURVEY PHOTOGRAPH AND COMMENTS

The following photographs were taken during the field survey. The text below the photograph describes the landscape and visual issues of the locality, if applicable. The photograph points are mapped in the Survey Point Locality Map in Annexure B.

Figure 1: Survey Point 1 photograph taken towards the northwest of the preferred access off the N14 National Road.

Figure 2: Survey Point 2 photograph taken towards the northwest of the alternative access point off the N14 National Road.

Cultivated lands are visible to the left, with the viticulture practice creating a unique landscape element and contributing to the cultural landscape that defines the areas on either side of the Orange River. The existing Eskom power line is visible in the background, which, with the built structures of the agriculture of the area increases the visual carrying capacity of the N14 National Road.

Figure 3: Survey Point 3 photograph taken towards the southwest of the vineyards that are located on the southern portions of the property.

As indicated earlier, the viticulture practice is an important component of the Orange River cultural landscape. The proposed access road would be routed adjacent to the cultivated lands and would need to be tarred to protect crops.

Figure 4: Survey Point 4 photograph taken towards the southeast from a slightly prominent locality on the property, of the Orange River valley with the agriculturally related structures and vineyards.

Given the 3.5km distance and the built environment of Bloemsmond settlement, this area is unlikely to be influenced by the change to the landscape character. This portion of the property falls within the area authorised for the development of the Bloemsmond 1 & 2 Solar PV plant. No construction has yet taken place.

Figure 5: Survey Point 5 photograph taken towards the south of the typical arid vegetation of the Nama-karoo landscapes of this portion of the property.

Figure 6: Survey Point 6 photograph taken to the northeast of the arid vegetation of this portion of the property, with the Kai Solar One CSP structure in the mid-ground.

This portion of the property is authorised for the construction of Bloemsmond Solar PV 1 and 2. The terrain is flat and without any significant visual resources that would be degraded.

Figure 7: Survey Point 7 photograph taken towards the southeast of the rocky outcrop of this portion of the property.

This area was excluded from the initial Bloemsmond PV authorisation due to ecological sensitivity. The preferred access road is routed through this area, which could result in ecological impacts (subject to ecological specialists findings). This area is also prominent with clear views to the west of the property, and includes visual resources associated with rocky outcrops, and a long red dune feature.

Figure 8: Survey Point 8 photograph taken towards the north of the small rocky outcrop located to the north west of the proposed PV area.

Figure 9: Survey Point 9 photograph taken towards the east of the Khi Solar One CSP Tower as seen from the proposed development footprint.

This portion of the property is flat and offers limited scenic value. Clearly visible in the mid-ground to the east is the large and glowing (during the day) structure of the CSP tower, which dominates the sense of place.

Figure 10: Survey Point 10 photograph taken towards the west of the rocky outcrops and low hills to the west of the property.

The hilly terrain to the west of the property increases the scenic value of the area west of the farm where the PV project is proposed. Located 3km from the site, it is unlikely that the visual resources of this area will be degraded by the 3.5m high PV panels, which are not prominently located.

Figure 11: Survey Point 11 photograph taken towards the west of the hilly terrain located to the west of the property.

As indicated previously, the increased undulation of the terrain to the west of the property increases scenic resources and opportunities for eco-tourism. This location is also exposed and located on a rocky outcrop which could be ecologically significant (subject to ecological specialists findings).

Figure 12: Survey Point 12 photograph taken towards the west of the large pan located on the property.

This area is low lying and probably subjected to periodic flooding, as seen in the 2017 Google Earth satellite image which depicts the area filled with water. The pan, located in a low lying area in closer proximity to the western hilly terrain, increases the potential for this area to be utilised for ecotourism / game farming.

Figure 13: Survey Point 13 photograph taken north of the remote nature of the site.

Although remote in nature, two CSP towers (Sasol CSP) are authorised for construction in the area, but due to the distance, are unlikely to further degrade the remaining natural sense of place of the locality.

12 ANNEXURE B: LANDSCAPE AND VISUAL IMPACT MAPS

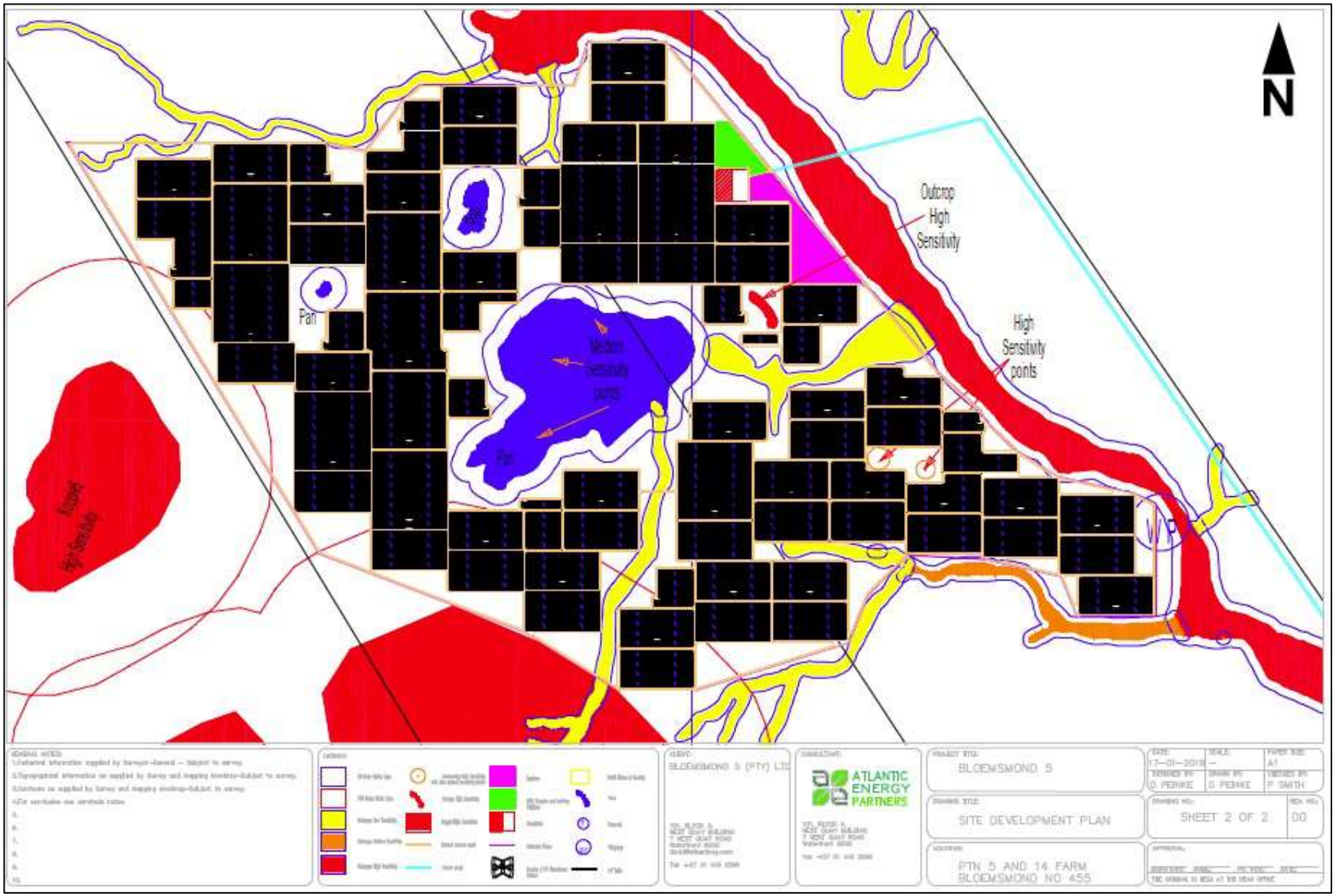


Figure 14: Proposed site layout plan for the preferred development option (Bloemsmond PV 5)

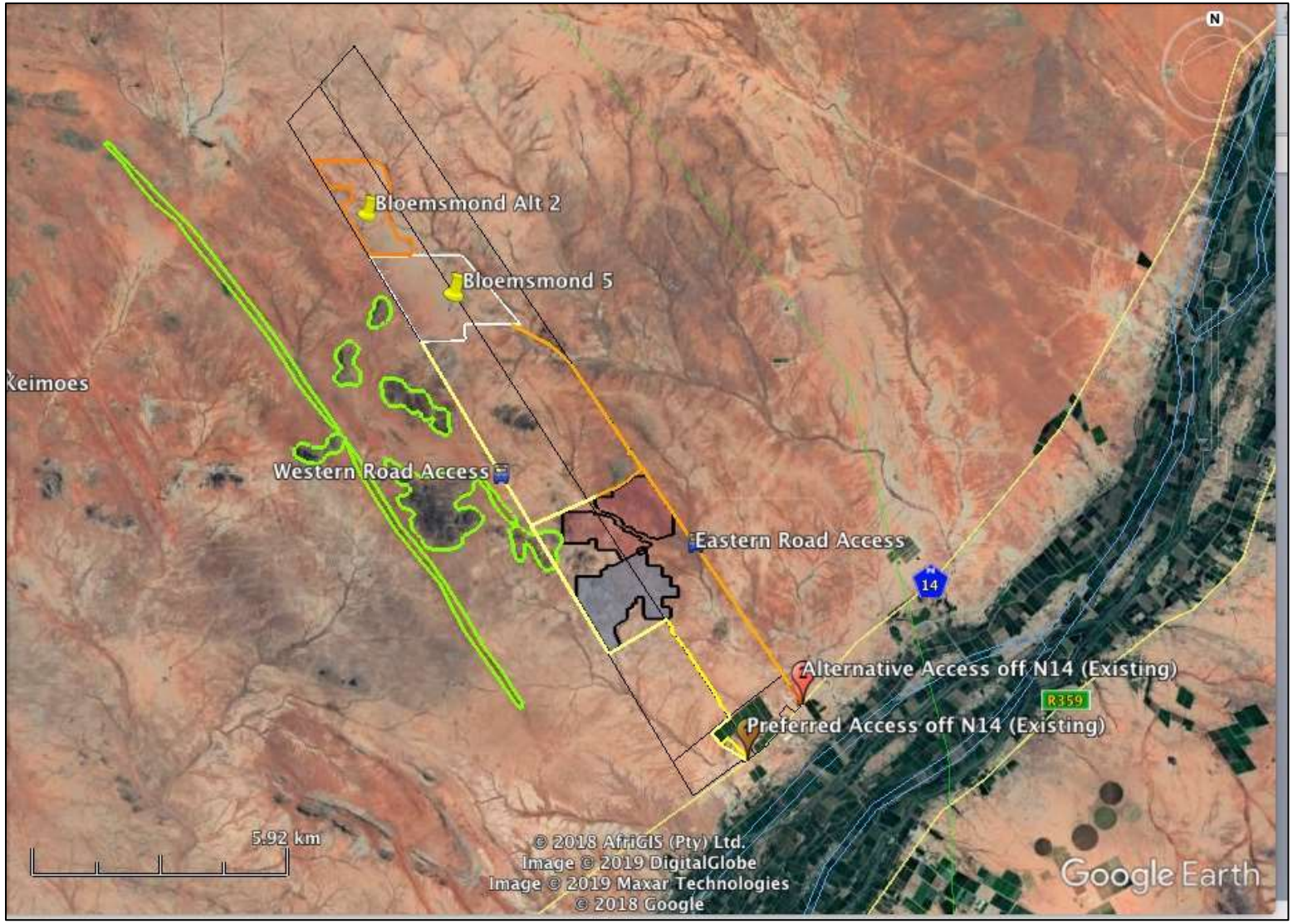


Figure 15: Proposed project PV and Road Access Alternatives mapping overlay onto Google Earth satellite imagery (filled polygons represent authorised, un-built PV projects).

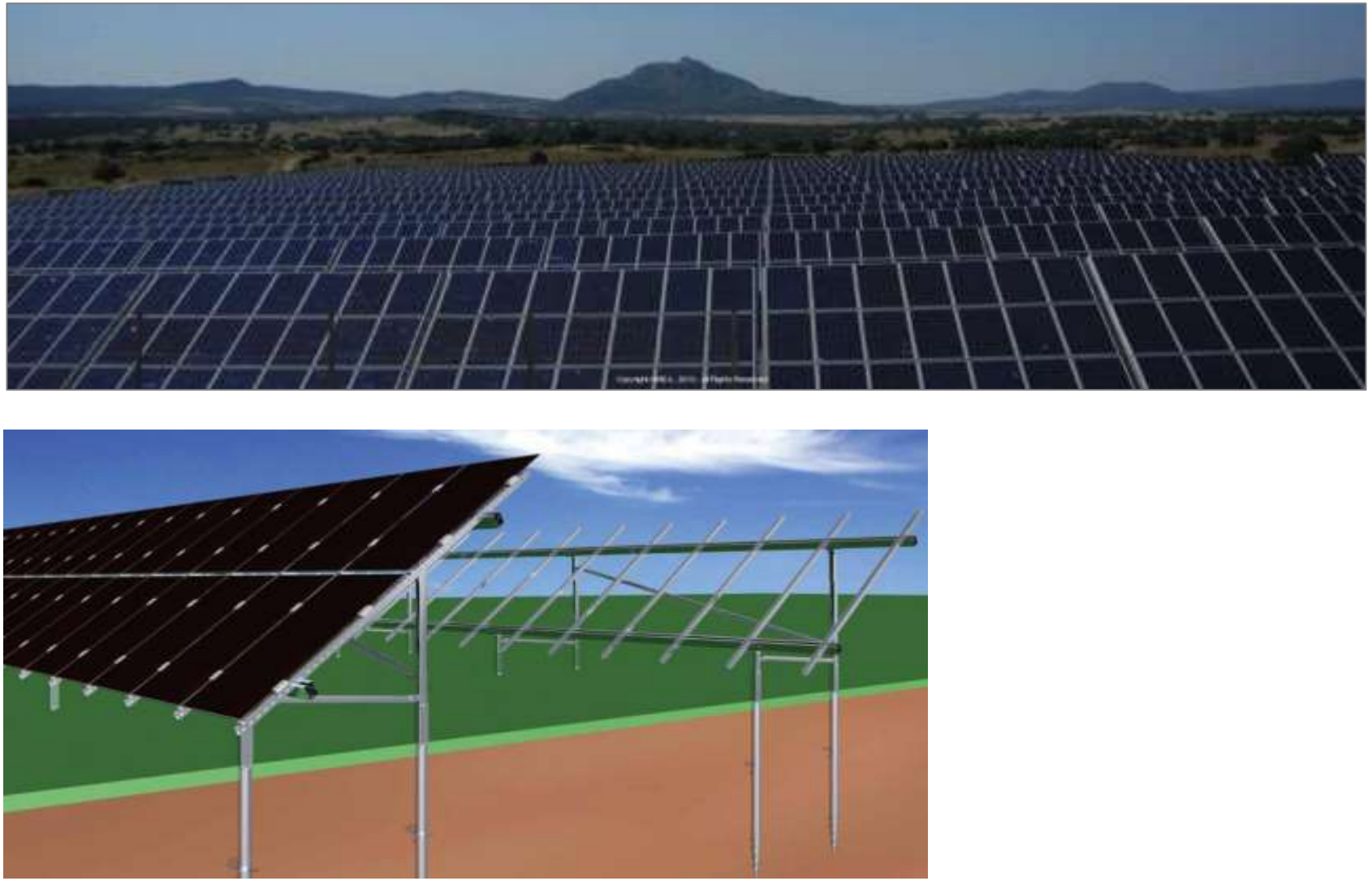


Figure 16: Photographic example of standard Solar PV panels and a generic 3D graphic indicating typical fixed installation structure.

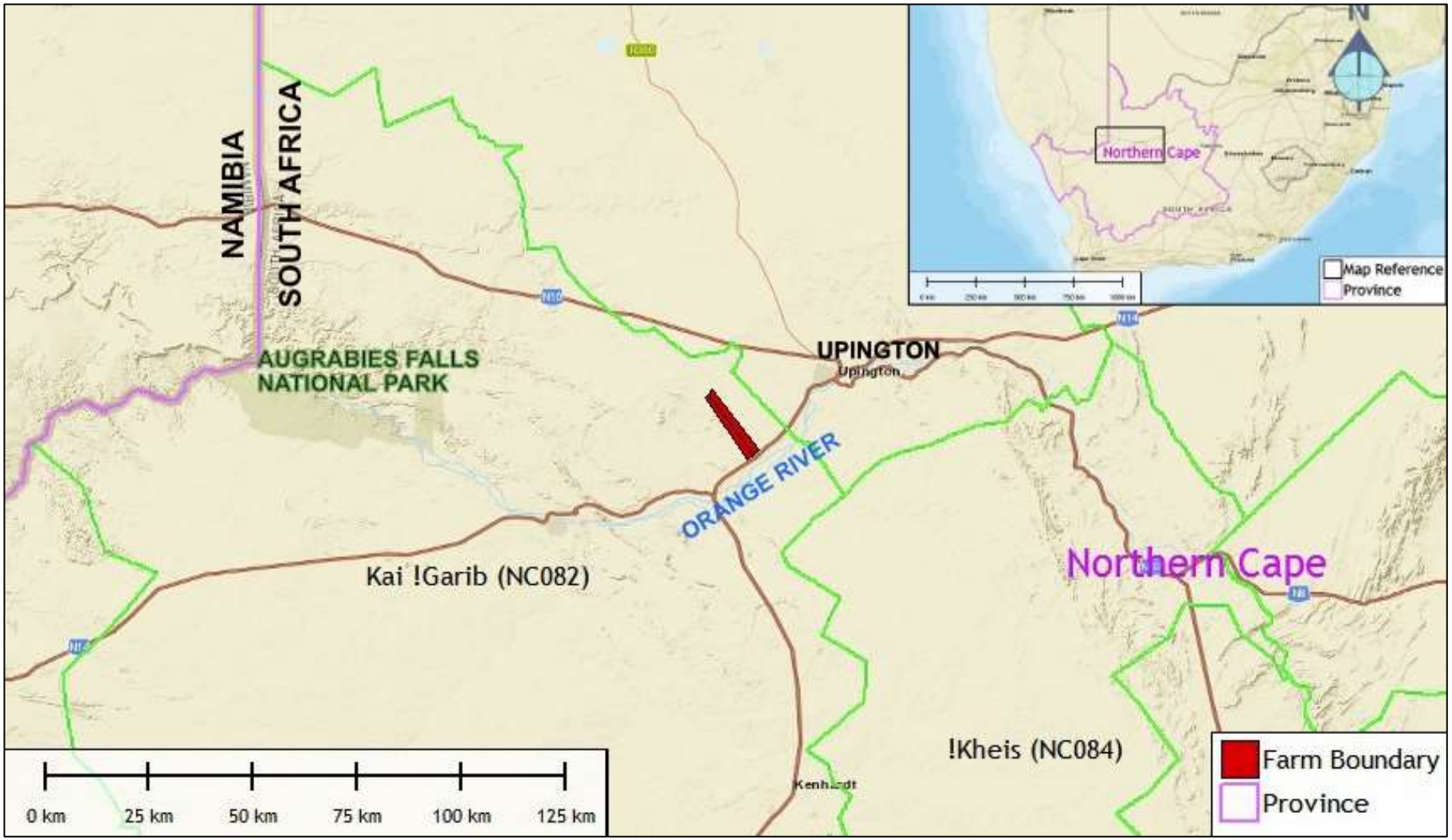


Figure 17: National and Regional Governance Locality Map

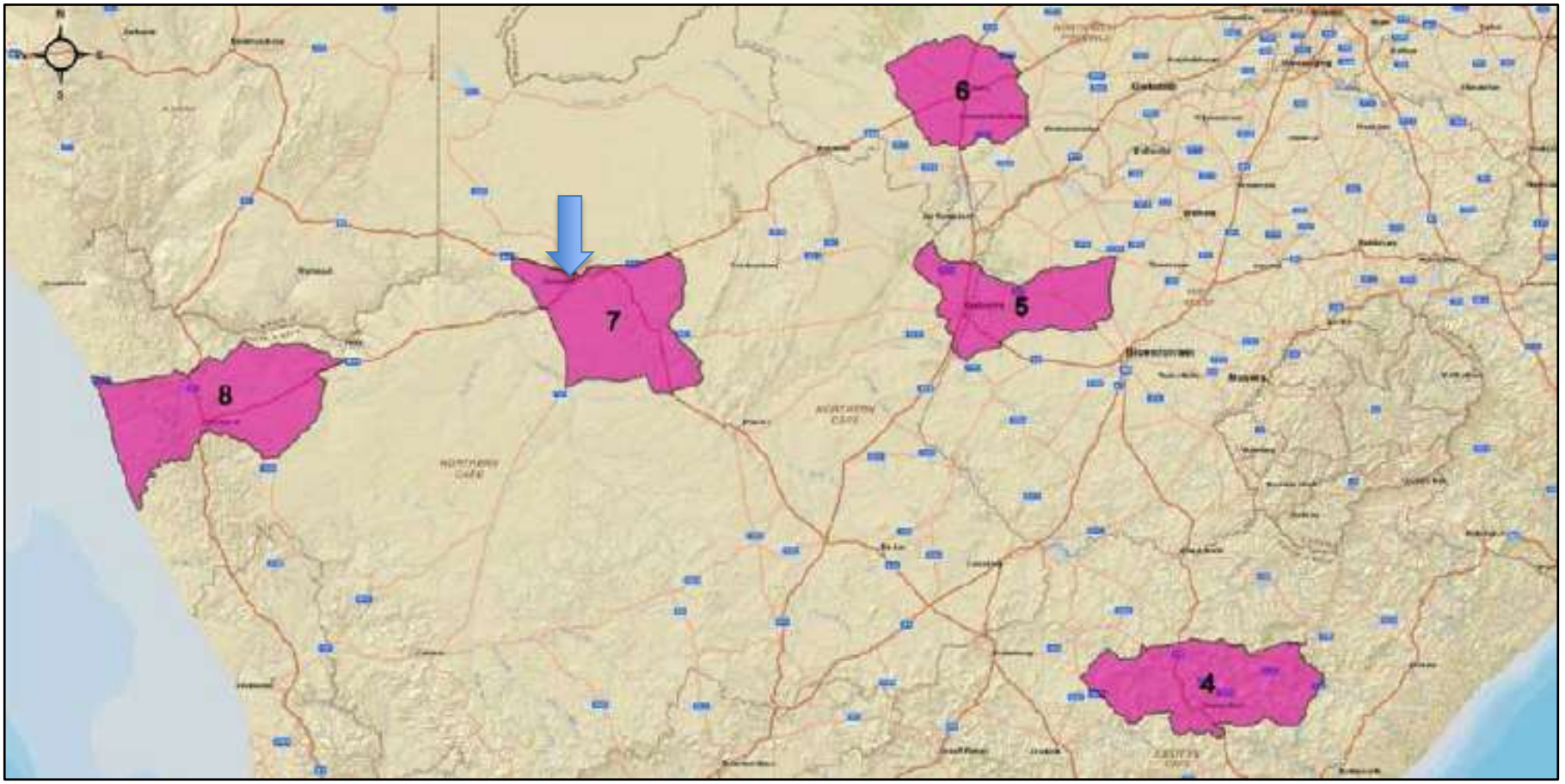


Figure 18: Renewable Energy Development Zones map with the arrow indicating the approximate location of the projects in REDZ 7.

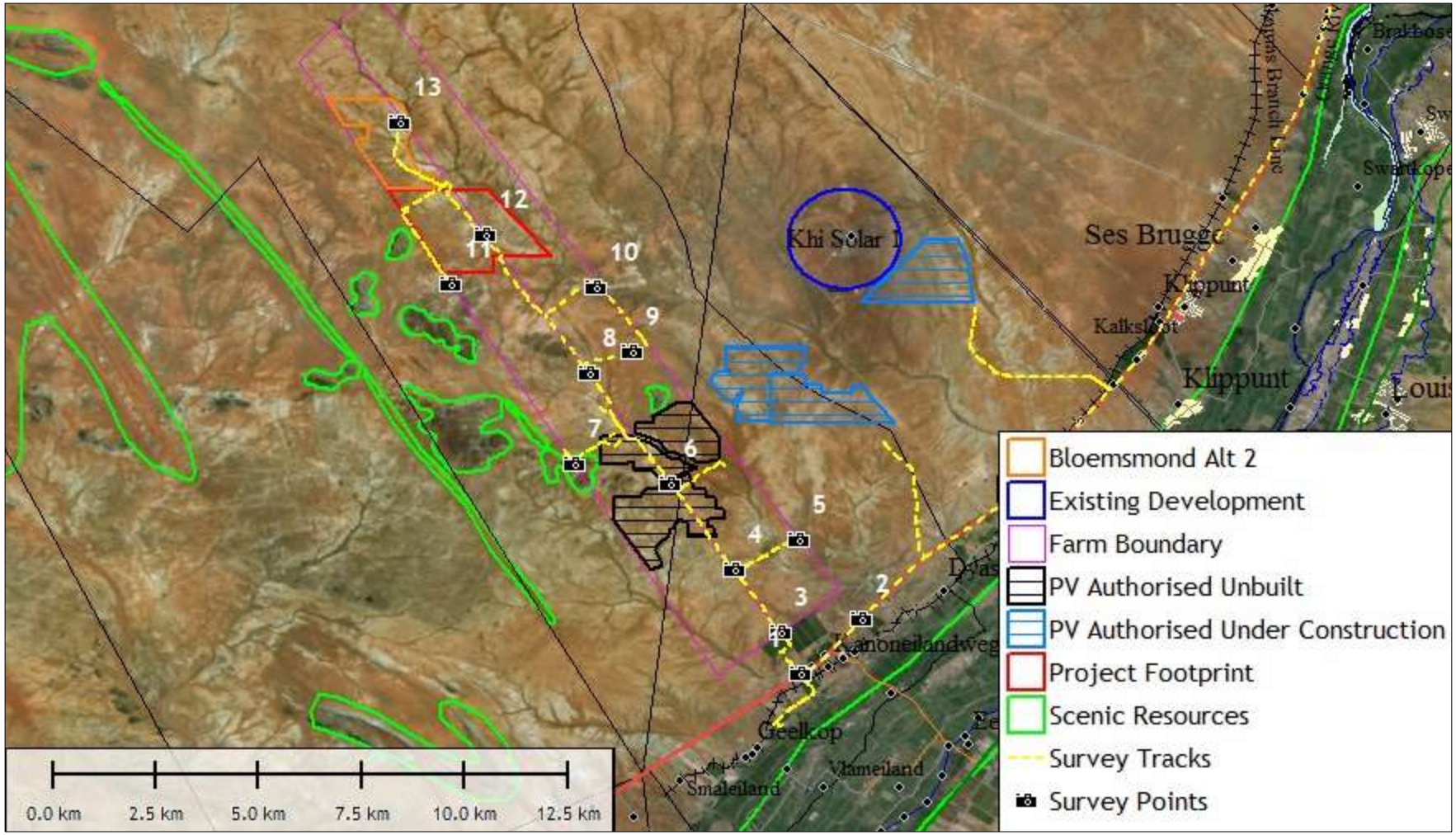


Figure 19: Field Survey Point and Track Map

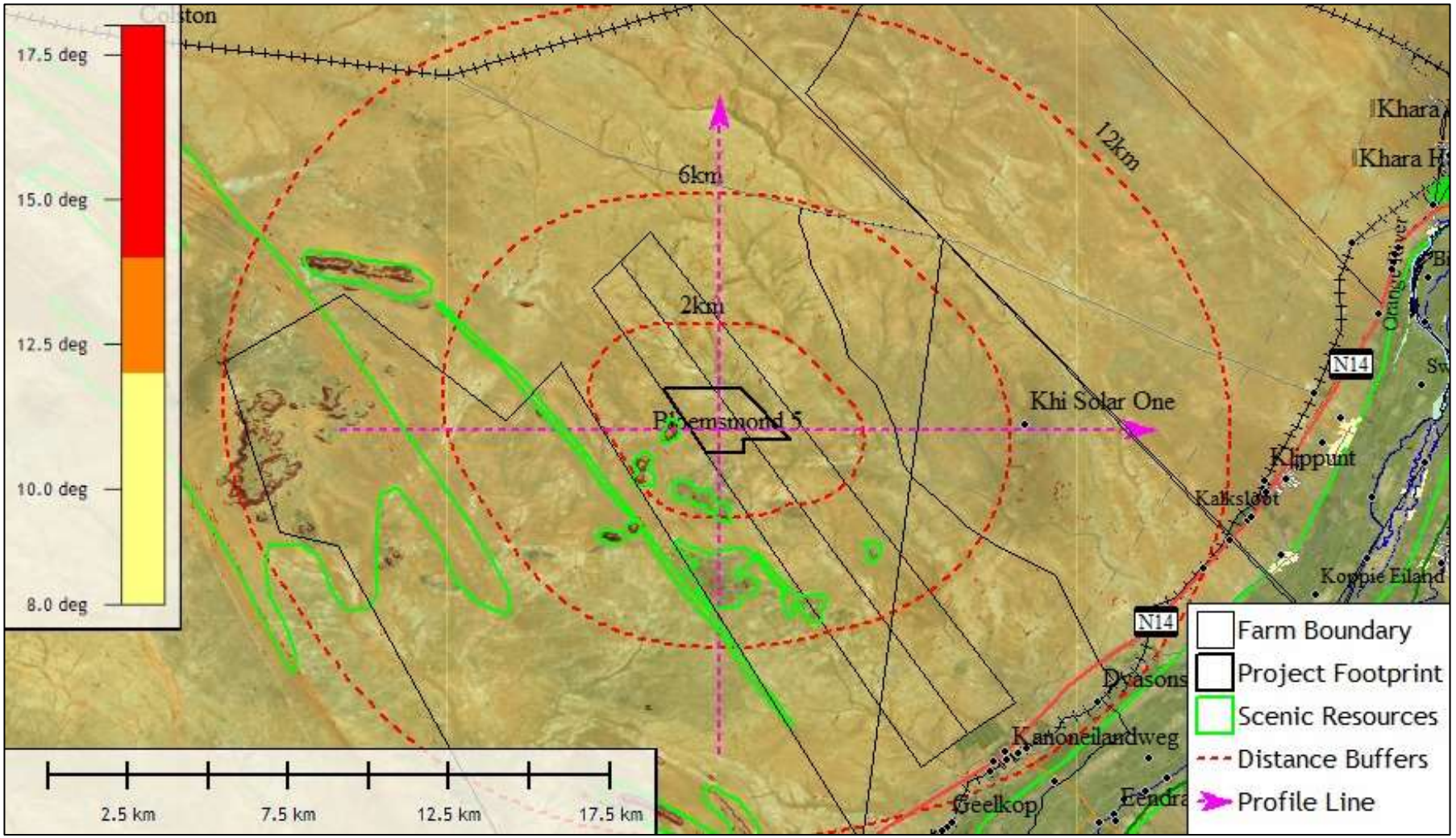


Figure 20: Bloemsmond PV 5 Regional Steep Slopes, Scenic Resources and Elevation Profile Locality Map.

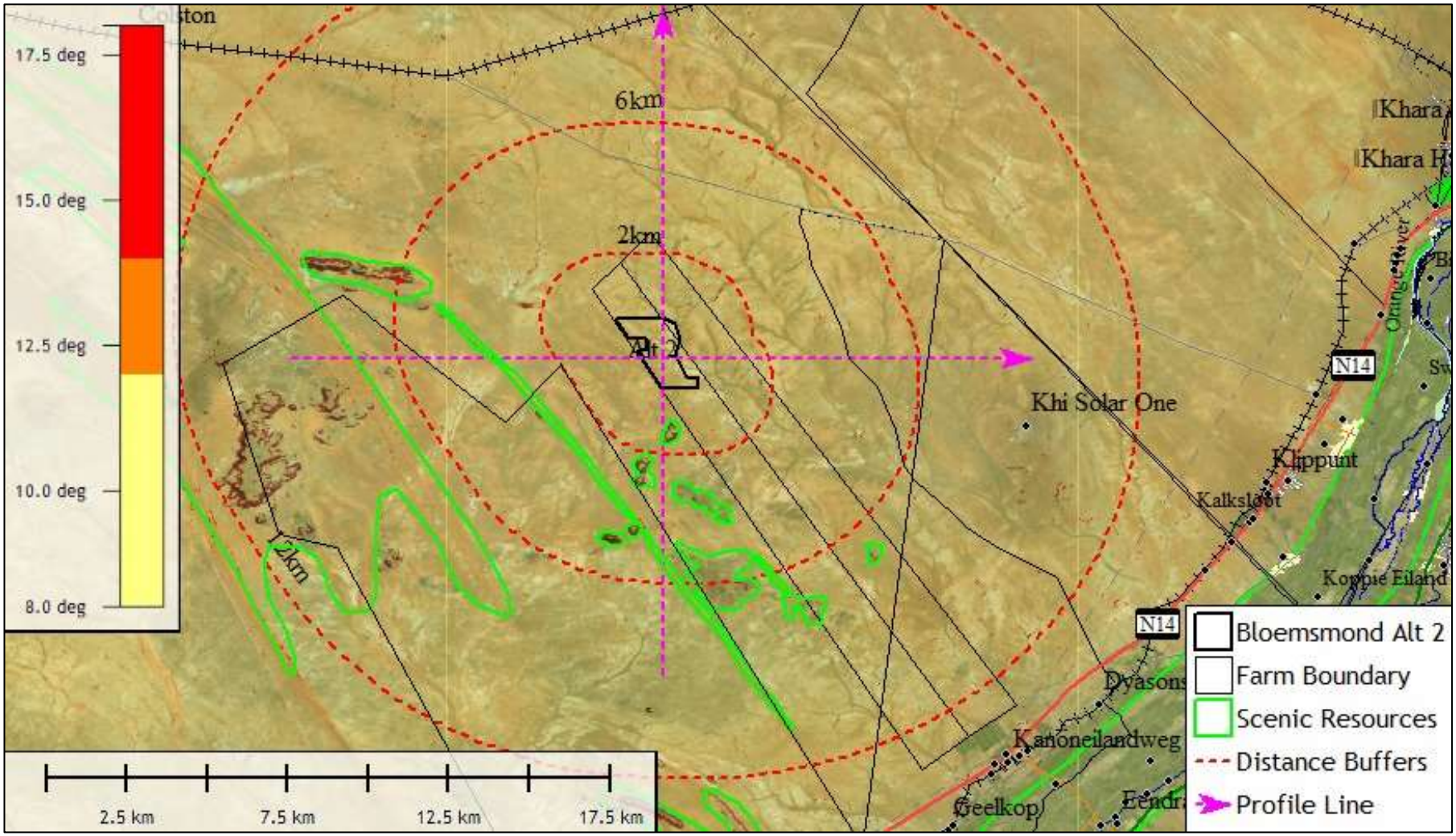
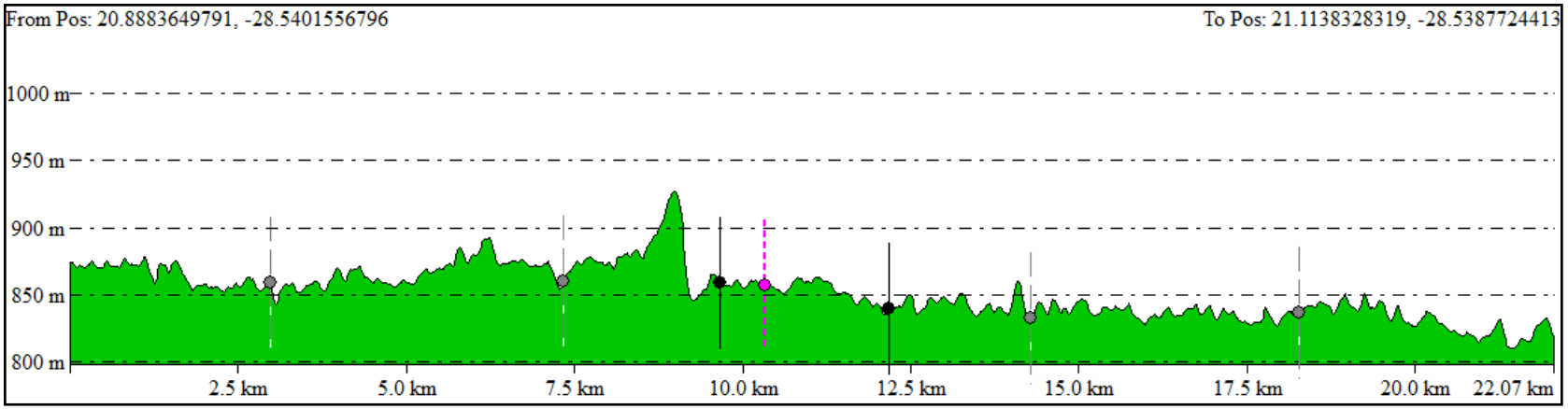


Figure 21: Bloemsmond PV Alternative 2 Regional Steep Slopes, Scenic Resources and Elevation Profile Locality Map.

WEST to EAST Profile



SOUTH to NORTH Profile

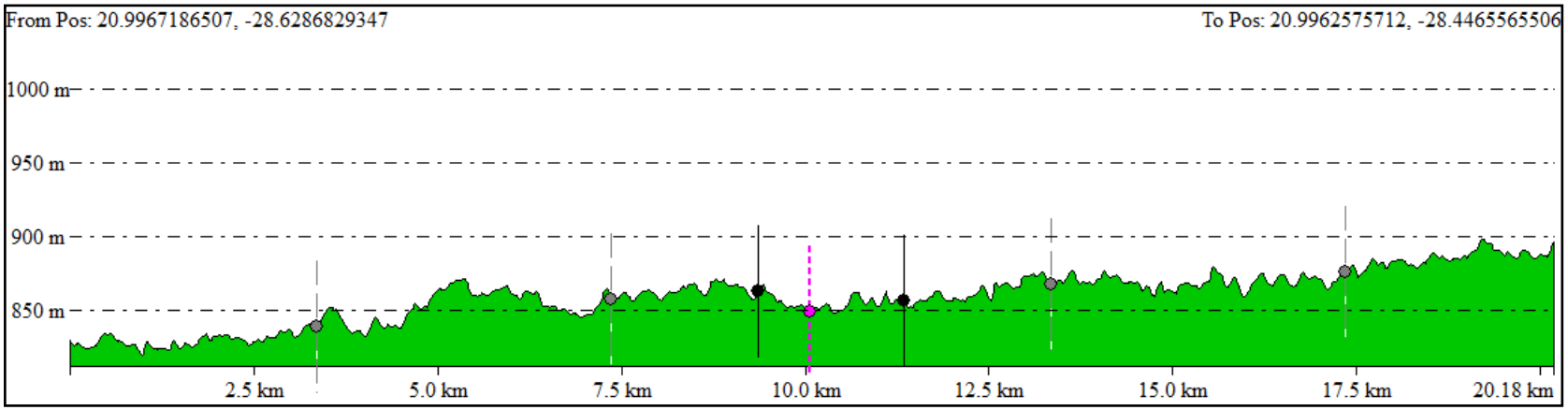
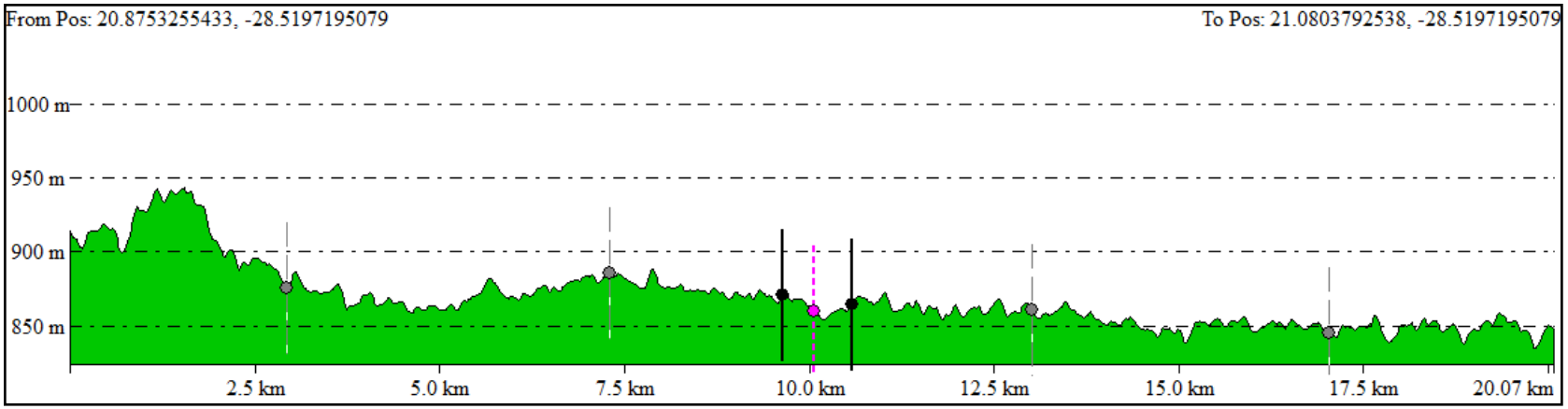


Figure 22: Bloemsmond PV 5 Regional topographic profile graphs.

WEST to EAST Profile



SOUTH to NORTH Profile

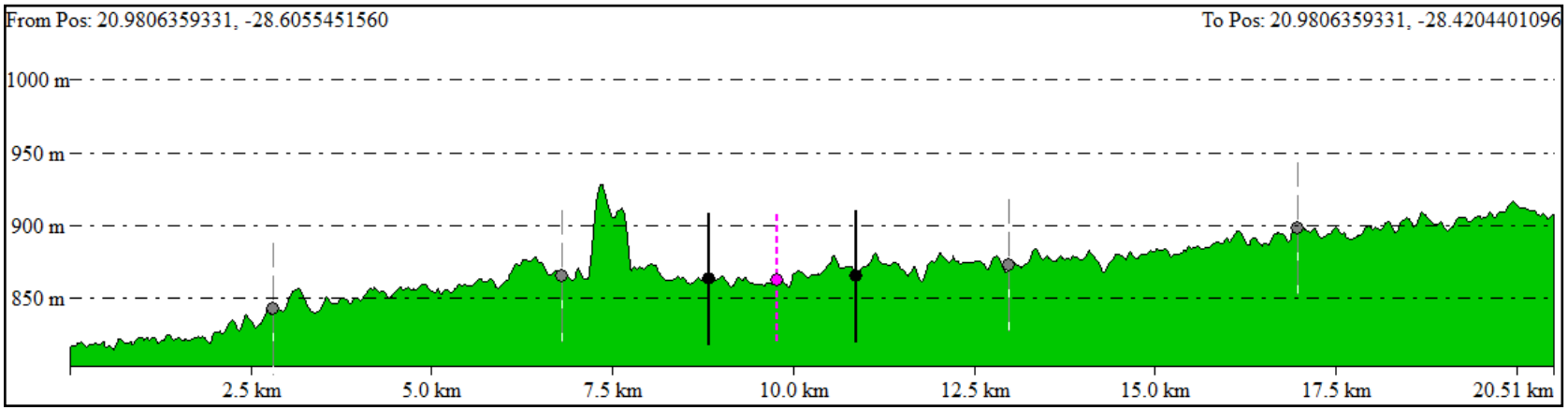


Figure 23: Bloemsmond PV Alternative 2 Regional topographic profile graphs.

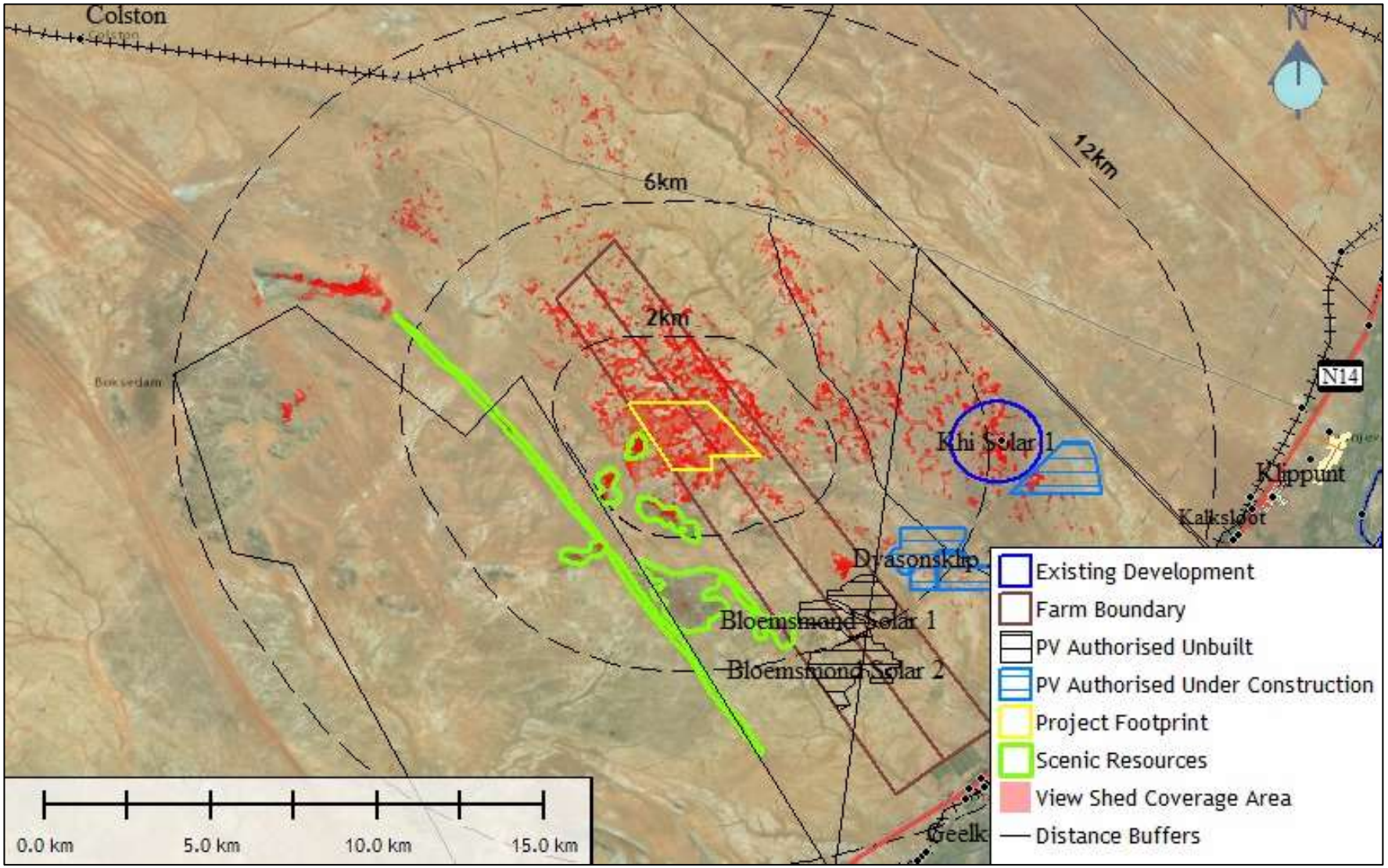


Figure 24: Bloemsmond PV 5 Viewshed Map

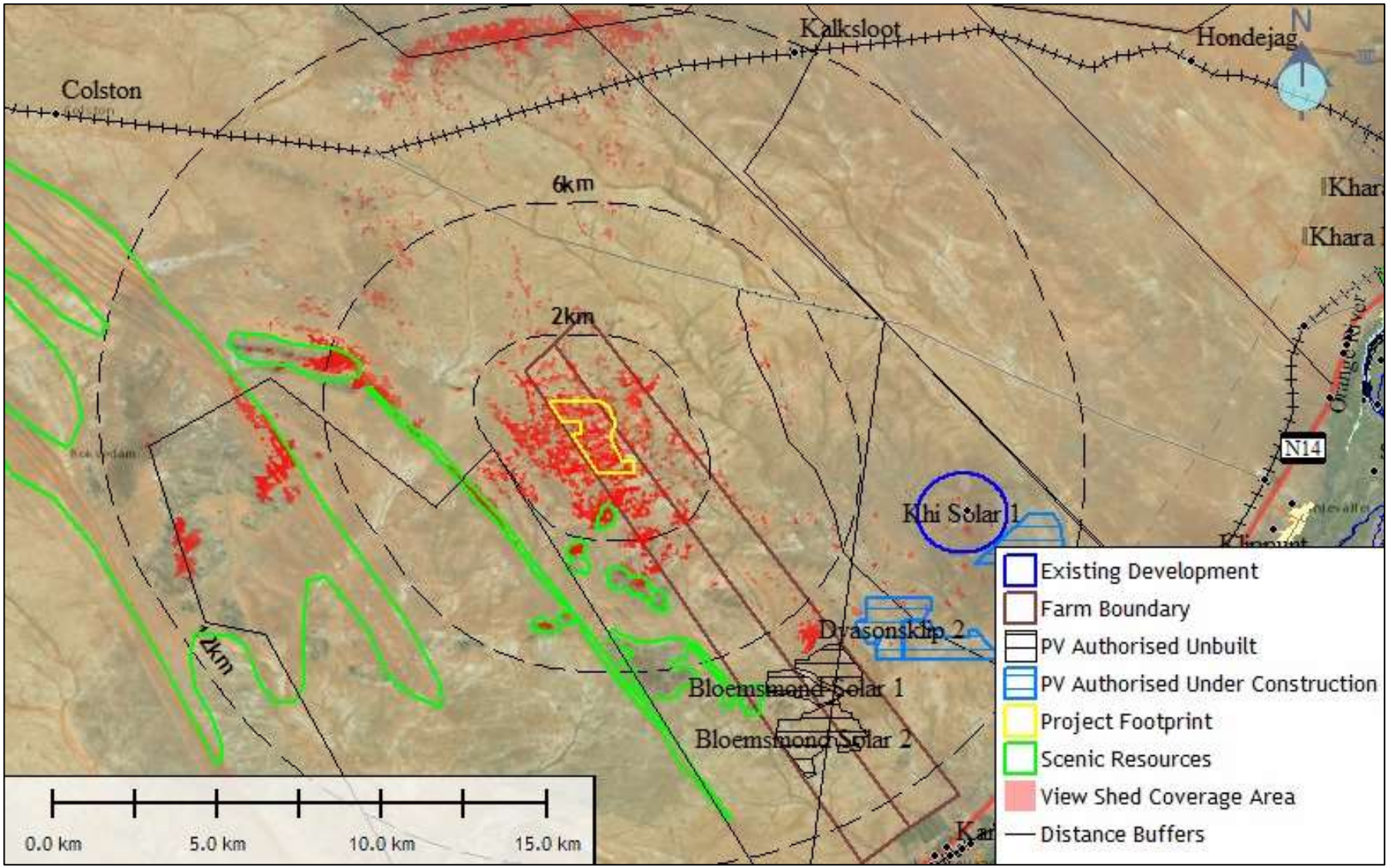


Figure 25: Bloemsmond PV Alternative 2 Viewshed Map

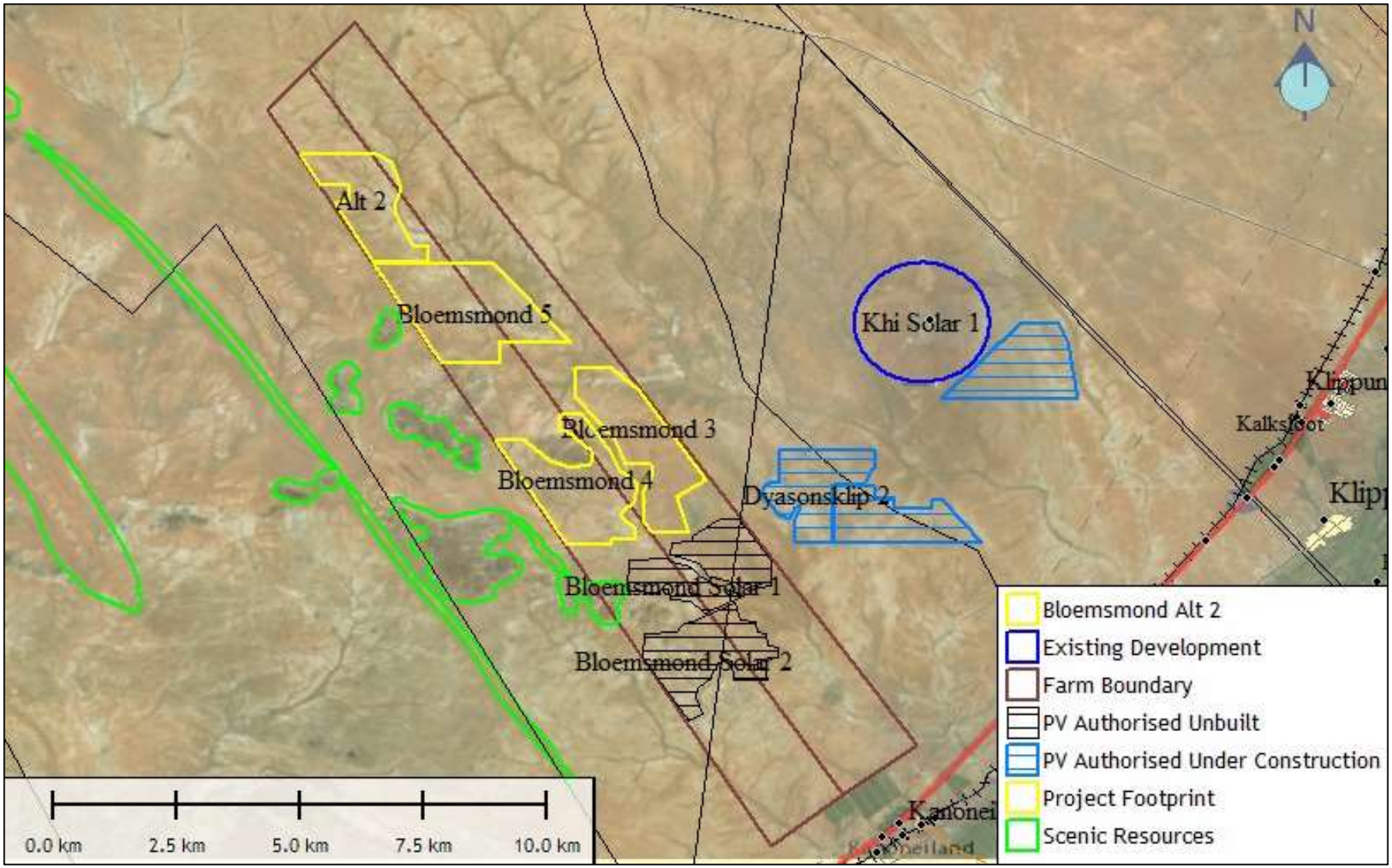


Figure 26: Renewable Energy Cumulative Projects maps.

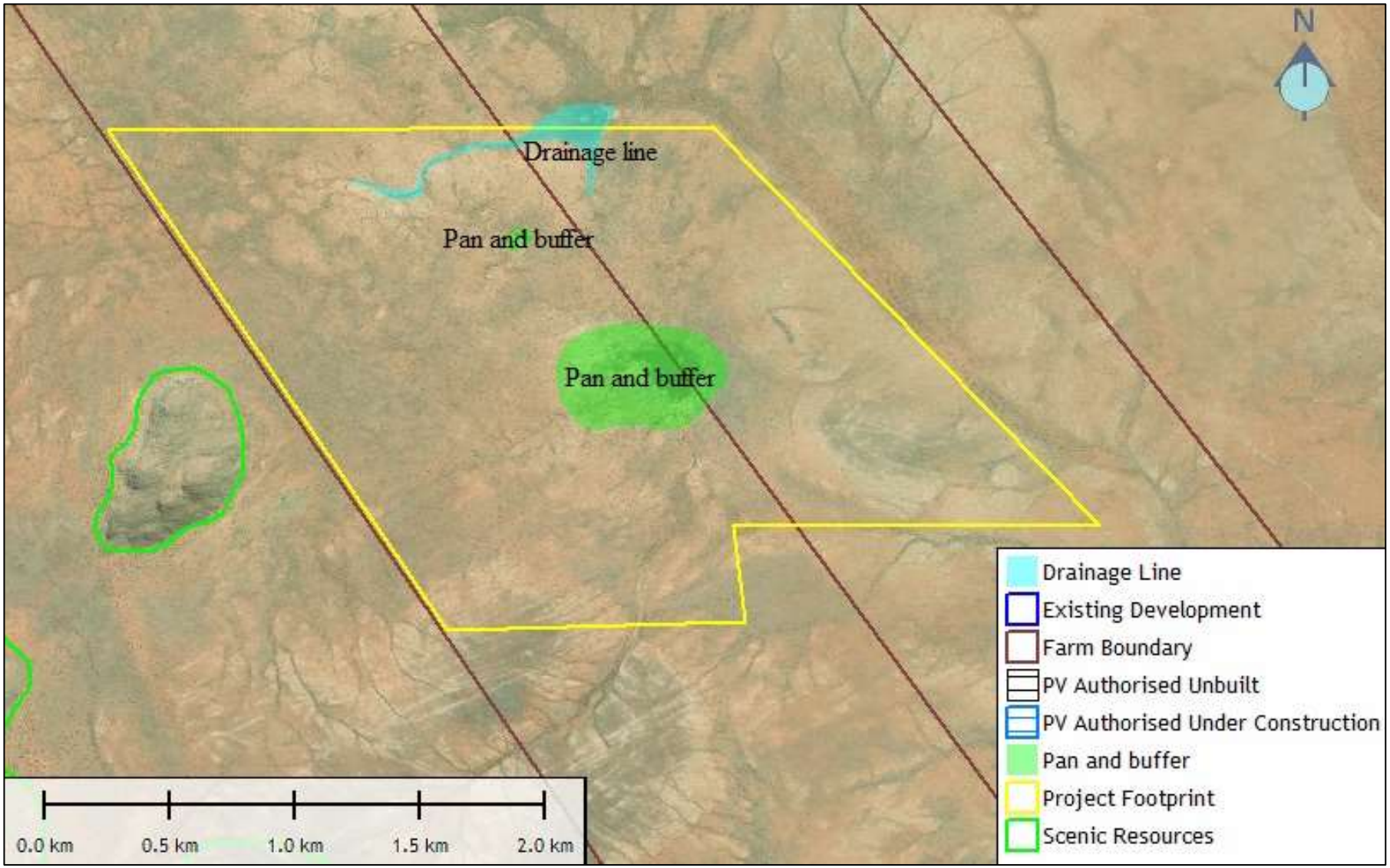


Figure 27: Bloemsmond PV 5 Physiographic Rating Units Map

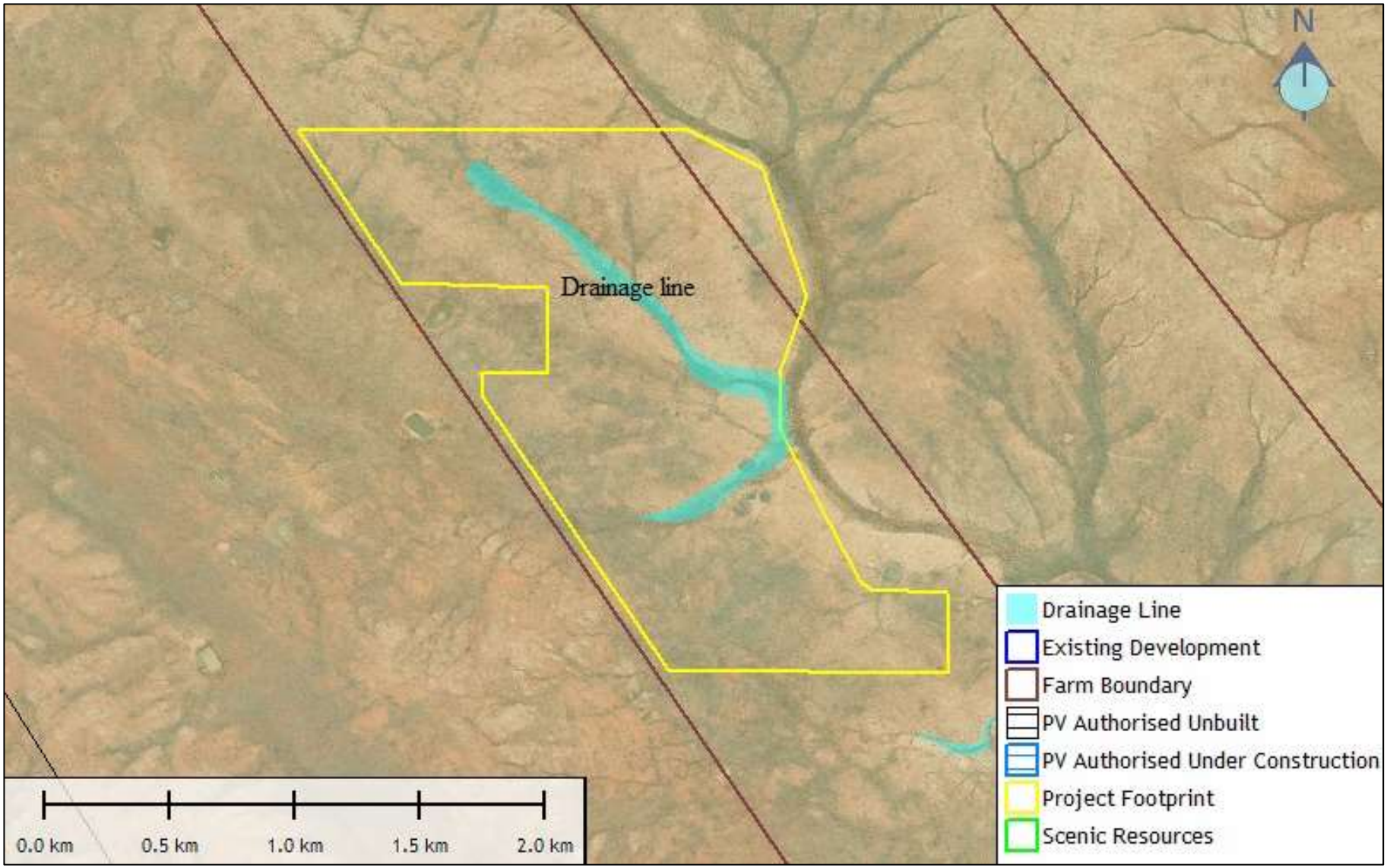


Figure 28: Bloemsmond PV Alternative 2 Physiographic Rating Units Map

13 ANNEXURE C: SPECIALIST INFORMATION

Curriculum Vitae (CV)

1. **Position**: Owner / Director
2. **Name of Firm**: Visual Resource Management Africa cc *(www.vrma.co.za)*
3. **Name of Staff**: Stephen Stead
4. **Date of Birth**: 9 June 1967
5. **Nationality:** South African
6. **Contact Details:** **Tel: +27 (0) 44 876 0020**
   Cell: +27 (0) 83 560 9911
   Email: steve@vrma.co.za

7. **Educational qualifications**:
   - University of Natal (Pietermaritzburg):
   - Bachelor of Arts: Psychology and Geography
   - Bachelor of Arts (Hons): Human Geography and Geographic Information Management Systems

8. **Professional Accreditation**
   - Association of Professional Heritage Practitioners (APHP) Western Cape
     - Accredited VIA practitioner member of the Association (2011)

9. **Association involvement:**

   - International Association of Impact Assessment (IAIA) South African Affiliate
     - Past President (2012 - 2013)
     - President (2012)
     - President-Elect (2011)
     - Conference Co-ordinator (2010)
     - National Executive Committee member (2009)
     - Southern Cape Chairperson (2008)

10. **Conferences Attended:**
    - IAIAsa 2012
    - IAIAsa 2011
    - IAIA International 2011 (Mexico)
    - IAIAsa 2010
    - IAIAsa 2009
    - IAIAsa 2007

11. Continued Professional Development:

- Integrating Sustainability with Environment Assessment in South Africa (IAIAsa Conference, 1 day)
- Achieving the full potential of SIA (Mexico, IAIA Conference, 2 days 2011)
- Researching and Assessing Heritage Resources Course (University of Cape Town, 5 days, 2009)

12. Countries of Work Experience:

- South Africa, Mozambique, Malawi, Lesotho, Kenya and Namibia

13. Relevant Experience:

Stephen gained six years of experience in the field of Geographic Information Systems mapping and spatial analysis working as a consultant for the KwaZulu-Natal Department of Health and then with an Environmental Impact Assessment company based in the Western Cape. In 2004 he set up the company Visual Resource Management Africa that specializes in visual resource management and visual impact assessments in Africa. The company makes use of the well-documented Visual Resource Management methodology developed by the Bureau of Land Management (USA) for assessing the suitability of landscape modifications. Stephen has assessed of over 150 major landscape modifications throughout southern and eastern Africa. The business has been operating for eight years and has successfully established and retained a large client base throughout Southern Africa which include amongst other, Rio Tinto (Pty) Ltd, Bannerman (Pty) Ltd, Anglo Coal (Pty) Ltd, Eskom (Pty) Ltd, NamPower and Vale (Pty) Ltd, Ariva (Pty) Ltd, Harmony Gold (Pty) Ltd, Millennium Challenge Account (USA), Pretoria Portland Cement (Pty) Ltd

14. Languages:

- English – First Language
- Afrikaans – fair in speaking, reading and writing

15. Projects:

A list of ***some*** of the large scale projects that VRMA has assessed has been attached below with the client list indicated per project (Refer to www.vrma.co.za for a full list of projects undertaken).

Table 13: VRM Africa Projects Assessments Table

YEAR	NAME	DESCRIPTION	LOCATION
2018	Mogara PV	Solar Energy	Northern Cape (SA)
2018	Gaetsewe PV	Solar Energy	Northern Cape (SA)
2017	Kalungwishi Hydroelectric (2) and power line	Hydroelectric	Zambia
2017	Mossel Bay UISP (Kwanoqaba)	Settlement	Western Cape (SA)
2017	Pavua Dam and HEP	Hydroelectric	Mozambique (SA)
2017	Penhill UISP Settlement (Cape Town)	Settlement	Western Cape (SA)
2016	Kokerboom WEF * 3	Wind Energy	Northern Cape (SA)
2016	Hotazel PV	Solar Energy	Northern Cape (SA)
2016	Eskom Sekgame Bulkop Power Line	Infrastructrue	Northern Cape (SA)

2016	Ngonye Hydroelectric	Hydroelectric	Zambia
2016	Levensdal Infill	Settlement	Western Cape (SA)
2016	Arandis CSP	Solar Energy	Namibia
2016	Bonnievale PV	Solar Energy	Western Cape (SA)
2015	Noblesfontein 2 & 3 WEF (Scoping)	Wind Energy	Eastern Cape (SA)
2015	Ephraim Sun SEF	Solar Energy	Nothern Cape (SA)
2015	Dyasonsklip and Sirius Grid TX	Solar Energy	Nothern Cape (SA)
2015	Dyasonsklip PV	Solar Energy	Nothern Cape (SA)
2015	Zeerust PV and transmission line	Solar Energy	North West (SA)
2015	Bloemsmond SEF	Solar Energy	Nothern Cape (SA)
2015	Juwi Copperton PV	Solar Energy	Nothern Cape (SA)
2015	Humansrus Capital 14 PV	Solar Energy	Nothern Cape (SA)
2015	Humansrus Capital 13 PV	Solar Energy	Nothern Cape (SA)
2015	Spitzkop East WEF (Scoping)	Solar Energy	Western Cape (SA)
2015	Lofdal Rare Earth Mine and Infrastructure	Mining	Namibia
2015	AEP Kathu PV	Solar Energy	Nothern Cape (SA)
2014	AEP Mogobe SEF	Solar Energy	Nothern Cape (SA)
2014	Bonnievale SEF	Solar Energy	Western Cape (SA)
2014	AEP Legoko SEF	Solar Energy	Northern Cape (SA)
2014	Postmasburg PV	Solar Energy	Northern Cape (SA)
2014	Joram Solar	Solar Energy	Northern Cape (SA)
2014	RERE PV Postmasberg	Solar Energy	Northern Cape (SA)
2014	RERE CPV Upington	Solar Energy	Northern Cape (SA)
2014	Rio Tinto RUL Desalinisation Plant	Industrial	Namibia
2014	NamPower PV * 3	Solar Energy	Namibia
2014	Pemba Oil and Gas Port Expansion	Industrial	Mozambique
2014	Brightsource CSP Upington	Solar Energy	Northern Cape (SA)
2014	Witsand WEF (Scoping)	Wind Energy	Western Cape (SA)
2014	Kangnas WEF	Wind Energy	Western Cape (SA)
2013	Cape Winelands DM Regional Landfill	Industrial	Western Cape (SA)
2013	Drennan PV Solar Park	Solar Energy	Eastern Cape (SA)
2013	Eastern Cape Mari-culture	Mari-culture	Eastern Cape (SA)
2013	Eskom Pantom Pass Substation	Substation /Tx lines	Western Cape (SA)
2013	Frankfort Paper Mill	Plant	Free State (SA)
2013	Gibson Bay Wind Farm Transmission lines	Tranmission lines	Eastern Cape (SA)
2013	Houhoek Eskom Substation	Substation /Tx lines	Western Cape (SA)
2013	Mulilo PV Solar Energy Sites (x4)	Solar Energy	Northern Cape (SA)
2013	Namies Wind Farm	Wind Energy	Northern Cape (SA)
2013	Rossing Z20 Pit and WRD	Mining	Namibia
2013	SAPPI Boiler Upgrade	Plant	Mpumalanga (SA)
2013	Tumela WRD	Mine	North West (SA)

2013	Weskusfleur Substation (Koeburg)	Substation /Tx lines	Western Cape (SA)
2013	Yzermyn coal mine	Mining	Mpumalanga (SA)
2012	Afrisam	Mining	Western Cape (SA)
2012	Bitterfontein	Solar Energy	Northern Cape (SA)
2012	Kangnas PV	Solar Energy	Northern Cape (SA)
2012	Kangnas PV	Solar Energy	Northern Cape (SA)
2012	Kathu CSP Tower	Solar Energy	Northern Cape (SA)
2012	Kobong Hydro	Hydro & Powerline	Lesotho
2012	Letseng Diamond Mine Upgrade	Mining	Lesotho
2012	Lunsklip Wind Farm	Wind Energy	Western Cape (SA)
2012	Mozambique Gas Engine Power Plant	Plant	Mozambique
2012	Ncondezi Thermal Power Station	Substation /Tx lines	Mozambique
2012	Sasol CSP Tower	Solar Power	Free State (SA)
2012	Sasol Upington CSP Tower	Solar Power	Northern Cape (SA)
2011	Beaufort West PV Solar Power Station	Solar Energy	Western Cape (SA)
2011	Beaufort West Wind Farm	Wind Energy	Western Cape (SA)
2011	De Bakke Cell Phone Mast	Structure	Western Cape (SA)
2011	ERF 7288 PV	Solar Energy	Western Cape (SA)
2011	Gecko Industrial park	Industrial	Namibia
2011	Green View Estates	Residential	Western Cape (SA)
2011	Hoodia Solar	Solar Energy	Western Cape (SA)
2011	Kalahari Solar Power Project	Solar Energy	Northern Cape (SA)
2011	Khanyisa Power Station	Power Station	Western Cape (SA)
2011	Olvyn Kolk PV	Solar Energy	Northern Cape (SA)
2011	Otjikoto Gold Mine	Mining	Namibia
2011	PPC Rheebieck West Upgrade	Industrial	Western Cape (SA)
2011	George Southern Arterial	Road	Western Cape (SA)
2010	Bannerman Etango Uranium Mine	Mining	Namibia
2010	Bantamsklip Transmission	Transmission	Eastern Cape (SA)
2010	Beaufort West Urban Edge	Mapping	Western Cape (SA)
2010	Bon Accord Nickel Mine	Mining	Mapumalanga (SA)
2010	Etosha National Park Infrastructure	Housing	Namibia
2010	Herolds Bay N2 Development Baseline	Residential	Western Cape (SA)
2010	MET Housing Etosha	Residential	Namibia
2010	MET Housing Etosha Amended MCDM	Residential	Namibia
2010	MTN Lattice Hub Tower	Structure	Western Cape (SA)
2010	N2 Herolds Bay Residental	Residential	Western Cape (SA)
2010	Onifin(Pty) Ltd Hartenbos Quarry Extension	Mining	Western Cape (SA)
2010	Still Bay East	GIS Mapping	Western Cape (SA)
2010	Vale Moatize Coal Mine and Railway	Mining / Rail	Mozambique
2010	Vodacom Mast	Structure	Western Cape (SA)

2010	Wadrif Dam	Dam	Western Cape (SA)
2009	Asazani Zinyoka UISP Housing	Residential Infill	Western Cape (SA)
2009	Eden Telecommunication Tower	Structure	Western Cape (SA)
2009	George SDF Landscape Characterisation	GIS Mapping	Western Cape (SA)
2009	George SDF Visual Resource Management	GIS Mapping	Western Cape (SA)
2009	George Western Bypass	Road	Western Cape (SA)
2009	Knysna Affordable Housing Heidevallei	Residential Infill	Western Cape (SA)
2009	Knysna Affordable Housing Hornlee Project	Residential Infill	Western Cape (SA)
2009	Rossing Uranium Mine Phase 2	Mining	Namibia
2009	Sun Ray Wind Farm	Wind Energy	Western Cape (SA)
2008	Bantamsklip Transmission Lines Scoping	Transmission	Western Cape (SA)
2008	Erf 251 Damage Assessment	Residential	Western Cape (SA)
2008	Erongo Uranium Rush SEA	GIS Mapping	Namibia
2008	Evander South Gold Mine Preliminary VIA	Mining	Mpumalanga (SA)
2008	George SDF Open Spaces System	GIS Mapping	Western Cape (SA)
2008	Hartenbos River Park	Residential	Western Cape (SA)
2008	Kaaimans Project	Residential	Western Cape (SA)
2008	Lagoon Garden Estate	Residential	Western Cape (SA)
2008	Moquini Beach Hotel	Resort	Western Cape (SA)
2008	NamPower Coal fired Power Station	Power Station	Namibia
2008	Oasis Development	Residential	Western Cape (SA)
2008	RUL Sulpher Handling Facility Walvis Bay	Mining	Namibia
2008	Stonehouse Development	Residential	Western Cape (SA)
2008	Walvis Bay Power Station	Structure	Namibia
2007	Calitzdorp Retirement Village	Residential	Western Cape (SA)
2007	Calitzdorp Visualisation	Visualisation	Western Cape (SA)
2007	Camdeboo Estate	Residential	Western Cape (SA)
2007	Destiny Africa	Residential	Western Cape (SA)
2007	Droogfontein Farm 245	Residential	Western Cape (SA)
2007	Floating Liquified Natural Gas Facility	Structure tanker	Western Cape (SA)
2007	George SDF Municipality Densification	GIS Mapping	Western Cape (SA)
2007	Kloofsig Development	Residential	Western Cape (SA)
2007	OCGT Power Plant Extension	Structure Power Plant	Western Cape (SA)
2007	Oudtshoorn Municipality SDF	GIS Mapping	Western Cape (SA)
2007	Oudtshoorn Shopping Complex	Structure	Western Cape (SA)
2007	Pezula Infill (Noetzie)	Residential	Western Cape (SA)
2007	Pierpoint Nature Reserve	Residential	Western Cape (SA)
2007	Pinnacle Point Golf Estate	Golf/Residential	Western Cape (SA)
2007	Rheebok Development Erf 252 Appeal	Residential	Western Cape (SA)
2007	Rossing Uranium Mine Phase 1	Mining	Namibia
2007	Ryst Kuil/Riet Kuil Uranium Mine	Mining	Western Cape (SA)

2007	Sedgefield Water Works	Structure	Western Cape (SA)
2007	Sulpher Handling Station Walvis Bay Port	Industrial	Namibia
2007	Trekkopje Uranium Mine	Mining	Namibia
2007	Weldon Kaya	Residential	Western Cape (SA)
2006	Farm Dwarsweg 260	Residential	Western Cape (SA)
2006	Fynboskruin Extention	Residential	Western Cape (SA)
2006	Hanglip Golf and Residential Estate	Residential	Western Cape (SA)
2006	Hansmoeskraal	Slopes Analysis	Western Cape (SA)
2006	Hartenbos Landgoed Phase 2	Residential	Western Cape (SA)
2006	Hersham Security Village	Residential	Western Cape (SA)
2006	Ladywood Farm 437	Residential	Western Cape (SA)
2006	Le Grand Golf and Residential Estate	Residential	Western Cape (SA)
2006	Paradise Coast	Residential	Western Cape (SA)
2006	Paradyskloof Residential Estate	Residential	Western Cape (SA)
2006	Riverhill Residential Estate	Residential	Western Cape (SA)
2006	Wolwe Eiland Access Route	Road	Western Cape (SA)
2005	Harmony Gold Mine	Mining	Mpumalanga (SA)
2005	Knysna River Reserve	Residential	Western Cape (SA)
2005	Lagoon Bay Lifestyle Estate	Residential	Western Cape (SA)
2005	Outeniquabosch Safari Park	Residential	Western Cape (SA)
2005	Proposed Hotel Farm Gansevallei	Resort	Western Cape (SA)
2005	Uitzicht Development	Residential	Western Cape (SA)
2005	West Dunes	Residential	Western Cape (SA)
2005	Wilderness Erf 2278	Residential	Western Cape (SA)
2005	Wolwe Eiland Eco & Nature Estate	Residential	Western Cape (SA)
2005	Zebra Clay Mine	Mining	Western Cape (SA)
2004	Gansevallei Hotel	Residential	Western Cape (SA)
2004	Lakes Eco and Golf Estate	Residential	Western Cape (SA)
2004	Trekkopje Desalination Plant	Structure Plant	Namibia (SA)
1995	Greater Durban Informal Housing Analysis	Photogrammetry	KwaZulu-Natal (SA)

14 ANNEXURE D: VRM CHECKLISTS AND TERMINOLOGY

Table 14: Scenic Quality Checklist

KEY FACTORS	RATING CRITERIA AND SCORE		
SCORE	**5**	**3**	**1**
Land Form	High vertical relief as expressed in prominent cliffs, spires or massive rock outcrops, or severe surface variation or highly eroded formations or detail features that are dominating and exceptionally striking and intriguing.	Steep-sided river valleys, or interesting erosion patterns or variety in size and shape of landforms; or detail features that are interesting, though not dominant or exceptional.	Low rolling hills, foothills or flat valley bottoms; few or no interesting landscape features.
Vegetation	A variety of vegetative types as expressed in interesting forms, textures and patterns.	Some variety of vegetation, but only one or two major types.	Little or no variety or contrast in vegetation.
Water	Clear and clean appearing, still or cascading white water, any of which are a dominant factor in the landscape.	Flowing, or still, but not dominant in the landscape.	Absent, or present but not noticeable.
Colour	Rich colour combinations, variety or vivid colour: or pleasing contrasts in the soil, rock, vegetation, water.	Some intensity or variety in colours and contrast of the soil, rock and vegetation, but not a dominant scenic element.	Subtle colour variations contrast or interest: generally mute tones.
Adjacent Scenery	Adjacent scenery greatly enhances visual quality.	Adjacent scenery moderately enhances overall visual quality.	Adjacent scenery has little or no influence on overall visual quality.
Scarcity	One of a kind: unusually memorable, or very rare within region. Consistent chance for exceptional wildlife or wildflower viewing etc.	Distinctive, though somewhat similar to others within the region.	Interesting within its setting, but fairly common within the region.
SCORE	**2**	**0**	**-4**
Cultural Modification	Modifications add favourably to visual variety, while promoting visual harmony.	Modifications add little or no visual variety to the area, and introduce no discordant elements.	Modifications add variety but are very discordant and promote strong disharmony.

Table 15: Sensitivity Level Rating Checklist

FACTORS	QUESTIONS	
Type of Users	**Maintenance of visual quality is:**	
	A major concern for most users	High
	A moderate concern for most users	Moderate
	A low concern for most users	Low
Amount of use	**Maintenance of visual quality becomes more important as the level of use increases:**	
	A high level of use	High
	Moderately level of use	Moderate
	Low level of use	Low
Public interest	**Maintenance of visual quality:**	
	A major concern for most users	High
	A moderate concern for most users	Moderate
	A low concern for most users	Low
Adjacent land Users	**Maintenance of visual quality to sustain adjacent land use objectives is:**	
	Very important	High
	Moderately important	Moderate
	Slightly important	Low
Special Areas	**Maintenance of visual quality to sustain Special Area management objectives is:**	
	Very important	High
	Moderately important	Moderate
	Slightly important	Low

Table 16: VRM Terminology Table

FORM	LINE	COLOUR	TEXTURE
Simple	Horizontal		Smooth
Weak	Vertical		Rough
Strong	Geometric		Fine
Dominant	Angular		Coarse
Flat	Acute		Patchy
Rolling	Parallel		Even
Undulating	Curved	Dark	Uneven
Complex	Wavy	Light	Complex
Plateau	Strong	Mottled	Simple
Ridge	Weak		Stark
Valley	Crisp		Clustered
Plain	Feathered		Diffuse
Steep	Indistinct		Dense
Shallow	Clean		Scattered
Organic	Prominent		Sporadic
Structured	Solid		Consistent

Simple	Basic, composed of few elements	**Organic**	Derived from nature; occurring or developing gradually and naturally
Complex	Complicated; made up of many interrelated parts	**Structure**	Organised; planned and controlled; with definite shape, form, or pattern
Weak	Lacking strength of character	**Regular**	Repeatedly occurring in an ordered fashion
Strong	Bold, definite, having prominence	**Horizontal**	Parallel to the horizon
Dominant	Controlling, influencing the surrounding environment	**Vertical**	Perpendicular to the horizon; upright
Flat	Level and horizontal without any slope; even and smooth without any bumps or hollows	**Geometric**	Consisting of straight lines and simple shapes
Rolling	Progressive and consistent in form, usually rounded	**Angular**	Sharply defined; used to describe an object identified by angles
Undulating	Moving sinuously like waves; wavy in appearance	**Acute**	Less than 90°; used to describe a sharp angle
Plateau	Uniformly elevated flat to gently undulating land bounded on one or more sides by steep slopes	**Parallel**	Relating to or being lines, planes, or curved surfaces that are always the same distance apart and therefore never meet
Ridge	A narrow landform typical of a highpoint or apex; a long narrow hilltop or range of hills	**Curved**	Rounded or bending in shape
Valley	Low-lying area; a long low area of land, often with a river or stream running through it, that is surrounded by higher ground	**Wavy**	Repeatedly curving forming a series of smooth curves that go in one direction and then another
Plain	A flat expanse of land; fairly flat dry land, usually with few trees	**Feathered**	Layered; consisting of many fine parallel strands
Steep	Sloping sharply often to the extent of being almost vertical	**Indistinct**	Vague; lacking clarity or form
Prominent	Noticeable; distinguished, eminent, or well-known	**Patchy**	Irregular and inconsistent;
Solid	Unadulterated or unmixed; made of the same material throughout; uninterrupted	**Even**	Consistent and equal; lacking slope, roughness, and irregularity
Broken	Lacking continuity; having an uneven surface	**Uneven**	Inconsistent and unequal in measurement irregular
Smooth	Consistent in line and form; even textured	**Stark**	Bare and plain; lacking ornament or relieving features
Rough	Bumpy; knobbly; or uneven, coarse in texture	**Clustered**	Densely grouped
Fine	Intricate and refined in nature	**Diffuse**	Spread through; scattered over an area
Coarse	Harsh or rough to the touch; lacking detail	**Diffuse**	To make something less bright or intense

15 ANNEXURE E: GENERIC LIGHT SPILLAGE MITIGATIONS

Mitigation:

- Effective light management needs to be incorporated into the design of the lighting to ensure that the visual influence is limited to the mine, without jeopardising mine operational safety and security (See lighting mitigations by The New England Light Pollution Advisory Group (NELPAG) and Sky Publishing Corp in 14.2).
- Utilisation of specific frequency LED lighting with a green hue on perimeter security fencing.
- Directional lighting on the more exposed areas of operation, where point light source is an issue.
- No use of overhead lighting and, if possible, locate the light source closer to the operation.
- If possible, the existing overhead lighting method utilised at the mine should be phased out and replaced with an alternative lighting using closer to source, directed LED technology.

Mesopic Lighting

Mesopic vision is a combination of photopic vision and scotopic vision in low, but not quite dark, lighting situations. The traditional method of measuring light assumes photopic vision and is often a poor predictor of how a person sees at night. The light spectrum optimized for mesopic vision contains a relatively high amount of bluish light and is therefore effective for peripheral visual tasks at mesopic light levels. *(CIE, 2012)*

The Mesopic Street Lighting Demonstration and Evaluation Report by the Lighting Research Centre (LRC) in New York found that the 'replacement of white light sources (induction and ceramic metal halide) were tuned to optimize human vision under low light levels while remaining in the white light spectrum. Therefore, outdoor electric light sources that are tuned to how humans see under mesopic lighting conditions can be used to reduce the luminance of the road surface while providing the same, or better, visibility. Light sources with shorter wavelengths, which produce a "cooler" (more blue and green) light, are needed to produce better mesopic vision. Based on this understanding, the LRC developed a means of predicting visual performance under low light conditions. This system is called the unified photometry system. Responses to surveys conducted on new installations revealed that area residents perceived higher levels of visibility, safety, security, brightness, and colour rendering with the new lighting systems than with the standard *High-Purity Standards* (HPS) systems. The new lighting systems used 30% to 50% less energy than the HPS systems. These positive results were achieved through tuning the light source to optimize mesopic vision. Using less wattage and photopic luminance also reduces the reflectance of the light off the road surface. Light reflectance is a major contributor to light pollution (sky glow).' *(Lighting Research Center. New York. 2008)*

‘Good Neighbour – Outdoor Lighting’

Presented by the New England Light Pollution Advisory Group (NELPAG) http://cfa/ www.harvard .edu /cfa/ps/nelpag.html) and Sky & Telescope http://SkyandTelescope.com/). NELPAG and Sky & Telescope support the International Dark-Sky Association (IDA) *(http://www.darksky.org/).* (NELPAG)

What is good lighting? Good outdoor lights improve visibility, safety, and a sense of security, while minimizing energy use, operating costs, and ugly, dazzling glare.

Why should we be concerned? Many outdoor lights are poorly designed or improperly aimed. Such lights are costly, wasteful, and distractingly glary. They harm the night-time environment and neighbours’ property values. Light directed uselessly above the horizon creates murky skyglow — the “light pollution” that washes out our view of the stars.

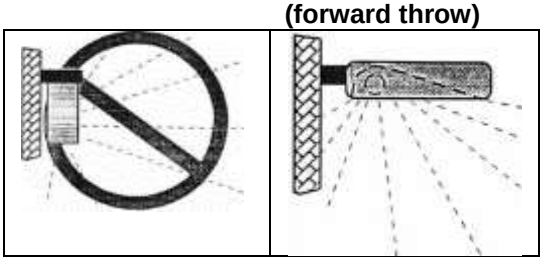
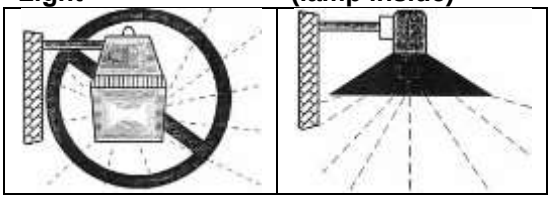
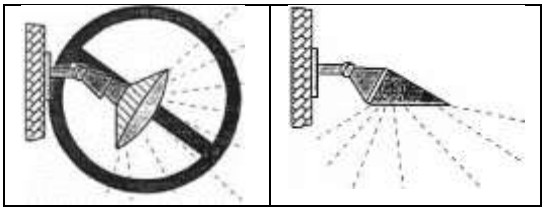
Glare Here’s the basic rule of thumb: If you can see the bright bulb from a distance, it’s a bad light. With a good light, you see lit ground instead of the dazzling bulb. “Glare” is light that beams directly from a bulb into your eye. It hampers the vision of pedestrians, cyclists, and drivers.

Light Trespass Poor outdoor lighting shines onto neighbours’ properties and into bedroom windows, reducing privacy, hindering sleep, and giving the area an unattractive, trashy look.

Energy Waste Many outdoor lights waste energy by spilling much of their light where it is not needed, such as up into the sky. This waste results in high operating costs. Each year we waste more than a billion dollars in the United States needlessly lighting the night sky.

Excess Lighting Some homes and businesses are flooded with much stronger light than is necessary for safety or security.

Good and Bad Light Fixtures

Typical “Wall Pack”	**Typical “Shoe Box” (forward throw)**
	
BAD Waste light goes up and sideways	**GOOD** Directs all light down
Typical “Yard Light”	**Opaque Reflector (lamp inside)**
	
BAD Waste light goes up and sideways	**GOOD** Directs all light down
Area Flood Light	**Area Flood Light with Hood**
	
BAD Waste light goes up and sideways	**GOOD** Directs all light down

How do I switch to good lighting?
Provide only enough light for the task at hand; don’t over-light, and don’t spill light off your property. Specifying enough light for a job is sometimes hard to do on paper. Remember that a full Moon can make an area quite bright. Some lighting systems illuminate areas 100 times more brightly than the full Moon! More importantly, by choosing properly shielded lights, you can meet your needs without bothering neighbours or polluting the sky.

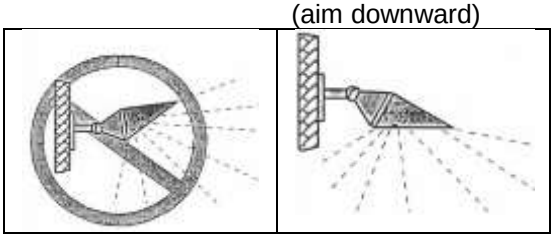
1. Aim lights down. Choose “full-cutoff shielded” fixtures that keep light from going uselessly up or sideways. Full-cutoff fixtures produce minimum glare. They create a pleasant-looking environment. They increase safety because you see illuminated people, cars, and terrain, not dazzling bulbs.

2. Install fixtures carefully to maximize their effectiveness on the targeted area and minimize their impact elsewhere. Proper aiming of fixtures is crucial. Most are aimed too high. Try to install them at night, when you can see where all the rays actually go. Properly aimed and shielded lights may cost more initially, but they save you far more in the long run. They can illuminate your target with a low-wattage bulb just as well as a wasteful light does with a high-wattage bulb.

3. If colour discrimination is not important, choose energy-efficient fixtures utilising yellowish high-pressure sodium (HPS) bulbs. If “white” light is needed, fixtures using compact fluorescent or metal-halide (MH) bulbs are more energy-efficient than those using incandescent, halogen, or mercury-vapour bulbs.

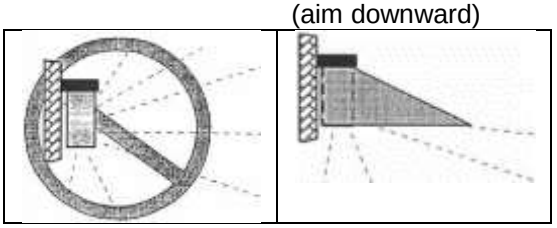
What You Can Do To Modify Existing Fixtures

Change this . . . to this (aim downward)



Floodlight:

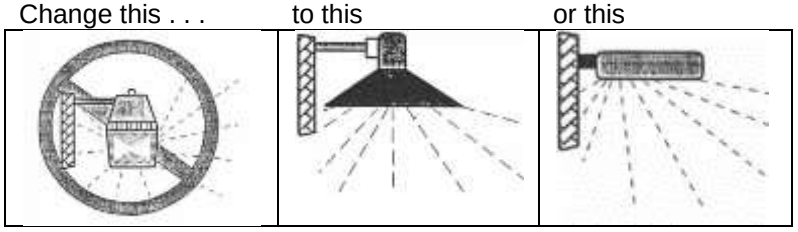
Change this . . . to this (aim downward)



Wall Pack

4. Where feasible, put lights on timers to turn them off each night after they are no longer needed. Put home security lights on a motion-detector switch, which turns them on only when someone enters the area; this provides a great deterrent effect!

Change this . . . to this or this



Yard Light | Opaque Reflecter | Show Box

Replace bad lights with good lights.
You’ll save energy and money. You’ll be a good neighbour. And you’ll help preserve our view of the stars.