ENVIRONMENTAL IMPACT ASSESSMENT FOR THE PROPOSED DYASONKLIP 5 PHOTOVOLTAIC PROJECT, NORTHERN CAPE

SPECIALIST REPORT:
BASIC VISUAL IMPACT ASSESSMENT

DRAFT v2: May 2020

Document prepared for Cape EAPrac (Pty) Ltd;
On behalf of Dyasons Klip PV 5 Proprietary Limited

Visual Resource Management Africa cc
P O Box 7233, George, 6531
Cell: +27 (83) 560 9911
E-Mail: steve@vrma.co.za
Web: www.vrma.co.za

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GLOSSARY

Best Practicable Environmental Option (BPEO)
This is the option that provides the most benefit, or causes the least damage, to the environment as a whole, at a cost acceptable to society, in the long, as well as the short, term.

Cumulative Impact
The impact on the environment, which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency or person, undertakes such other actions. Cumulative impacts can result from individually minor, but collectively significant, actions taking place over a period of time.

Impact (visual)
A description of the effect of an aspect of a development on a specified component of the visual, aesthetic or scenic environment, within a defined time and space.

Issue (visual)
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?"

Key Observation Points (KOPs)
KOPs refer to receptors (people affected by the visual influence of a project) located in the most critical locations 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.

Management Actions
Actions that enhance the benefits of a proposed development, or avoid, mitigate, restore or compensate for, negative impacts.

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.

Scoping
The process of determining the key issues, and the space and time boundaries, to be addressed in an environmental assessment.

Viewshed
The outer boundary defining a view catchment area, usually along crests and ridgelines. Similar to a watershed. This reflects the area in which, or the extent to which, the landscape modification is likely to be seen.

Zone of Visual Influence (ZVI)
The ZVI is defined as 'the area within which a proposed development may have an influence or effect on visual amenity.'

LIST OF ACRONYMS

APHP	Association of Professional Heritage Practitioners
BLM	Bureau of Land Management (United States)
BPEO	Best Practicable Environmental Option
CALP	Collaborative for Advanced Landscape Planning
DEA&DP	Department of Environmental Affairs and Development Planning (South Africa)
DEM	Digital Elevation Model
DoC	Degree of Contrast
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
GIS	Geographic Information System
I&APs	Interested and Affected Parties
IEMA	Institute of Environmental Management and Assessment (United Kingdom)
IEMP	Integrated Environmental Management Plan
KOP	Key Observation Point
MAMSL	Metres above mean sea level
NELPAG	New England Light Pollution Advisory Group
PSDF	Provincial Spatial Development Framework
ROD	Record of Decision
SAHRA	South African National Heritage Resources Agency
SDF	Spatial Development Framework
SEA	Strategic Environmental Assessment
VAC	Visual Absorption Capacity
VIA	Visual Impact Assessment
VRM	Visual Resource Management
ZVI	Zone of Visual Influence

This document was completed by Silver Solutions 887 cc trading as VRM Africa, a Visual Impact Study and Mapping organisation located in George, South Africa. VRM Africa cc was appointed as an independent professional visual impact practitioner to facilitate this VIA.

This document was undertaken by the following team:

Stephen Stead	Director/ Visual Impact	APHP accredited VIA Practitioner
Lisa Schultz	Editing and Contrast Rating	Bachelor of Arts, Fine Art

Stephen Stead
APHP accredited VIA Specialist

1 INTRODUCTION

VRM Africa was appointed by Atlantic Renewable Energy Partners (Pty) Ltd to undertake a Visual Statement of the proposed Dyasonsklip Solar Energy Facility 1, for RE Capital 11 (Pty) Ltd. The site is situated on Remainder of Farm 454, Dyason's Klip farm, Upington, within the jurisdiction area of the Khai Garib Local Municipality in the ZF Mgcawu of the Northern Cape Province. A preliminary site visit was undertaken on 6th August 2014.

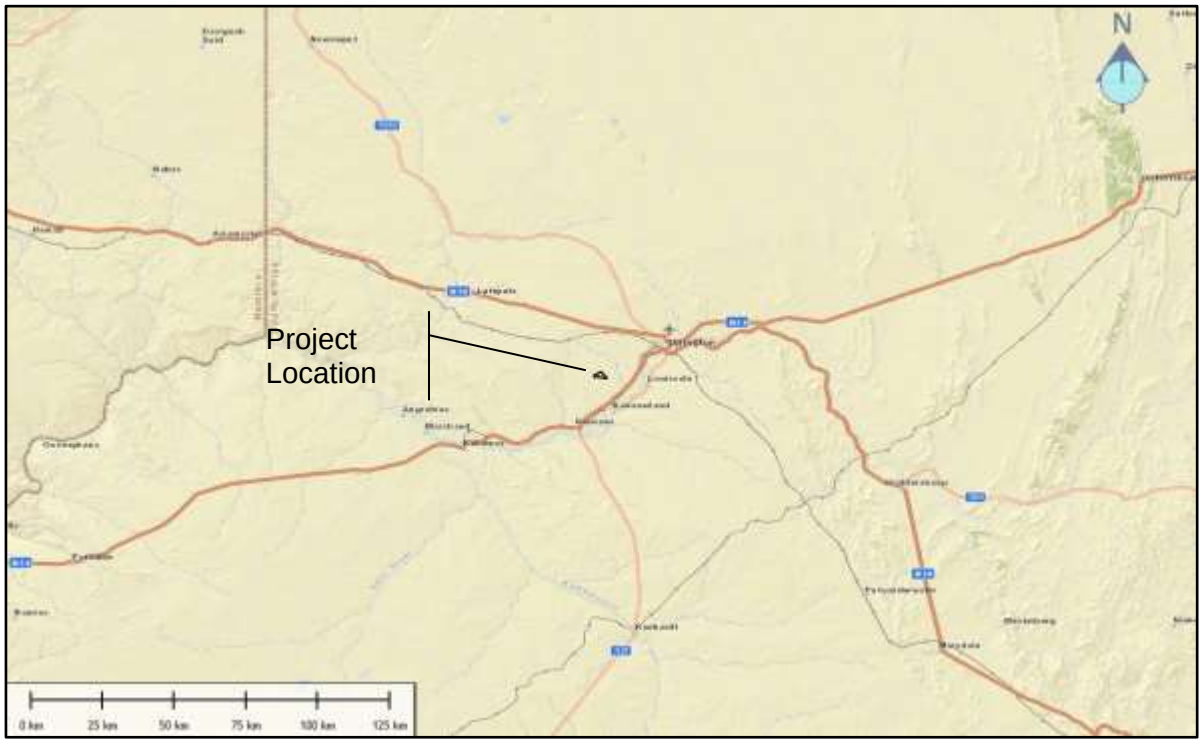


Figure 1: Regional locality map

1.1 Terms of Reference

According to the Bureau of Land Management, U.S. Department of Interior, landscape significance is assessed by differentiating between those landscapes of recognized or potential significance or sensitivity to modification and landscapes that have low sensitivity and scenic value. 'Different levels of scenic values require different degrees 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. Assessing scenic values and determining visual impacts can be a subjective process. Objectivity and consistency can be greatly increased by using standard assessment criteria to describe and evaluate landscapes, and to also describe proposed projects.' (USDI., 2004)

The scope of the study is to cover the entire proposed project area, and the 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.
- Consider all cumulative effects in all impact reports.
- 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.
- Identifying possible mitigation measures to reduce negative visual impacts for inclusion into the proposed project design, including input into the Environmental Management Plan (EMP).

1.2 Assumptions and Limitations

- Information pertaining to the specific heights of activities proposed for the development was limited and, where required, generic heights will be used to define the visibility of the project.
- Although every effort to maintain accuracy was undertaken, as a result of the Digital Elevation Model (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.
- The use of open source satellite imagery was utilised for base maps in the report.
- The viewsheds were generated using ASTER elevation data. (NASA, 2009)
- Some of the mapping in this document was created using Bing Maps (previously *Live Search Maps*, *Windows Live Maps*, *Windows Live Local*, and *MSN Virtual Earth*) and powered by the Enterprise framework.
- This study is based on assessment techniques and investigations that are limited by time and budgetary constraints applicable to the type and level of assessment undertaken. 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.

1.3 Approach and Methods

According to the Guidelines for Landscape and Visual Impacts by the Institute of Environmental Management and Assessment (United Kingdom), landscape impacts derive from changes in the physical landscape; which may give rise to changes in its character and how this is experienced. This in turn may affect the perceived value attributed to the landscape. Visual impacts relate to changes that arise in the composition of available views as a result of changes to the landscape, to people's response to any changes, and the overall impacts with respect to visual amenity. (U.K Institute of Environmental Management and Assessment (IEMA), 2002)

Approach

A site visit was undertaken on the 18th of June 2018. During the site visit, a visual confirmation of the desktop viewshed mapping was undertaken, to determine the anticipated zone of visual influence. From the property, key landforms and receptor points were identified. These local landforms and receptors points were then visited to determine the extent of the property visibility from the receptor locations. Photographs from the receptor locations in the direction of the property were also taken.

The process that VRMA followed 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).

Methods and Activities

The assessment comprises two main sections: firstly, the Visual Inventory to identify the visual resources along the proposed routing; and secondly, the Analysis Stage. The second impact assessment stage may require a Contrast Rating to assess the expected degree of contrast the proposed project would generate within the receiving landscape in order to define the Magnitude of the impact.

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. Scenic Quality and Receptor Sensitivity are defined making use of the BLM check sheets located in the Annexure. These findings are then submitted to a VRM Matrix in Table 1 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 1: 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.

Should the landscape character be found to be significant, a contrast rating would be undertaken during the impacts phase to inform the impact ratings. A contrast rating is undertaken from the receptor Key Observation Points, where the level of change to the existing landscape is assessed in terms of line, colour, texture and form, in relation to the visual objectives defined for the area. KOPs are defined by the BLM as the people (receptors) located in strategic locations surrounding the property or development that make consistent use of the views associated with the site where the landscape modifications are proposed.

2 PROJECT DESCRIPTION

The following extract from the Technical Layout Report outlines the project:

Table 2: Site and Project Details Table

Dyasons Klip 5			
Applicant Details	Applicant Name:	Dyasons Klip PV 5 (Pty) Ltd is a Special Purpose Vehicle (SPV) incorporated for the sole purpose of developing, constructing, and operating a proposed 100 MW solar PV facility located on the Remainder of Farm Dyason's Klip 454	
	Company Registration Number:	2019/627994/07	
	BBBEE Status:	n/a	
	Project Name:	Dyasons Klip 5	
Site Details			
Size of the property	Description and Size in hectares of the affected property.	**PV Site**: the Remainder of Farm Dyason's Klip 454, Total Property Size: 5725.28 ha ha	
Size of the study area	Size in ha of initial study area.	327ha	

Dyasons Klip 5			
Development Footprint	This includes the total footprint of PV panels, auxiliary buildings, onsite substation, inverter stations and internal roads.	Approximately 267ha	
Technology Details			
Capacity of the facility	Capacity of facility (in MW)	Net generating capacity of 100MWac	
Solar Technology selection	Type of technology	Solar photovoltaic (PV) with either of fixed-tilt-, single-axis tracking- or dual-axis tracking- mounting structures. PV structures/ modules: up to a maximum of 250ha Laydown area: ± 3 - 5ha Internal roads ± 6.5ha Auxiliary buildings: ± 1ha Facility substation: up to 1ha Battery storage area: up to ± 4ha	
	Structure height	Solar panels a maximum of ± 3.5m from ground level	
	Surface area to be covered (including associated infrastructure such as roads)	Approximately 267ha	
	Structure orientation	Fixed-tilt: north-facing at a defined angle of tilt Single-axis: horizontal axis mounted in a north-south orientation, tracking from east to west	
	Laydown area dimensions	Approximately 3 - 5ha of temporary laydown area will be required (the laydown areas will not exceed 5ha and will be situated within the assessed footprint). Permanent laydown area will not exceed 1ha and will be contained within the footprint of the temporary laydown area.	
Grid connection	Substation to which project will connect.	There are two substation alternatives (Alt 1 and Alt 2), both 100m x 100m: - **Alternative 1 (preferred)** is located near the north-eastern corner of the Dysons Klip 5 development footprint; - **Alternative 2** is located at the south-eastern corner of the development footprint which	

Dyasons Klip 5		
		borders Dyasonsklip Solar Energy Facility 1 (DK SEF 1), or otherwise referred to as Dyasons Klip 4 (DK4).
	Capacity of substation to connect facility	There are three power line options, each has a 200m buffer either side of the proposed lines routes (i.e. the 400m wide corridors will be the focus areas): - **Alternative 1** runs past (switches into) the Dyasonsklip Solar Energy Facility 1 substation, along the north and then western boundary of DK3 into DK1/2 Switching Station, and then parallel to the existing 132kV line all the way back to Upington MTS. - **Alternative 2** runs past (switches into) the Dyasonsklip Solar Energy Facility 1 substation, runs down the eastern boundary, and then parallel to the existing 132kV line all the way back to the MTS. - **Alternative 3** runs past (switches into) the Dyasonsklip Solar Energy Facility 1 substation, runs down the eastern boundary, and then parallel to the proposed 400kV Aries-Upington line all the way back to the MTS.
Auxiliary Infrastructure		
Other infrastructure	Additional Infrastructure	Auxiliary buildings of approximately 1 ha. The functions within these buildings include (but are not limited to) a gate house, ablutions, workshops, storage and warehousing area, site offices, and control centre. Substation Sizes: Dyasons Klip 5 is 100m x 100m it total; ± 100m x 50m for the facility side, and ± 100m x 50m for the Eskom Switching Station side. Electrified Perimeter Fencing not exceeding 3.5m in height.
	Details of access roads	The internal access roads will not exceed 5m in width, and main access roads will not exceed 8m in width.
	Extent of areas required for laydown of materials and equipment	Approximately 2-5ha of laydown areas will be required (laydown areas will not exceed 5ha). A permanent laydown area of a maximum of 1ha will remain.

The Solar PV Development 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 MWac as well as associated infrastructure, which will include:

- Dyasons Klip 5 is to consist of solar photovoltaic (PV) technology with fixed, single or double axis tracking mounting structures, with a net generation (contracted) capacity of 100 MW_{AC} (MegaWatts), as well as associated infrastructure, which will include:
- Auxiliary buildings (gate-house and security, control centre, office, warehouse, canteen & visitors centre, staff lockers etc.);
- Access (at an existing access on the N14) and internal road network that extends beyond that authorised for DK SEF 1;
- Laydown area;
- Battery storage area;
- Rainwater tanks;
- Perimeter fencing and security infrastructure;
- Inverter-stations, transformers and internal electrical reticulation (underground cabling);
- On-site switching-station / substation; and
- Overhead 132kV electrical transmission line / grid connection.

Table 3. Component Details Table

Component	**Description/ Dimensions**
Location of the site	Approximately 20km West of Upington along the N14
PV Panel area	A maximum of 250ha with a total project footprint of approximately 267ha
SG Codes	C02800000000045400000
Preferred Site access	Access (at an existing access on the N14) and internal road network that extends beyond that authorised for DK SEF 1.
Export capacity	100 MWac
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 Internal 5m, Main 8m. Length: up to 15km

Figure 2: DRAFT PV Layout overlay onto Google Earth map (To be updated)

Figure 3: Road Access Alternatives locality map (To be updated)

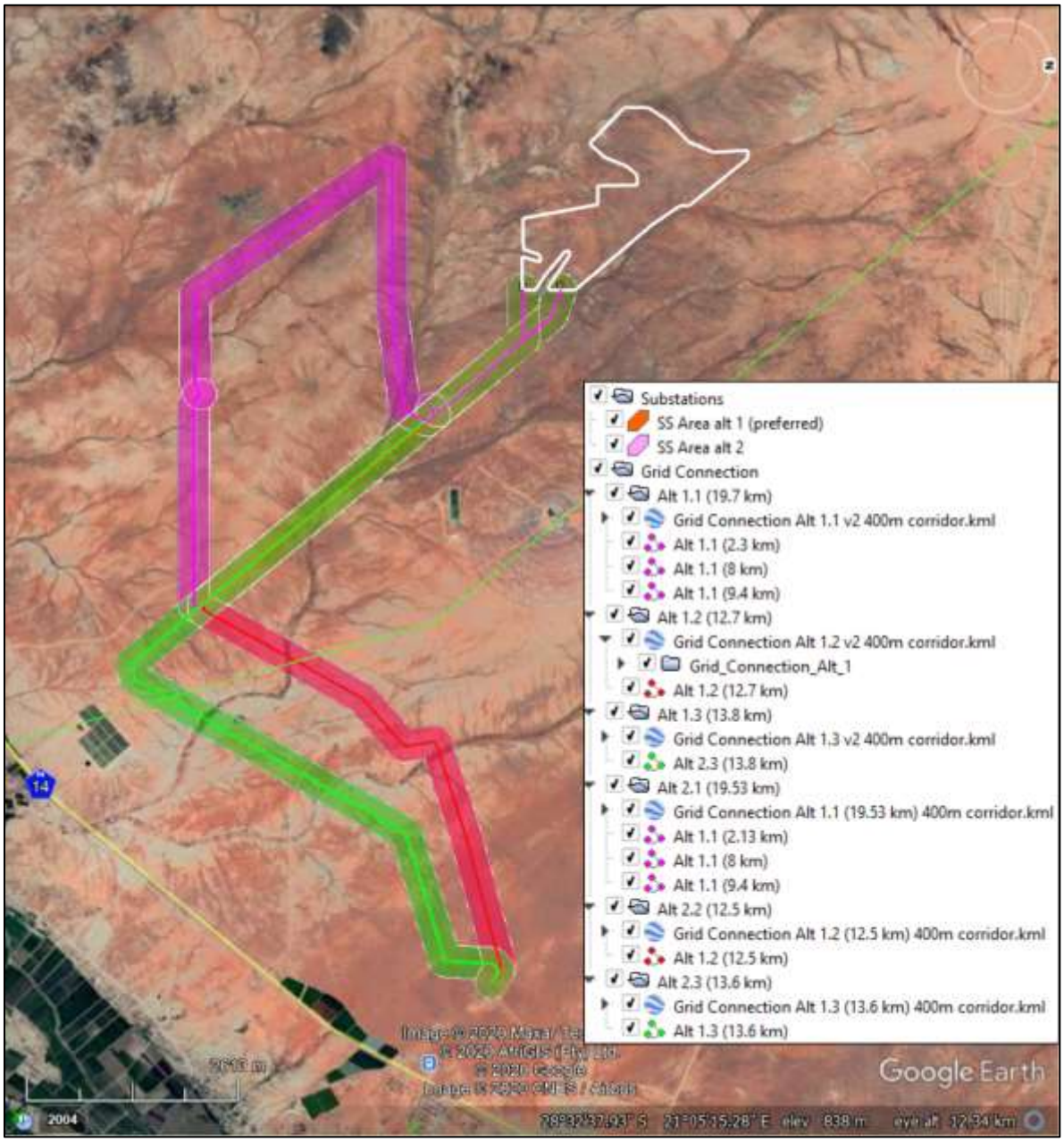


Figure 4. Proposed Grid connection alternatives map overlay onto Google Earth (To be updated)

The photographs below show examples of existing solar energy photovoltaic (PV) projects.

Figure 5: Photograph example of solar panels
(Source: www.hawaiirenewableenergy.org/Villamesias2)

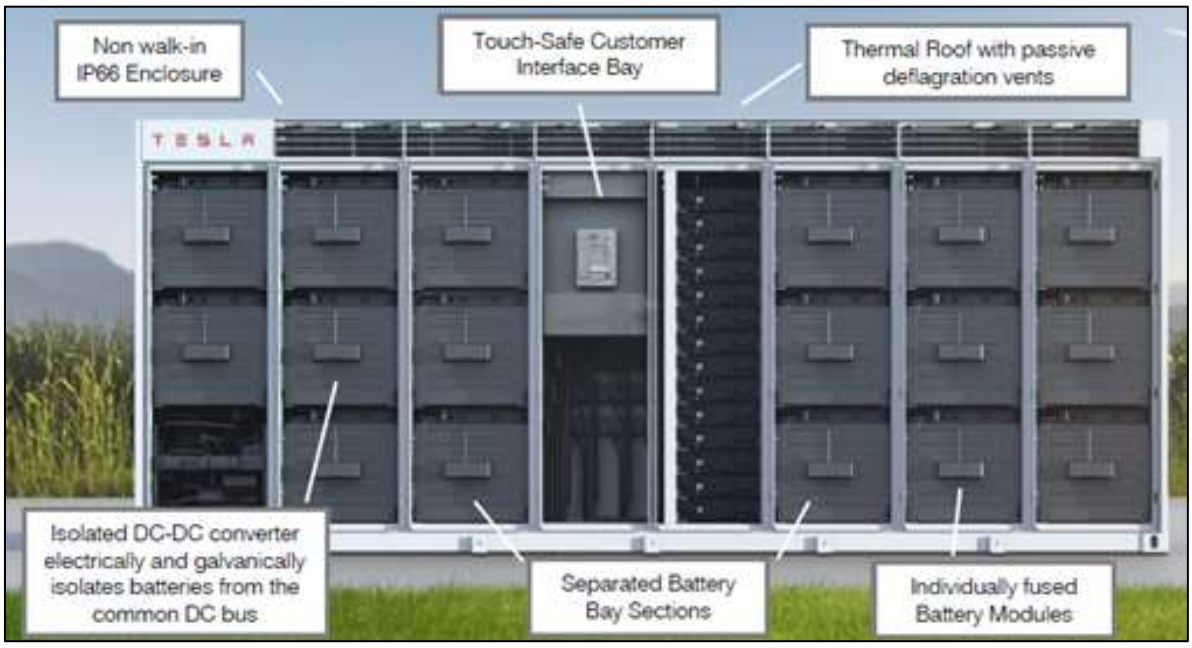


Figure 6. Example image of expected look and feel of the battery storage facilities.

2.1 Legislative and Planning Context

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:

2.2 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.

2.2.1 *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.

2.2.2 *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.

2.2.3 *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.

2.3 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.

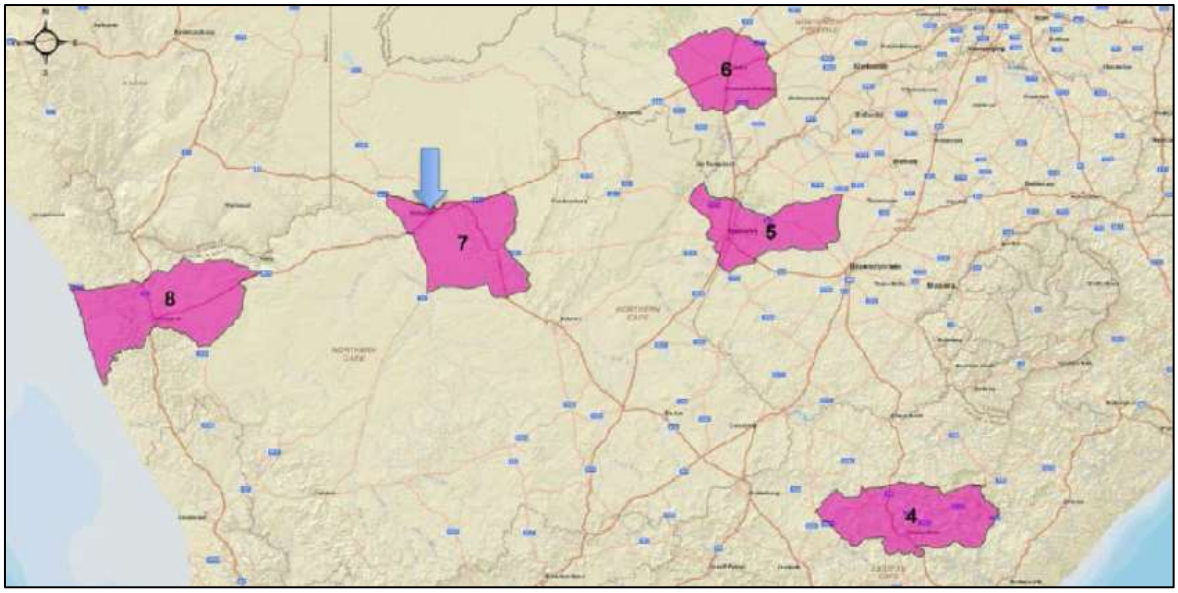


Figure 7: Renewable Energy Development Zones map with the arrow indicating the approximate location of the projects in REDZ 7.

3 BASELINE ASSESSMENT

3.1 Locality

The project site is situated on Remainder of Farm 454, Dyason's Klip farm, approximately 22 km west southwest of Upington and 15 km northeast of Keimoes. Key tourism features in the immediate vicinity include the Orange River, the Augrabies Falls National Park (60 km south-west) and Kgalagadi Transfrontier Park (220 km north).

The proposed project site forms part of the greater south Kalahari landscape, a flat and arid areas, north-west of the Orange River. According to the Ecological Specialist, the majority of the farm is located within the Bushmanland Arid Grassland, while the northern portion is located within the Kalahari Karroid Shrubland vegetation type, as identified in the National Vegetation Map of Southern Africa. Both these vegetation types are classified as Least Threatened in terms of the National Environmental Management: Biodiversity Act. *(CapeEAPrac 2014)*

3.2 Regional Landscape Character

A broad brush regional landscape survey was undertaken to identify key features that define the landscape context within the project approximate viewshed area. The following landmarks were identified as significant in defining the surrounding areas characteristic landscape as indicated in the landmark locality map on the previous page:

- Orange River
- Khi Solar 1 Facility and Other Solar Energy Facilities
- Existing 132 kv Transmission Line
- Agricultural areas
- N14 National Road

3.2.1 *Orange River Viniculture Cultural Landscape*

Figure 8: View of Orange River town of Keimoes

The main landscape feature in the area is the Orange River valley. 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. In the Northern Cape context where much of the terrain is fairly flat, this landform and hence, scenic quality, is rated as *moderate to high* as it does offer some variation and visual interest. 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. Receptor sensitivity to change in landscape character in these areas would likely be *moderate to high*.

3.2.2 *Khi Solar 1 Facility and Other Solar Energy Facilities*

Figure 9: View of Khi Solar 1 as seen from the N14

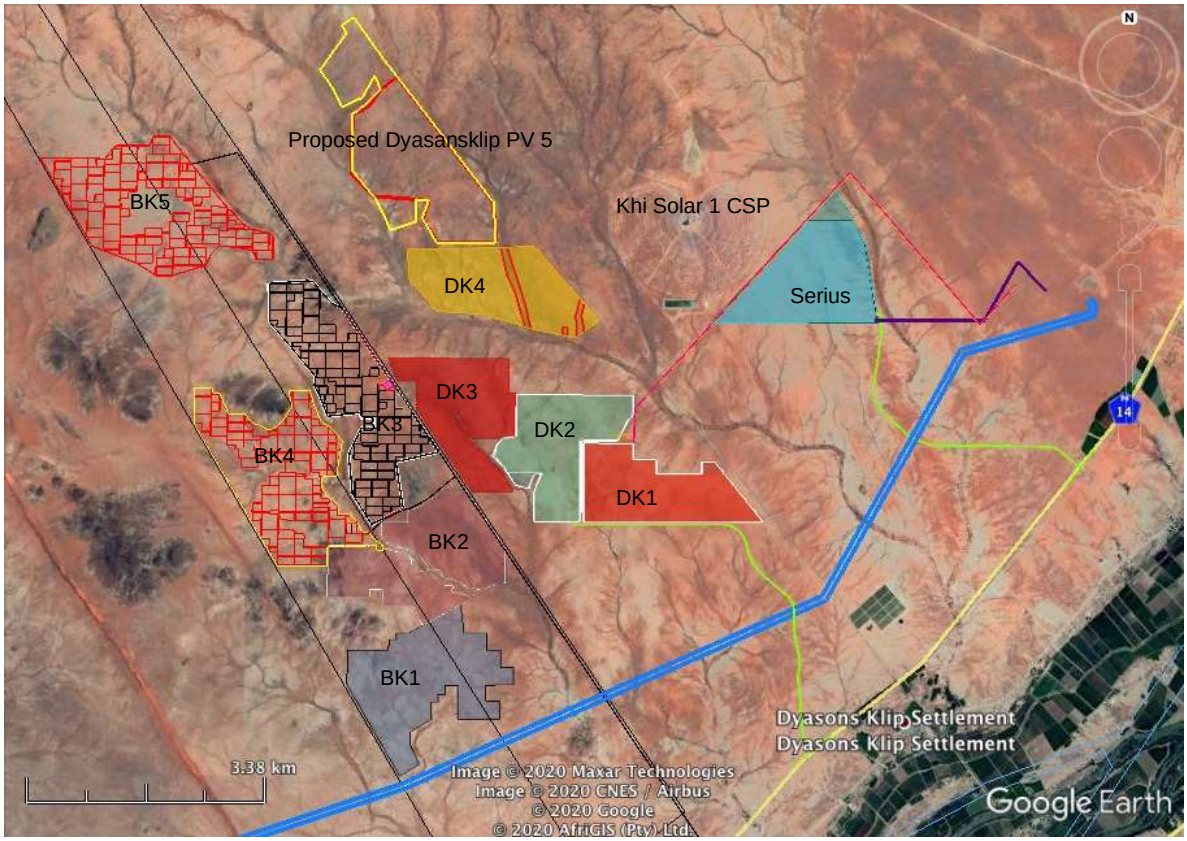


Figure 10: Other solar developments in relation to the proposed project.

The site is situated in close proximity to the Khi Solar One Concentrated Solar Power (CSP) tower project, currently under construction. This creates a large vertical feature in the landscape. It is likely that the area will become a solar energy hub as within the surrounding landscape there are other proposed and approved CSP towers and large scale PV projects as well as an approved Eskom MTS substation. Other PV projects include the Serius and Dyasansklip (DK) developments that are both under construction. Bloemsmond PV projects (BM) are also indicated on the above map with Bloemsmond 1 & 2 authorised, and PV 3 to PV 5 proposed. The Khi Solar 1, with the other PV developments and associated infrastructure all generate a strong renewable energy sense of place. These landscape modifications also increase the local visual absorption capacity.

3.2.3 *Agricultural areas*


Figure 11: View of the farming in the areas north of the proposed site which are typical of the characteristic landscape

The majority of the surrounding landscape to the south and north of the proposed site is associated with rural agriculture and low intensity grassland farming with cattle, sheep and

goats. The intensity of the farm practice is very low. As a result, the farming activities seen are mainly gravel roads, tracks and farm fencing. Isolated farmsteads also occur which are often surrounded by garden trees for shade. The flat, uniform landform offers little diversity or interest. The texturing and variety of Kalahari grasses, the red sands and the red rocky hills in the background add value to the landscape. The scenic quality of these areas is *moderate to high*. The remoteness of the area results in a particular sense of place and it is likely that farmer and worker receptors would be sensitive to landscape change. However, due to the remoteness and moderate use, it is likely that public interest in protecting these areas would be limited. Typically agricultural areas do allow for moderate levels of modification without resulting in a significant change to the landscape.

3.2.4 *N14 National Road*

The N14 is an important tourist view corridor and it is recommended that a suitable visual buffer along the road is set in place to ensure that views of the proposed PV facilities are set back and do not detract from the viniculture sense of place found in this section of the N14 and the Orange River Valley. As depicted in the photograph above, the Khi Solar One CSP tower which is under construction, is clearly visible from the N14. This would increase the probability that public interest in maintaining visual quality would be low. It is important to ensure that the proposed Solar Energy projects to not detract from the tourism associated with the viniculture cultural landscape along the Orange River.

Figure 12: Typical view from the N14 road to the north depicting the telephone lines, the transmission line and Khi Solar One in the background

3.3 Project Visibility

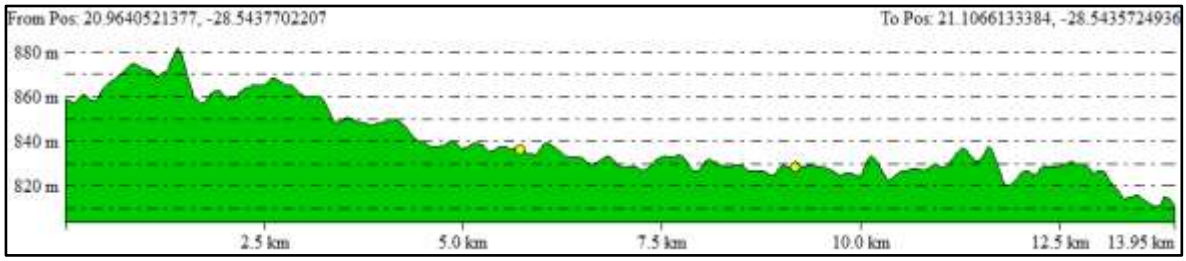
3.3.1 *Regional Topography*

A regional Digital Elevation Model (DEM) was generated using NASA ASTER 90m DEM data (NASA, 2009). The data is generalised and used to better understand the broader terrain. Graphical representation of the terrain was also implemented with two profile lines cutting through the study area and extending beyond the area approximately 15km on either side of the proposed development area.

As can be seen on the two profile drawings below, the site is characterised by flat open terrain covered with Bushmanland Grass. The west to east profile reflects little topographic undulation an eastern aspect. The raised ground to the east and west significantly contains the visibility of the proposed PV. The north to south profile reflects more variation with the site having a southern aspect. A network of shallow drainage lines drain the proposed site

to the south, creating some shallow undulations. A slopes analysis indicated that there are no steep slopes areas on the site.

West to East



North to South

3.3.2 *Viewshed Analysis*

The visible extent, or viewshed, is 'the outer boundary defining a view catchment area, usually along crests and ridgelines' *(Oberholzer, 2005).* This reflects the area, or extent, where a landscape modification of a specified height would probably be seen. In order to define the extent of the possible influence of the proposed project, a viewshed analysis is undertaken from the proposed sites at a specified height above ground level as indicated in the below table. The extent of the viewshed analysis was restricted to a defined distance that represents the approximate zone of visual influence (ZVI) of the proposed activities. The maps are informative only as visibility tends to diminish exponentially with distance, which is well recognised in visual analysis literature (*(Hull, R.B. and Bishop, I.E., 1988)*.

Table 4: Proposed Project Heights Table

Project Phase	Proposed Activity	Approx. Height (m)	Approx. ZVI (km)
Operation	PV and substation	10	14

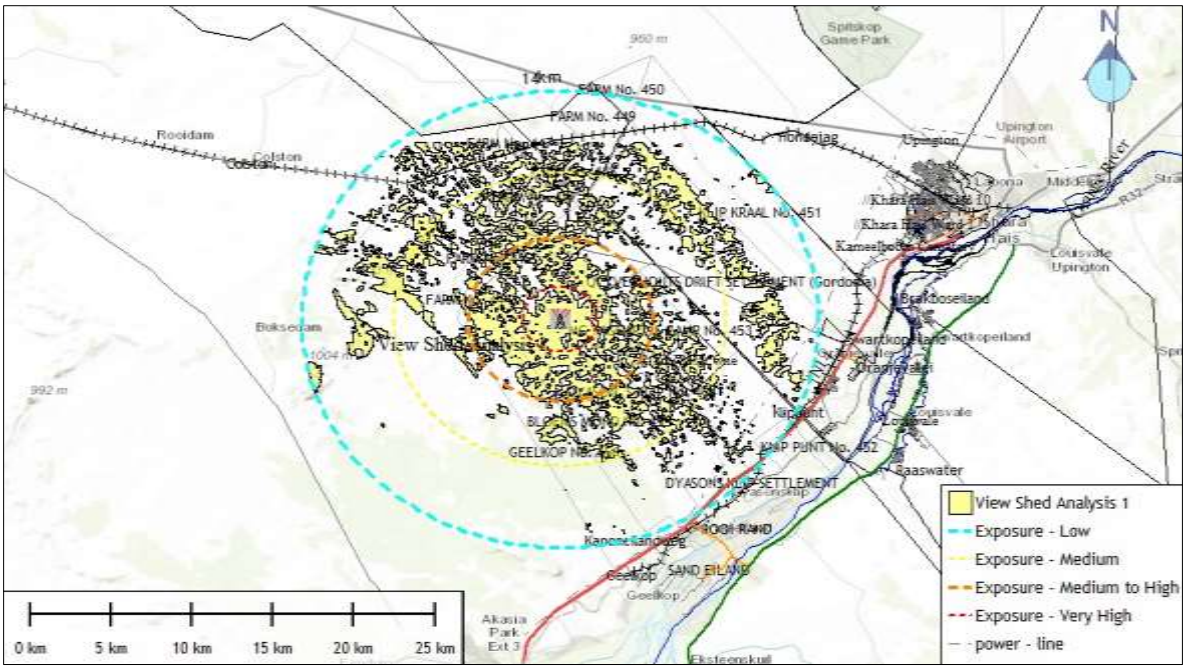


Figure 13: Approximate visibility map.

The viewshed analysis undertaken for the project depicts a fairly contained visual extent, mainly centred around the project site within the Medium to High Exposure areas. Outside of the Foreground areas, the viewshed becomes increasingly fragmented and does not extend beyond the 14km background region. The Zone of Visual Influence is defined as Local in extent.

3.3.3 *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 includes sensitive receptors. This is due to the remoteness of the site, as well as the slight undulation of the terrain.

4 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.

4.1 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:

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.

During the site visit, two main broad-brush landscapes were identified, these being Bushmanland Arid Grassland, and the Shallow Drainage Lines. The majority of the proposed development site is flat and covered with Bushmanland Grassland. A small, portion of the proposed development area comprises a shallow drainage line which could be ecologically significant. Due to their potential significance, these areas are defined as Class I (Subject to Ecological / surface Water Hydrology specialists findings).

Table 5: Scenic Quality and Receptor Sensitivity Rating Table.

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**
Drainage lines	**(Class I is not rated)**																**I**
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.

4.2 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.* 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 north of the property adds value due to the wilderness sense of place. Scarcity factor is rated *Low*, as this type of scenery is fairly widespread in the area and cultural modifications on the site 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 and rated ***Moderate to Low***.

4.3 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***.*

4.4 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 1):

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 5.

4.4.1 *VRM Class I*

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

Drainage Lines (Subject to Ecological / surface Water Hydrology specialists findings)

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.

4.4.2 *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.

4.4.3 *VRM Class III*

Bushmanland Arid Grassland

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 farming which could increase potential of eco-tourism in the area. As such, the area does require mitigation 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

4.4.4 *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.

5 IMPACT ASSESSMENT

5.1 Impact Assessment Rating 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).*

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.
Confidence	Key uncertainties and risks in the VIA process, which may influence the accuracy of, and confidence in, the VIA process.

Source: DEA&DP Guideline for involving Visual and Aesthetic Specialists in EIA Processes

5.2 PV and Associated Infrastructure 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.

Due to the similar locality and overlap of the two alternatives, only a single impact ratings was undertaken.

Table 6: PV and Battery Storage Impacts Ratings Table (Both options)

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	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 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 constructed PV and CSP landscape modifications.		
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). • Dust management during the lifetime of the project.		
Cumulative impacts: • Excessive lights at night could reduce the current dark sky sense of place that could detract from tourism opportunities in the area.		
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. • 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.		

5.3 Grid Connection Visual Impacts

The Nature of the Visual Impact of the proposed power line routings is rated Negative, as all these landscape modifications will require the removal of vegetation, or have the potential to be visually discordant with the surrounding rural landscape to some degree. Although the power

lines do follow an existing Eskom power line routing, the multi-lines will create a visual massing effect which will degrade the local landscape character.

The following visual impacts could take place during the lifetime of the proposed ***transmission line***:

Construction Phase
- Loss of site landscape character due to the removal of vegetation and the construction of the power line structures and temporary access road.
- Possible soil erosion from temporary roads crossing drainage lines.
- Possible windblown litter from the lay-down and construction sites.

Operation Phase
- On-going soil erosion.
- On-going windblown dust.
- Sunlight glint off cables and structures.

Decommissioning Phase
- Movement of vehicles and associated dust.
- Windblown dust from the disturbance of cover vegetation/gravel.

Cumulative Effects
- Massing effects from numerous power lines converging on the substations.
- Cluttering effects from add-hoc routings that are not aligned with existing Eskom power line corridors.

Reversibility
Due to the small footprint of the structure, all the alternatives were defined as ***Reversible***. The monopoles can be removed, and existing vegetation would grow back, but only after a long period of time. Rehabilitation and restoration would be required.

Confidence
Confidence for the PV grid connection was rated ***Sure*** as sufficient information was provided regarding the nature of the proposed landscape modification.

Due to similar positioning and alignments, the Alternatives 1.2 and 1.3 are impacted in one table, with Alternative 1.1 assessed separately.

Table 7: Grid Impacts Ratings Table for Alternative 1.2 (Red Line) and 1.3 (Green Line)

Nature: Change of local and surrounds visual resources due to the construction and operation of the proposed power line mono pole structures.		
	Without mitigation	**With mitigation**
Extent	Local	Local
Duration	Long-term	Long-term
Magnitude	Medium to Low	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 proposed 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 existing renewable energy projects that also include power lines.
- The alignments of both proposed power lines are along existing road and existing power line infrastructure corridors.
- The average distance of 2.5km from these lines to the N14 National Highway reduce the visual exposure to the proposed landscape change.
- The area already has a higher Visual Absorption Capacity due to the renewable energy development node within the REDZ 7 area.

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.
- Dust management during the lifetime of the project.

Cumulative impacts:

- Visual massing effects created by multiple lines from multiple projects, congregating in a single location that has the potential to generate strong levels of visual intrusion.

Residual Risks:

- Should the mitigations be implemented, the residual risks from soil erosion and intrusion from massing effects in prominent locations would be limited.

Table 8: Grid Impacts Ratings Table for Alternative 1.1 (Pink Line).

Nature: Change of local and surrounds visual resources due to the construction and operation of the proposed power line mono pole structures.		
	Without mitigation	**With mitigation**
Extent	Local	Local
Duration	Long-term	Long-term
Magnitude	Medium	Medium
Probability	Probable	Probable
Significance	**Medium**	**Medium**
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 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 existing renewable energy projects that also include power lines.
- The alignments of both proposed power lines are along existing road and existing power line infrastructure corridors.
- The area already has a higher Visual Absorption Capacity due to the renewable energy development node within the REDZ 7 area.
- Although not a fatal flaw, the extra length of the power line routed around the Dyasansklip PV 1 to PV 3 is likely to increase the visual cluttering in the vicinity.

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. • Dust management during the lifetime of the project.
Cumulative impacts: • Visual massing effects created by multiple lines from multiple projects, congregating in a single location that has the potential to generate strong levels of visual intrusion.
Residual Risks: • Should the mitigations be implemented, the residual risks from soil erosion and intrusion from massing effects in prominent locations would be limited.

5.4 Road Access Landscape and Visual Impacts

The Nature of the Visual Impact of the proposed power line routings is rated Negative, as all these landscape modifications will require the removal of vegetation, or have the potential to be visually discordant with the surrounding rural landscape to some degree. The road structure is essentially flat and as it does not route over any prominent ground, the visual extent of the landscape change is limited.

The following visual impacts could take place during the lifetime of the proposed ***transmission line***:

Construction Phase
- Loss of site landscape character due to the removal of vegetation and the construction of the access road.
- Possible soil erosion from temporary roads crossing drainage lines.
- Possible windblown litter from the lay-down and construction sites.

Operation Phase
- 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 Effects
- Massing effects from numerous roads from multiple projects.

<u>Reversibility</u>
Due to the small footprint of the structure, all the alternatives were defined as ***Reversible***. The monopoles can be removed, and existing vegetation would grow back, but only after a long period of time. Rehabilitation and restoration would be required.

<u>Confidence</u>
Confidence was rated ***Sure*** as sufficient information was provided regarding the nature of the proposed landscape modification.

Table 9: Southern 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**	**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 proposed southern access road is an extension on an existing PV access road; • The area has a high visual absorption capacity due to the existing PV and CSP projects located in the vicinity. • Assess the possibility of accessing the site via the CSP Khi Solar 1 road which is already established as this would reduce fragmentation of the landscape from multiple roads.		
Mitigation: • Dust management during the lifetime of the project.		
Cumulative impacts: • The construction of multiple roads running adjacent to each other for each project increases fragmentation.		
Residual Risks: • 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 10: Northern 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	**Medium**	**Medium to 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 proposed northern access road would require vehicles to route of a minor road,		

increasing distance and the movement of large vehicles into the northern areas that are predominately rural. This will create dust and influence the rural sense of place. While this will have an increased visual presence, the area is located within the REDZ and as such landscape modifications associated with renewable energy projects is to be expected.
Mitigation: • Dust management during the lifetime of the project.
Cumulative impacts: • The construction of a new road is likely to increase landscape fragmentation. The southern access route is preferred.
Residual Risks: • 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.

6 ENVIRONMENTAL MANAGEMENT PLAN RECOMMENDATIONS

6.1 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.
- Light spillage should be strictly controlled in order to maintain the surrounding rural agricultural and Orange River landscape character.

6.2 Operation 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.

6.3 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 Battery Storage Facilities and associated 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.

7 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 to Low***.

There is a good policy fit for the PV project (located within the REDZ7) with the existing solar PV and CSP projects clearly in view, and with the further development of the area as a renewable energy node.

PV Visual Impact Significance: **Low with Mitigation** (both Alternatives)

- 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 constructed PV and CSP landscape modifications.

Grid Connection Alternative 1.1 Visual Impact Significance: **Medium with Mitigation**

- The proposed 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 existing renewable energy projects that also include power lines.
- The visual exposure to the proposed landscape modification is Low.
- The area already has a higher Visual Absorption Capacity due to the renewable energy development node within the REDZ 7 area.
- Although not a fatal flaw, the extra length of the power line routed around the Dyasansklip PV 1 to PV 3 is likely to increase the visual cluttering in the vicinity.

Grid Connection Alternative 1.2 and 1.3 Visual Impact Significance: **Low with Mitigation**

- The proposed 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 existing renewable energy projects that also include power lines.
- The alignments of both proposed power lines are along existing road and existing power line infrastructure corridors.
- The average distance of 2.5km from these lines to the N14 National Highway reduce the visual exposure to the proposed landscape change. The area already has a higher Visual Absorption Capacity due to the renewable energy development node within the REDZ 7 area.

Southern Access Alternative Visual Impact Significance: **Low with Mitigation**

- The proposed southern access road is an extension on an existing PV access road;
- The area has a high visual absorption capacity due to the existing PV and CSP projects located in the vicinity.

In summary, the proposed PV, Road and Grid landscape modifications will not degrade significant visual resources and ***should be authorized with mitigation***. The following mitigations should be considered:

- To reduce the cumulative effects of multiple roads, the possibility of accessing the site via the CSP Khi Solar 1 road should be assessed as this road is already established, as this would reduce fragmentation of the landscape from multiple roads. However, this should not prejudice this development alternative as the visual preference is for Southern Access Road as the areas to the north are currently rural agricultural and extra vehicles moving along the district road would increase dust effects.
- The Grid Connections 1.2 and 1.3 are visually preferred as they are well aligned with existing road and grid infrastructure. Grid Alternative 1.1 creates a longer loop and as such is likely to increase visual cluttering. However, this routing is also aligned with existing powerline, road or PV project boundaries.

8 REFERENCES

(n.d.).

Cape EAPrac. (2020). *Dyasonsklip 5 PV Background Information Document.*

IEMA. (2002). *U.K Institute of Environmental Management and Assessment (IEMA). 'Guidelines for Landscape and Visual Impact Assessment' Second Edition, Spon Press. Pg 44.*

NASA, A. G. (2009). *Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER) Global Digital Elevation Model Version 2 (GDEM V2 2011). Ministry of Economy, Trade, and Industry (METI) of Japan and United States National Aeronauti.*

NELPAG. (n.d.). *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.o.*

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

SANBI. (2014). *SANBI tools for Georeferencing, Species distributions and extensions for ArcView 3.x. v. 25. Unpublished guide. South African National Biodiversity Institute, Cape Town.*

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 .

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

The Landscape Institute. (2003). *Guidelines for Landscape and Visual Impact Assessment* (Second ed.). Spon Press.

U.K Institute of Environmental Management and Assessment (IEMA). (2002). *Guidelines for Landscape and Visual Impact Assessment* (Second Edition ed.). Spon Press.

USDI., B. (2004). *Bureau of Land Management, U.S. Department of Interior. 2004. Visual Resource Management Manual 8400.*

Western Cape Government. (2002). *Guideline for the Management of Developmetn on Mountains, Hills and Ridges in teh Western Cape.* Environmental Affairs & Development Planning.

9 ANNEXURE 1: SPECIALIST DECLARATION OF INDEPENDENCE

DETAILS OF SPECIALIST AND DECLARATION OF INTEREST

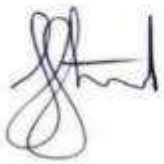
Specialist:	VRM AFRICA CC		
Contact person:	STEPHEN STEAD		
Postal address:	P.O BOX 7233, BLANCO		
Postal code:	6531	Cell:	083 560 9911
Telephone:	044 874 0020	Fax:	086 653 3738
E-mail:	steve@vrma.co.za		
Professional affiliation(s) (if any)	Association of Professional Heritage Practitioners South Africa (APHP)		

The specialist appointed in terms of the Regulations

I, **STEPHEN STEAD**, declare that ---

General declaration:

- I act as the independent specialist in this application
  I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- all the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of Regulation 71 and is punishable in terms of section 24F of the Act.



Signature of the specialist:

SILVER SOLUTIONS TRADING AS VRM AFRICA

9.1 Curriculum Vitae

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 which 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. In association with ILASA qualified landscape architect Liesel Stokes, he has assessed of over 100 major landscape modifications through-out 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, Mellium 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).

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 Wind	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 Windfarm	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 Apeal	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	Photogrametry	KwaZulu-Natal (SA)

10 ANNEXURE 2: VRM CHECK SHEETS

Scenic Quality Rating Questionnaire

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.

Sensitivity Level Rating Questionnaire

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

11 ANNEXURE 3: GENERAL LIGHTS AT NIGHT 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.

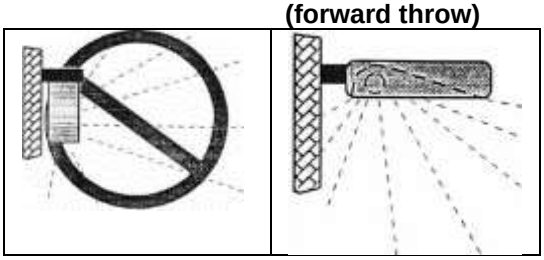
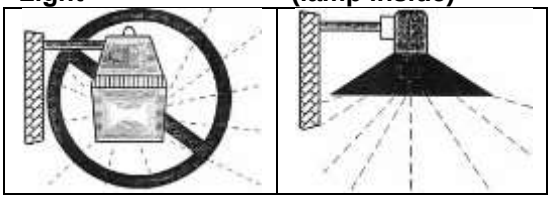
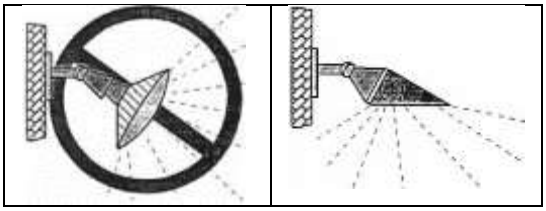
Glare Here’s the basic rule of thumb: If you can see the bright bulb from a distance, it’s a bad light. With a good light, you see lit ground instead of the dazzling bulb. “Glare” is light that beams directly from a bulb into your eye. It hampers the vision of pedestrians, cyclists, and drivers.

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.

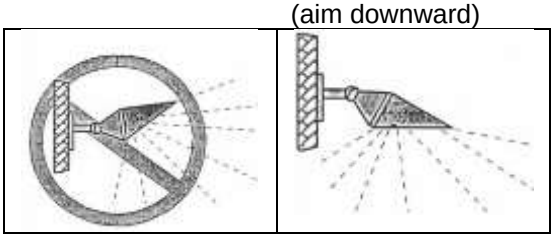
1. Aim lights down. Choose “full-cutoff shielded” fixtures that keep light from going uselessly up or sideways. Full-cutoff fixtures produce minimum glare. They create a pleasant-looking environment. They increase safety because you see illuminated people, cars, and terrain, not dazzling bulbs.

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.

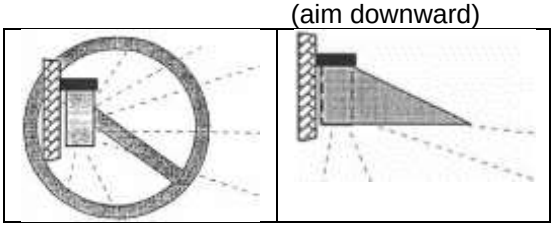
What You Can Do To Modify Existing Fixtures

Change this . . . to this (aim downward)



Floodlight:

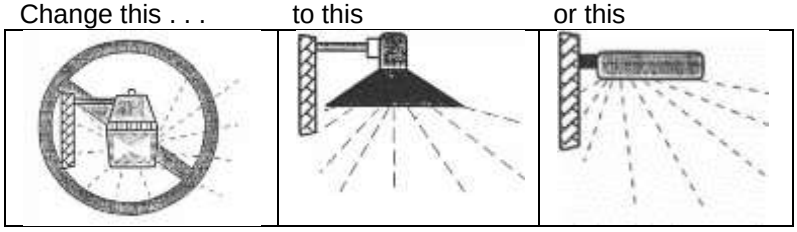
Change this . . . to this (aim downward)



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.