THE PROPOSED HARDEVELD PV, WESTERN CAPE PROVINCE, SOUTH AFRICA

Visual Impact Basic Assessment Report

Final v_2

DATE: 26 Nov 2021

Document prepared for Hardeveld PV (Pty) Ltd
On behalf of Cape EAPrac (PTY) Ltd

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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
DEM	Digital Elevation Model
DoC	Degree of Contrast
EIA	Environmental Impact Assessment
EMPr	Environmental Management Plan
GIS	Geographic Information System
GPS	Global Positioning System
IDP	Integrated Development Plan
IEMA	Institute of Environmental Management and Assessment (United Kingdom)
KOP	Key Observation Point
LVIA	Landscape and Visual Impact Assessment
MAMSL	Metres above mean sea level
NELPAG	New England Light Pollution Advisory Group
PNR	Private Nature Reserve
SDF	Spatial Development Framework
SEA	Strategic Environmental Assessment
VAC	Visual Absorption Capacity
VIA	Visual Impact Assessment
VRM	Visual Resource Management
VRMA	Visual Resource Management Africa
ZVI	Zone of Visual Influence

GLOSSARY OF TECHNICAL TERMS

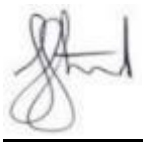
Technical Terms	**Definition** (Oberholzer, 2005)
Degree of Contrast	The measure in terms of the form, line, colour and texture of the existing landscape in relation to the proposed landscape modification in relation to the defined visual resource management objectives.
Visual intrusion	Issues are concerns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

Visual Absorption Capacity	The potential of the landscape to conceal the proposed project.

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

Table 1. Specialist declaration of independence.

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. I, Stephen Stead, hereby declare that VRM Africa, an independent consulting firm, has no interest or personal gains in this project whatsoever, except receiving fair payment for rendering an independent professional service.



Stephen Stead
APHP accredited VIA Specialist

Table 2 Specialist report requirements in terms of Appendix 6 of the EIA Regulations (2014), as amended in 2017

A specialist report prepared in terms of the Environmental Impact Regulations of 2014 (as amended in 2017) must contain:	**Relevant section in report**
Details of the specialist who prepared the report	Stephen Stead, owner / director of Visual Resource Management Africa. steve@vrma.co.za Cell: 0835609911
The expertise of that person to compile a specialist report including a curriculum vitae	Registration with Association of Professional Heritage Practitioners
A declaration that the person is independent in a form as may be specified by the competent authority	Table 1. Specialist declaration of independence.
An indication of the scope of, and the purpose for which, the report was prepared	Terms of Reference
A description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change	Visual Resource Management (VRM) Classes
The duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment	NA
A description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;	Methodology
Details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternative;	Baseline Visual Inventory
An identification of any areas to be avoided, including buffers	NA
A map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	Figure 22
A description of any assumptions made and any uncertainties or gaps in knowledge;	Assumptions and Limitations
A description of the findings and potential implications of such findings on the impact of the proposed activity or activities	Visual Resource Management Classes
Any mitigation measures for inclusion in the EMPr	Environmental Management Plan
Any conditions for inclusion in the environmental authorisation	NA
Any monitoring requirements for inclusion in the EMPr or environmental authorisation	NA

A specialist report prepared in terms of the Environmental Impact Regulations of 2014 (as amended in 2017) must contain:	**Relevant section in report**
A reasoned opinion as to whether the proposed activity or portions thereof should be authorised	Conclusion
Regarding the acceptability of the proposed activity or activities; and	Conclusion
If the opinion is that the proposed activity or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan	The proposed project should be authorised with mitigation. A 100m setback is required on the Steenbokkie PNR boundary, with dust and lights at night mitigation.
A description of any consultation process that was undertaken during the course of carrying out the study	A Draft Basic Assessment Report containing this VIA will be subjected to a consultative process as required in terms of regulation 56 of the NEMA 2014 EIA Regulations
A summary and copies if any comments that were received during any consultation process	NA
Any other information requested by the competent authority.	NA

1 INTRODUCTION

Visual Resource Management Africa CC (VRMA) was appointed by Cape EAPrac (Pty) Ltd to update the ***Visual Impact Assessment*** on behalf of Hardeveld PV (Pty) Ltd. (Proponent). The site visit was undertaken on the 21st of September 2021. The proposed development site is located in the Western Cape Province, Central Karoo District Municipality and within the Beaufort West Local Municipality. The Proponent proposes to construct a solar energy power station and associated infrastructure on a site located 11km south east of the town Beaufort West.

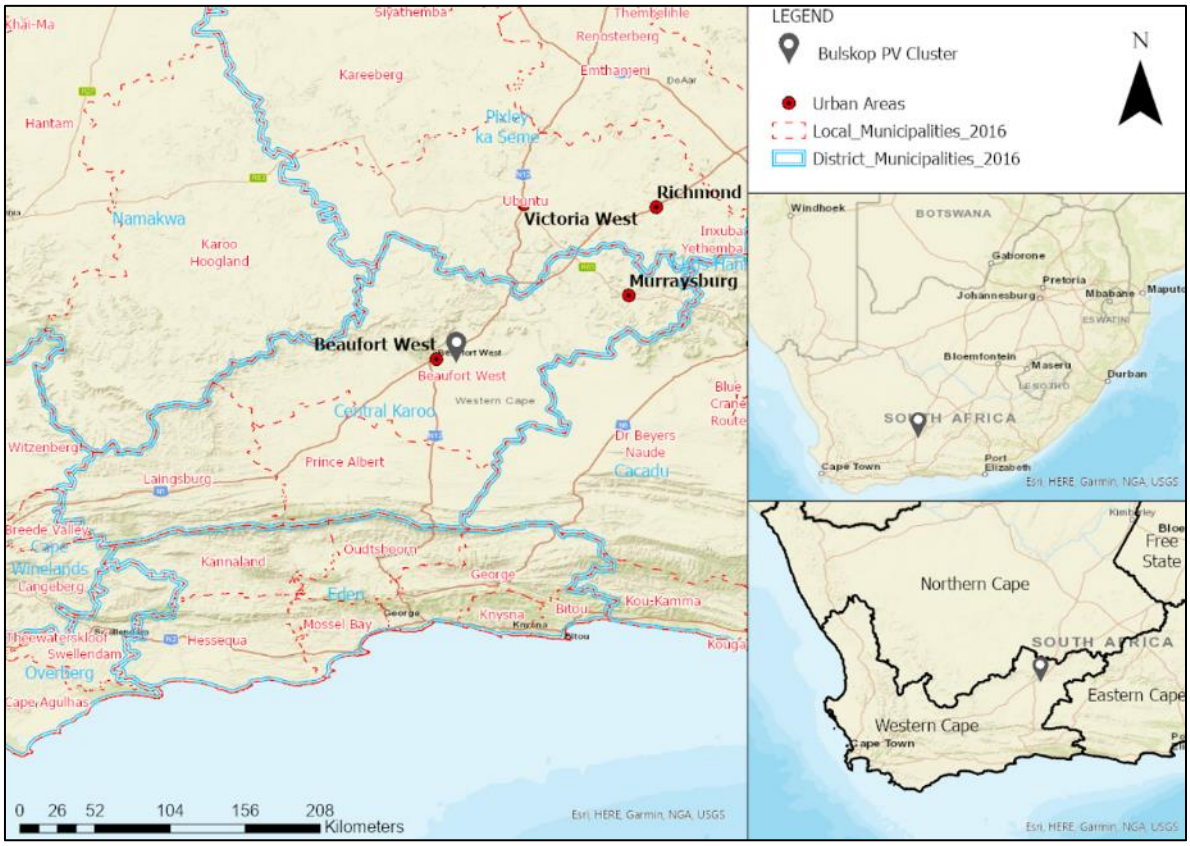


Figure 1. National locality map with the project location identified.

1.1 Terms of Reference

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

- Collate and analyse all available secondary data relevant to the affected proposed project area. This includes a site visit of the full site extent, as well as of areas where potential impacts may occur beyond the site boundaries.
- Specific attention is to be given to the following:
  - Quantifying and assessing existing scenic resources/visual characteristics on, and around, the proposed site.
  - Evaluation and classification of the landscape in terms of sensitivity to a changing land use.
  - Determining viewsheds, view corridors and important viewpoints in order to assess the visual impacts of the proposed project.
  - Determining visual issues, including those identified in the public participation process.

- Reviewing the legal framework that may have implications for visual/scenic resources.
- Assessing the significance of potential visual impacts resulting from the proposed project for the construction, operation and decommissioning phases of the proposed project.
- Assessing the potential cumulative impacts associated with the visual impact.
- Generate photomontages of the proposed landscape modification.
- Identifying possible mitigation measures to reduce negative visual impacts for inclusion into the proposed project design, including input into the Environmental Management Programme (EMPr).

1.2 Study Team

Contributors to this study are summarised in the table below.

Table 3: Authors and Contributors to this Report.

Aspect	Person	Organisation / Company	Qualifications
Landscape and Visual Assessment (author of this report)	Stephen Stead B.A (Hons) Human Geography, 1991 (UKZN, Pietermaritzburg)	VRMA	• Accredited with the Association of Professional Heritage Practitioner and • 16 years of experience in visual assessments including renewable energy, powerlines, roads, dams across southern Africa. • Registered with the Association of Professional Heritage Practitioners since 2014.

1.3 Visual Assessment Approach

The process that VRM Africa follows when undertaking a VIA is based on the United States Bureau of Land Management's (BLM) Visual Resource Management method (USDI., 2004). This mapping and GIS-based method of assessing landscape modifications allows for increased objectivity and consistency by using standard assessment criteria.

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

Table 4: Methodology Summary Table

Action	***Description***
Site Survey	The identification of existing scenic resources and sensitive receptors in and around the study area to understand the context of the proposed development within its surroundings to ensure that the intactness of the landscape and the prevailing sense of place are taken into consideration.
Project Description	Provide a description of the expected project, and the components that will make up the landscape modification.
Reviewing the Legal Framework	The legal, policy and planning framework may have implications for visual aspects of the proposed development. The heritage legislation tends to be pertinent in relation to natural and cultural landscapes, while Strategic

	Environmental Assessments (SEAs) for renewable energy provide a guideline at the regional scale.
Determining the Zone of Visual Influence	This includes mapping of viewsheds and view corridors in relation to the proposed project elements, in order to assess the zone of visual influence of the proposed project. Based on the topography of the landscape as represented by a Digital Elevation Model, an approximate area is defined which provides an expected area where the landscape modification has the potential to influence landscapes (or landscape processes) or receptor viewpoints.
Identifying Visual Issues and Visual Resources	Visual issues are identified during the public participation process, which is being carried out by others. The visual, social or heritage specialists may also identify visual issues. The significance and proposed mitigation of the visual issues are addressed as part of the visual assessment.
Assessing Potential Visual Impacts	An assessment is made of the significance of potential visual impacts resulting from the proposed project for the construction, operational and decommissioning phases of the project. The rating of visual significance is based on the methodology provided by the Environmental Assessment Practitioner (EAP).
Formulating Mitigation Measures	Possible mitigation measures are identified to avoid or minimise negative visual impacts of the proposed project. The intention is that these would be included in the project design, the Environmental Management programme (EMPr) and the authorisation conditions.

1.4 Assumptions and Uncertainties

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

2 PROJECT DESCRIPTION

The following table outlines the project information that was provided by the client that will be incorporated into the assessment and proposed infrastructure relating to the project would include:

Table 5: Property Information Table

PROJECT SPECIFICATIONS: SITE HARDEVELD PV	
Applicant Details	**Description**
Applicant Name:	Hardeveld PV (Pty) Ltd Hardeveld PV (Pty) Ltd is a Special Purpose Vehicle (SPV) incorporated for the sole purpose of developing, constructing, and operating a proposed 120 MW solar PV facility located on the Farm 423 Portion 0.
Company Registration Number:	2021/860694/07
BBBEE Status:	n/a
Project Name:	Hardeveld PV

Site Details	**Description**	**Size**
Size of the property:	Description and Size in hectares of the affected property.	Farm 423 Portion 0. Total Property Size: 2667.0374 ha
Size of the study area .	This includes the total footprint of PV panels, auxiliary buildings, onsite substation, BESS, inverter stations and internal roads	2667.0374 ha
Development Footprint .	This includes the total footprint of PV panels, auxiliary buildings, onsite substation, BESS, inverter stations and internal roads	Approximately 242 ha

(www.hawaiirenewableenergy.org/Villamesias2, n.d.)
Figure 2: Photographic example of what the proposed PV could look like.

TECHNOLOGY DETAILS							
Capacity of the facility	Capacity of facility (in MW)	Net generation (contracted) capacity of up to 120 MWac					
Solar Technology selection	Type of technology	Solar photovoltaic (PV) technology (monofacial or bifacial) with fixed, single or double axis tracking mounting structures, as well as associated infrastructure, which will include: • Laydown area. • Access and Internal Road network. • Auxiliary buildings (33kV switch room, gatehouse and security, control centre, office, warehouse, canteen & visitors centre, staff lockers etc.). • Facility substation. • Inverter-station, transformers and internal electrical reticulation (underground cabling). • Battery Energy Storage System (BESS). • Rainwater Tanks; and • Perimeter fencing and security infrastructure.					
	Structure height	Solar panels with a maximum height of ± 5.5m above the ground					
	Surface area to be covered (including associated infrastructure such as all buildings and internal roads)	Approximately 242 ha	Approximately 267 ha	Approximately 241 ha	Approximately 219 ha	Approximately 261 ha	Approximately 240 ha
	Structure orientation	Fixed-tilt: north-facing at a defined angle of tilt, or Single or double axis tracking: mounted in a north-south orientation, tracking from east to west.					
	Laydown area dimensions	Approximately 2-5 ha laydown area will be required for each PV facility (the laydown areas will not exceed 5ha and will be situated within the assessed footprint).					
	BESS	A technical report will be sent which includes the details of the proposed Battery Energy Storage System (BESS). • Area: up to ± 4 ha • Capacity: Unspecified (we would prefer to only limit the physical size) • Technology: Solid-state/ non-liquid type batteries,					

Own-Build Grid Connection		
	Size and capacity of on-site substation	It is estimated that the maximum size of each facility substation will not exceed 1ha. The facility substation will collect the power from the facility and transform it from medium voltage (up to 33kV) to high voltage (132 kV). Each facility will require inverter-stations, transformers, switchgear and internal electrical reticulation (underground cabling). For the Gamka PV and Hardeveld PV facilities, the preferred substation position is located adjacent to the proposed Bulskop Collector Switching Station, and not adjacent to the PV arrays (please note: Bulskop Collector Switching Station and the 132kV overhead line to the Droerivier MTS is being assessed in a separate BA). Therefore, Gamka PV and Hardeveld PV will require additional MV cabling from an on-site MV switch room to the facility substation. A 50 m wide corridor of approximately 1.3 km long has been assessed to allow for micro-siting.
	Length and capacity of on-site powerlines / cabling.	
Auxiliary Infrastructure		
Other infrastructure	Additional Infrastructure	• Auxiliary buildings of approximately 1 ha, including (but not limited to) a 33kV switch room, a gate house, ablutions, workshops, storage and warehousing areas, site offices and a control centre. • Rainwater tanks; and • Electrified perimeter fencing not exceeding 5 m in height.
	Details of access roads	The main access roads will not exceed 10m in width. The access road will comprise of a new road, as well as the expansion of sections of the existing farm road.
	Details of internal roads	A network of gravel internal access roads and perimeter roads with a width of up to ± 5 m, will be constructed to provide access to the various components of each facility.
	Extent of areas required for laydown of materials and equipment	Approximately 2-5 ha of laydown areas will be required during construction (laydown areas will not exceed 5 ha). A permanent laydown area of a maximum of a 1 ha will remain.

COMPONENT DETAILS	Description/ Dimensions
Location of the site	Approximately 13 km south east of Beaufort West town along the R61 road.
Respective surface areas to be covered by different components of the project (including associated infrastructure such as roads, buildings, etc.) which when combined make up the full development footprint.	• PV structures/ modules area: Approximately 246 ha. • Laydown area: 2 - 5 ha • Access Road: Approximately 4 ha • Internal roads Approximately 8 ha • Onsite Facility substation: Up to 1 ha • Ancillary Buildings: Up to 1 ha • Battery Energy Storage System (BESS): Up to 4 ha
SG Codes	C00900000000042300000
Preferred Site access	The main site access point will be via a new access point off the R61 as indicated in the KMZ as the preferred alternative. A 10m wide and approximately 6 km long main gravel/hard surfaced access road will be constructed to provide direct access to the Hardeveld PV facility. The road will be tarred if necessary. A network of gravel internal access roads, each with a width of up to ± 5 m, will be constructed to provide access to the various components of the Hardeveld PV development.
Export capacity	Up to 120 MWac
Proposed technology	Monofacial or Bifacial PV panels, mounted on either fixed-tilt, single-axis tracking, and/or double-axis tracking systems
Height of installed panels from ground level	Solar panels with a maximum height of ± 5.5 m from above the ground.

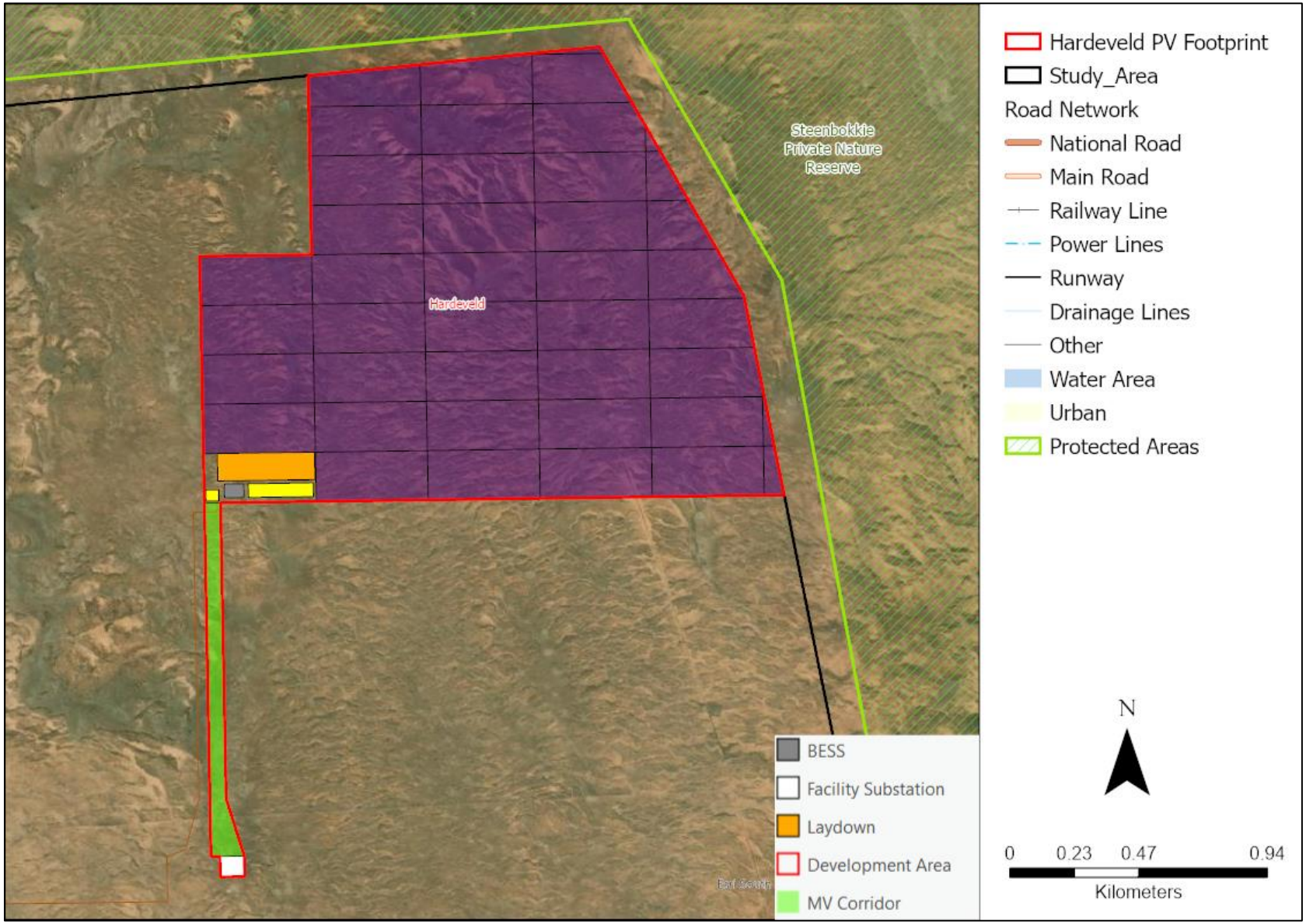


Figure 3: Proposed layout map depicting the original authorisation and the new area.

3 LEGAL FRAMEWORK

In order to comply with the Visual Resource Management requirements, it is necessary to relate the proposed landscape modification in terms of international best practice in understanding landscapes and landscape processes. The proposed project also needs to be evaluated in terms of 'policy fit'. This requires a review of National and Regional policy and planning for the area to ensure that the scale, density and nature of activities or developments are harmonious and in keeping with the planned sense of place and character of the area.

3.1 International and National Good Practice

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

- Guidelines for Landscape and Visual Impact Assessment (GLVIA), Second Edition.
- International Finance Corporation (IFC).
- Millennium Ecosystem Assessment (MEA).
- United Nations Educational, Scientific and Cultural Organisation (UNESCO) World Heritage Convention (WHC).

3.1.1 Guidelines for Landscape and Visual Impact Assessment, Second Edition

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

In the introduction, the guideline states that 'Landscape encompasses the whole of our external environment, whether within village, towns, cities or in the countryside. The nature and pattern of buildings, streets, open spaces and trees – and their interrelationships within the built environment – are an equally important part of our landscape heritage" (The Landscape Institute, 2003: Pg. 9). The guideline identifies the following reasons why landscape is important in both urban and rural contexts, in that it is:

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

3.1.2 International Finance Corporation (IFC)

The IFC Performance Standards (IFC, 2012) do not explicitly cover visual impacts or assessment thereof. Under IFC PS 6, ecosystem services are organized into four categories, with the third category related to cultural services which are defined as "the non-material benefits people obtain from ecosystems" and "may include natural areas that are sacred sites and areas of importance for recreation and aesthetic enjoyment" (IFC, 2012).

However, the IFC Environmental Health and Safety Guidelines for Electric Power Transmission and Distribution (IFC, 2007) specifically identifies the risks posed by power transmission and distribution projects to create visual impacts to residential communities. It recommends mitigation measures to be implemented to minimise visual impact. These should include the siting of powerlines and the design of substations with due consideration to landscape views and important environmental and community features. Prioritising the location of high-voltage transmission and distribution lines in less populated areas, where possible, is promoted.

IFC PS 8 recognises the importance of cultural heritage for current and future generations and aims to ensure that projects protect cultural heritage. The report defines Cultural Heritage as "(i) tangible forms of cultural heritage, such as tangible moveable or immovable objects, property, sites, structures, or groups of structures, having archaeological (prehistoric), paleontological, historical, cultural, artistic, and religious values; (ii) unique natural features or tangible objects that embody cultural values, such as sacred groves, rocks, lakes, and waterfalls" (IFC, 2012). The IFC PS 8 defines Critical Heritage as "one or both of the following types of cultural heritage: (i) the internationally recognized heritage of communities who use or have used within living memory the cultural heritage for long-standing cultural purposes; or (ii) legally protected cultural heritage areas, including those proposed by host governments for such designation" (IFC, 2012).

Legally protected cultural heritage areas are identified as important in the IFC PS 8 report. This is for "the protection and conservation of cultural heritage, and additional measures are needed for any projects that would be permitted under the applicable national law in these areas". The report states that "in circumstances where a proposed project is located within a legally protected area or a legally defined buffer zone, the client, in addition to the requirements for critical cultural heritage, will meet the following requirements:

- Comply with defined national or local cultural heritage regulations or the protected area management plans.
- Consult the protected area sponsors and managers, local communities and other key stakeholders on the proposed project; and
- Implement additional programs, as appropriate, to promote and enhance the conservation aims of the protected area". (IFC, 2012).

3.1.3 Millennium Ecosystem Assessment

In the Ecosystems and Human Well-being document compiled by the Millennium Ecosystem Assessment in 2005, Ecosystems are defined as being "essential for human well-being through their provisioning, regulating, cultural, and supporting services. Evidence in recent decades of escalating human impacts on ecological systems worldwide raises concerns about the consequences of ecosystem changes for human well-being". (Millennium Ecosystem Assessment, 2005)

The Millennium Ecosystem Assessment defined the following non-material benefits that can be obtained from ecosystems*:*

- Inspiration: Ecosystems provide a rich source of inspiration for art, folklore, national symbols, architecture, and advertising.

- Aesthetic values: Many people find beauty or aesthetic value in various aspects of ecosystems, as reflected in the support for parks, scenic drives, and the selection of housing locations.
- Sense of place: Many people value the “sense of place” that is associated with recognised features of their environment, including aspects of the ecosystem.
- Cultural heritage values: Many societies place high value on the maintenance of either historically important landscapes (“cultural landscapes”) or culturally significant species; and
- Recreation and ecotourism: People often choose where to spend their leisure time based in part on the characteristics of the natural or cultivated landscapes in a particular area. (Millennium Ecosystem Assessment, 2005)

The Millennium Ecosystem Assessment Ecosystems and Human Well-being: Synthesis report indicates that there has been a “rapid decline in sacred groves and species” in relation to spiritual and religious values, and aesthetic values have seen a “decline in quantity and quality of natural lands”. (Millennium Ecosystem Assessment, 2005)

3.2 National and Regional Legislation and Policies

In order to comply with the Visual Resource Management requirements, it is necessary to clarify which National and Regional planning policies govern the proposed development area to 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.

- DEA&DP Visual and Aesthetic Guidelines.
- Regional and Local Municipality Planning and Guidelines.

3.2.1 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 Environmental Impact Assessment (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)

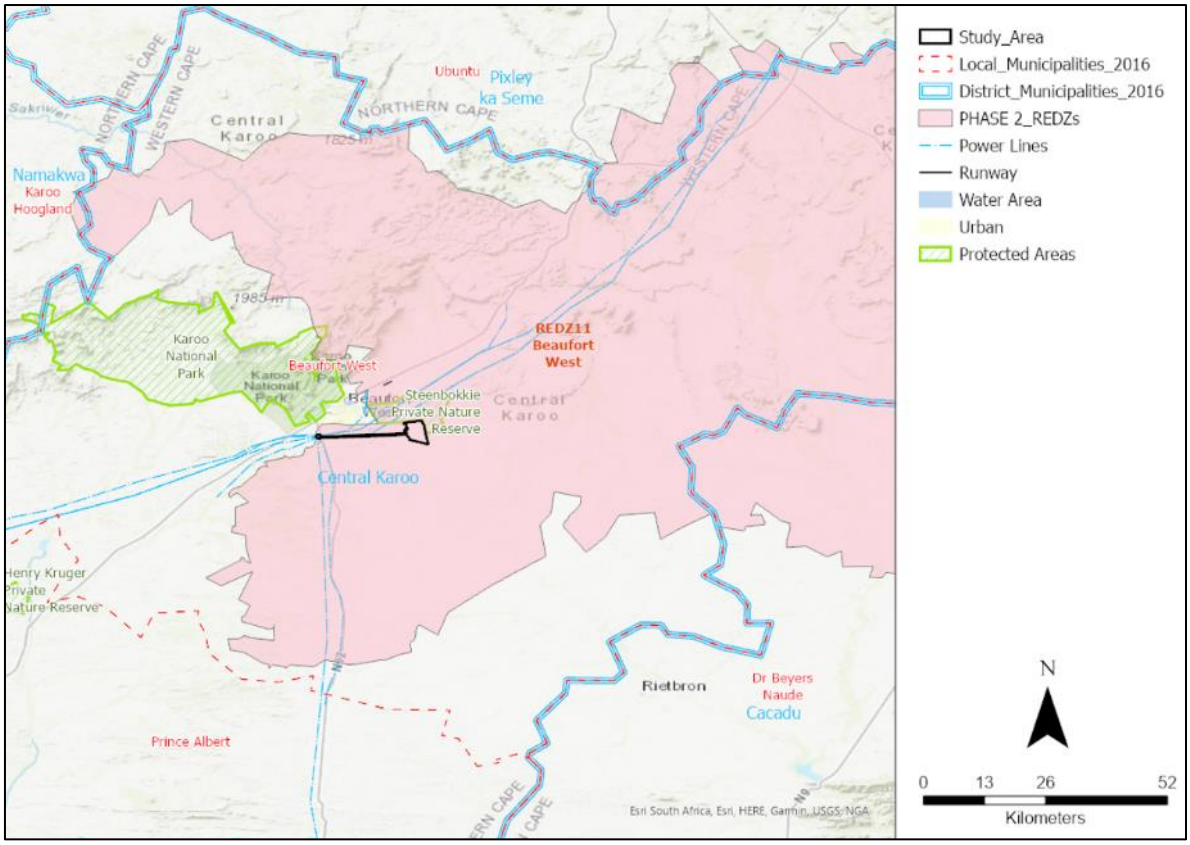


Figure 4. Planning locality map.

3.2.2 Local and Regional Planning

As indicated in the administrative map in Figure 4 above, the property falls within the following administrative jurisdiction:

Table 6: Governance administrative table

Theme	Requirements
Province	Western Cape
District Municipality	Central Karoo
Local Municipality	Beaufort West
REDZ Phase 2	Beaufort West REDZ11

The following tables list key regional and local planning that has relevance to the project pertaining to landscape-based tourism, and solar energy projects

Table 7: Central Karoo District Municipality Integrated Development Plan (2012 – 2017)

Theme	Requirements	Page
General	Non-rural development in rural areas in the Central Karoo can be found in Beaufort West, Laingsburg and Prince Albert. These areas are changing from purist agricultural areas to eco-tourism and game farming areas	56
Renewable Energy	Given the harmful environmental impacts of certain identifiable energy sources, as well as growing energy demand and needs, the use of clean and sustainable energy is becoming increasingly important	49

Theme	Requirements	Page
	Move to a less carbon-intensive electricity production with a focus on renewable energy and solar water heating	144
Tourism	To establish an inclusive tourism industry through sustainable development and marketing which is public sector led, private sector driven, and community based.	77

Table 8: Beaufort West Local Municipality Spatial Development Plan Framework (Beaufort West Municipality, 2004)

Theme	Requirements	Page
Landscape Character	Promoting the visual quality of the environment	12
	The scale of development relates to the size of the site the development is planned for. The rural character of the rural areas in the Beaufort West Municipal area should be maintained in all instances – scale should therefore not be too large, compared to the rural character of the area.	16
	The character of the rural nodes forms an integral part of the general rural character. It is therefore important to protect the inherent visual, aesthetic and location qualities of the rural nodes	49

Table 9: Beaufort West Local Municipality Integrated Development Plan (Beaufort West Municipality)

Theme	Requirements	Page
Renewable Energy	To make sure that everyone has significant access to electricity, the following is important:	43
	Establish an investment vehicle to attract funding for the provision of electricity by means of alternative energy sources.	43

3.3 Policy Fit

Policy fit refers to the degree to which the proposed landscape modifications align with International, National, Provincial and Local planning and policy.

In terms of international best practice, the proposed landscape modification will not trigger any issues as there no significant landscape/ cultural landscape features within the project area. The escarpment is a significant feature element in the regional landscape, and a portion of this visual resource is proclaimed a natural area within the Karoo National Park. However, the park is well set back from the proposed PV site, with the approximately 17km creating a suitable visual buffer for the protection of this significant feature. A possible risk to the local and regional planning, is the close proximity to the Steenbokkie Private Nature which is located adjacent to the proposed site. While views of the PV landscape modification will be visible from the reserve, the main camp area will be topographic screened, with no direct views from accommodation and general camp facilities. The southern portion of the reserve includes two Eskom power line corridors, with a further routing planned. The numerous power lines and pylons in this transmission corridor significantly reduce the local sense of place of the portion of the reserve adjacent to the PV site. Views from the reserve hiking routes also have the power lines in the foreground. As such, the southern portions of the reserve are not associated with significant landscape resources and are more associated with stocking of game for viewing from vehicles. With a suitable setback from the border, it is the opinion of the author that the PV landscape change can be accommodated with further

degradation to the existing moderate scenic qualities of the southern portion of the reserve. There are also already PV projects authorised adjacent to the reserve. Although the Beaufort West PV project is currently unbuilt, once developed the PV sense of place will become the status quo, given the REDZ planning for the area.

In terms of regional and local planning, there is clear mention of the economic value that the renewable energy will add to the local and regional economy. While there is a strong emphasis on tourism, the site does fall within the REDZ 11 area and as such the policy fit at a local and regional level is also rated **Medium-Positive**.

4 METHODOLOGY

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 Geographic Information System (GIS) based method of assessing landscape modifications allows for increased objectivity and consistency by using standard assessment criteria. The following key factors determine the suitability of landscape change:

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

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

4.1 Baseline Analysis Stage

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

4.1.1 Scenic Quality

The scenic quality is determined making use of the VRM Scenic Quality Checklist (refer to Annexure D). The checklist identifies seven scenic quality criteria which are rated with 1 (low) to 5 (high) scale. The scores are totalled and assigned an A (High), B (Moderate) or C (low) based on the following split:

A= scenic quality rating of ≥19.
B = rating of 12 – 18,
C= rating of ≤11

The seven scenic quality criteria are defined below:

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

4.1.2 Receptor Sensitivity

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

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

4.1.3 Exposure

The area where a landscape modification starts to influence the landscape character is termed the Zone of Visual Influence (ZVI) and is defined by the U.K. Institute of

Environmental Management and Assessment's (IEMA) *'Guidelines for Landscape and Visual Impact Assessment'* as 'the area within which a proposed development may have an influence or effect on visual amenity (of the surrounding areas).'

The inverse relationship of distance and visual impact is well recognised in visual analysis literature (Hull & Bishop, 1988)According to Hull and Bishop, exposure, or visual impact, tends to diminish exponentially with distance. The areas where most landscape modifications would be visible are located within 2 km from the site of the landscape modification. Thus, the potential visual impact of an object diminishes at an exponential rate as the distance between the observer and the object increases due to atmospheric conditions prevalent at a location, which causes the air to appear greyer, thereby diminishing detail. For example, viewed from 1000 m from a landscape modification, the impact would be 25% of the impact as viewed from 500 m from a landscape modification. At 2000m it would be 10% of the impact at 500 m.

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

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

4.1.4 Visual Resource Management Classes

These findings are then submitted to a VRM Matrix 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 10: VRM Class Matrix Table

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

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

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

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

4.1.5 Key Observation Points

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

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

4.2 Assessment and Impact Stage

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

4.2.1 Contrast Rating

The contrast rating is undertaken to determine if the VRM Class Objectives are met. The suitability of landscape modification is assessed by comparing and contrasting existing

receiving landscape to the expected contrast that the proposed landscape change will generate. This is done by evaluating the level of change to the existing landscape by assessing the line, colour, texture and form, in relation to the visual objectives defined for the area.
The following criteria are utilised in defining the DoC:

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

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

4.2.2 Photomontages

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

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

The Code of Ethical Conduct states that the presenter should:

- Demonstrate an appropriate level of qualification and experience.
- Use visualisation tools and media that are appropriate to the purpose.
- Choose the appropriate level of realism.

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

4.3 Impact Methodology

The following impact criteria were used to assess visual impacts. The criteria were defined by the Western Cape *DEA&DP Guideline for involving Visual and Aesthetic Specialists in EIA Processes* (Oberholzer, 2005)

Table 11. DEA&DP Visual and Aesthetic Guideline Impact Assessment Criteria Table.

Criteria	Definition
Extent	The spatial or geographic area of influence of the visual impact, i.e.: • *site-related:* extending only as far as the activity. • *local:* limited to the immediate surroundings. • *regional:* affecting a larger metropolitan or regional area. • *national:* affecting large parts of the country. • *international:* affecting areas across international boundaries.
Duration	The predicted life-span of the visual impact: • *short term,* (e.g., duration of the construction phase). • *medium term,* (e.g., duration for screening vegetation to mature). • *long term,* (e.g., lifespan of the project). • *permanent,* where time will not mitigate the visual impact.
Intensity	The magnitude of the impact on views, scenic or cultural resources. • *low,* where visual and scenic resources are not affected. • *medium,* where visual and scenic resources are affected to a limited extent. • *high,* where scenic and cultural resources are significantly affected.
Probability	The degree of possibility of the visual impact occurring: • *improbable,* where the possibility of the impact occurring is very low. • *probable,* where there is a distinct possibility that the impact will occur. • *highly probable,* where it is most likely that the impact will occur.

	• *definite,* where the impact will occur regardless of any prevention measures.
Significance	The significance of impacts can be determined through a synthesis of the aspects produced in terms of their nature, duration, intensity, extent and probability, and be described as: • *low,* where it will not have an influence on the decision. • *medium,* where it should have an influence on the decision unless it is mitigated. • *high,* where it would influence the decision regardless of any possible mitigation.

5 BASELINE VISUAL INVENTORY ASSESSMENT

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

5.1 Site Investigation

A field survey was undertaken to inform the landscape and visual impact assessment. During the site visit, photographs were taken from each viewpoint, and the view direction and GPS location captured. The main land-use was documented as well as the nature of the dominant landscape in the vista. In order to represent views of the proposed landscape modification by means of photomontages for assessment purposes, panoramic photographs were also taken from key viewpoints. The site survey locations mapped on the following page in Figure 5. The photographs are located in Annexure A.

Table 12: List of Sampling Sites where Landscape and Aesthetic Survey was Conducted

ID	Name	Date Time	Bearing	X	Y	Landscape
1	Eskom powerlines crossing over the N12 National Road	2021-09-21 8:43:07	350	22.53722	-32.4084	Medium
2	Droerivier Substation as seen from the N12 National Road	2021-09-21 8:43:45	270	22.53728	-32.4084	Low
3	Eskom powerlines crossing the district road linking the N12 to Beaufort West.	2021-09-21 9:04:34	90	22.57534	-32.4055	Low
5	Existing Eskom 400kV power line.	2021-09-21 9:29:05	300	22.61334	-32.4041	Medium
8	Eskom powerlines crossing the R61 district road.	2021-09-21 9:49:09	110	22.6753	-32.4019	Medium

9	View of the escarpment at the Karoo National Park that add landscape character to the region.	2021-09-21 9:49:14	290	22.6753	-32.4019	Medium to High
11	PV3 view of flat terrain with sparce vegetation.	2021-09-21 10:00:41	270	22.70746	-32.4011	Medium to Low
12	PV3 view of similar flat terrain to the east.	2021-09-21 10:01:00	90	22.70748	-32.4011	Medium to Low
13	PV4 site view northeast of flat terrain and escarpment in the background.	2021-09-21 10:04:58	45	22.72184	-32.4003	Medium to Low
14	PV4 site view northwest of escarpment in the background that does add some landscape value to the site.	2021-09-21 10:05:02	320	22.72179	-32.4003	Medium to Low
15	PV5 site view west of flat terrain and no proximate receptors.	2021-09-21 10:07:29	80	22.7328	-32.3997	Low
17	PV2 site view north of the Steenbokkie Private Nature Reserve game fence.	2021-09-21 10:18:15	350	22.72394	-32.375	Medium
18	PV2 Site view east along the SBPNR boundary.	2021-09-21 10:18:23	35	22.72397	-32.3751	Medium
19	PV1 Site view south at the flat terrain with few landscape features.	2021-09-21 10:21:29	180	22.71431	-32.3801	Low
20	PV1 Site view north to the low ridgeline located in the background on SPNR property. Clear views of multiple power lines detract from the sense of place.	2021-09-21 10:21:33	320	22.71431	-32.3801	Medium to Low
21	Zoomed view of adjacent traffic travelling on the R61 in the background.	2021-09-21 10:31:23	270	22.69922	-32.3984	Low
22	Zoomed view of Beaufort West in background as seen from Site.	2021-09-21 10:31:34	320	22.69929	-32.3984	Medium to Low
24	View towards PV project from R61 receptors.	2021-09-21 10:39:40	15	22.70037	-32.4172	Medium
26	Photograph of the accommodation at the Steenbokkie Priv. Nat Res. (PNR)	2021-09-21 11:01:20	340	22.65803	-32.3399	Medium to High
29	View from Steenbokkie PNR ridgeline towards the proposed PV site with clear views of the 3 Eskom power lines in the foreground.	2021-09-21 11:21:30	120	22.6673	-32.3467	Medium to Low

30	Close up view of the Eskom power lines located within the Steenbokkie PNV that do detract from the local sense of place.	2021-09-21 11:21:47	120	22.66718	-32.3468	Low

The site investigation also flagged landscape features and receptors that should be taken into consideration, and that were communicated to the EAP for early planning. The following landscape value issues were flagged:

- No significant landscape features on the proposed development sites with the majority of the site viewed rated Medium to Low for scenic appeal.
- The background views of the great Escarpment do add to the regional scenic quality.
- Landscape resources are being used for tourism, including the Karoo National Park landscapes (Very Low Exposure), and the Steenbokkie Private Nature Reserve (High Exposure)
- Eskom power line infrastructure to the north of the site degrades the local scenic quality (including this portion of the Steenbokkie Private Nature Reserve.
- There are limited High Exposure Receptors due to the rural agricultural context.

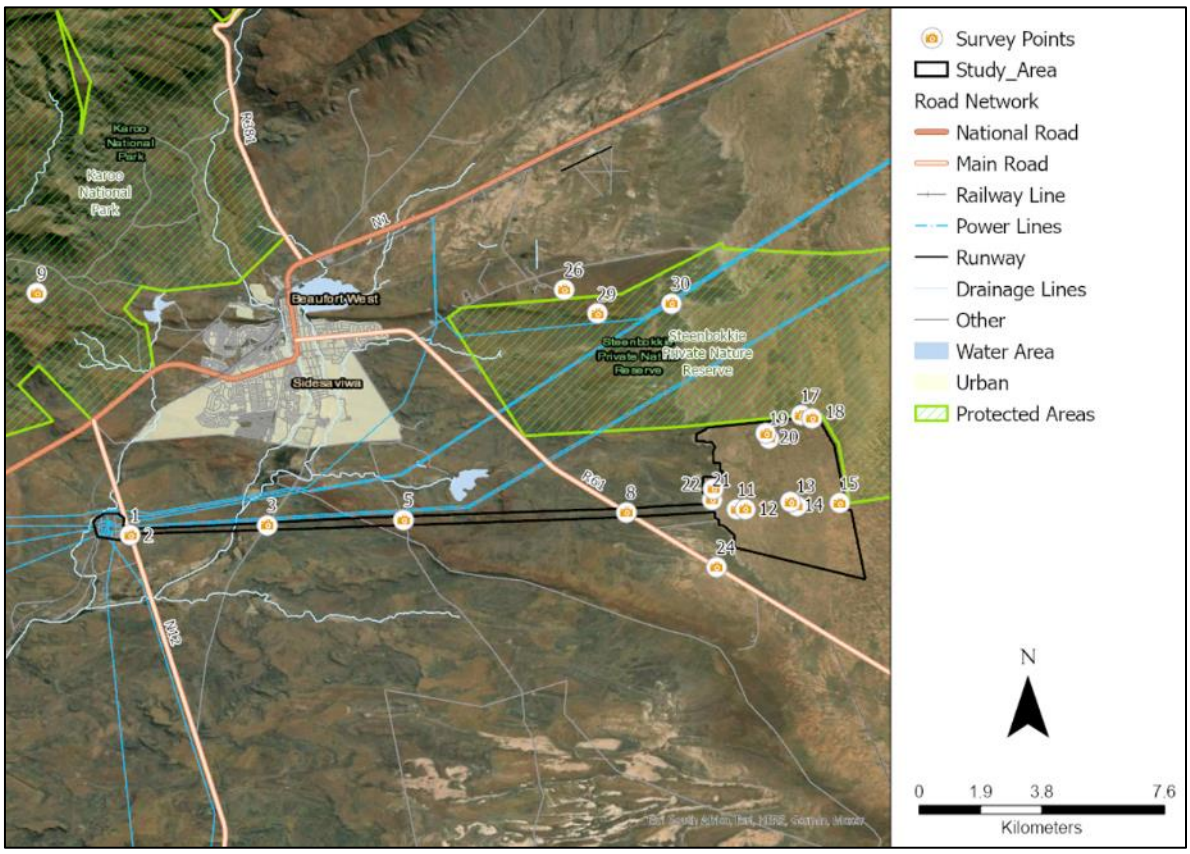


Figure 5: Survey Point Locality Map

5.2 Landscape Context

5.2.1 Regional Locality

The proposed Hardeveld PV Facility is located 11 km south east of the town Beaufort West in the Western Cape of South Africa. Within the regional context, the property is located in the Great Karoo stretching 600 km from Calvinia in the west to Cradock in the east, and approximately 600 km from Marydale to the north to Calitzdorp in the south. Beaufort West is the oldest Municipality in South Africa with settlement of the area beginning in the 1740's and extending rapidly in an easterly direction. The Karoo is a vast and diverse arid area which straddles four provinces. The vegetation falls within the Nama Karoo Biome. This consists of Montane Karoo grassy shrublands, Karoo grassy dwarf shrublands, Karoo succulent dwarf shrublands, and riparian thicket. (SanParks, n.d.) The economy in the Karoo has been largely based on extensive sheep and goat farming. Irrigation based agriculture is concentrated along the rivers. The arid areas are sparsely populated, and in some areas, the population density is less than 1 or 2 people per km². During the last fifty years, extensive stock farms have grown even larger. The recent advent of game farming has contributed to this trend, although opportunities in agri-tourism and eco-tourism have created scope for new and more sophisticated types of employment. (http://www.aridareas.co.za/characteristics.htm, n.d.)

Existing development has been historically restricted to settlement nodes located close to water resources. The town of Beaufort West lies south of the Nuweveld Mountains range which forms part of the Great Escarpment which divides South Africa into two distinct basins. The town lies between the Gamka and Kuils Rivers (normally dry) and on the outskirts of Beaufort West lies the 75 000 ha Karoo National Park. Here two of South Africa's most highly endangered species, the riverine rabbit and the black rhinoceros have been successfully resettled. (http://www.beaufortwest.com/, n.d.) Significant features in the landscape are the escarpment, the inselbergs and the vast open spaces with minimal man-made modifications.

5.2.2 Vegetation

Vegetation type has a large factor in determining the scenic quality or the site in terms of colour and texture, as well as influencing the local ability of the landscape to absorb the landscape change. The following paragraph and mapping outline the broad vegetation biome and type.

According to the South African National Biodiversity Institute 2018 Vegetation Map of South Africa Lesotho and Swaziland in Figure 6, the Bioregion where the development is proposed is Lower Karoo Bioregion with the Biome described as Nama-Karoo. The SANBI vegetation data reflects two vegetation types, the Southern Karoo Riveriere, and the Gamka Karoo.

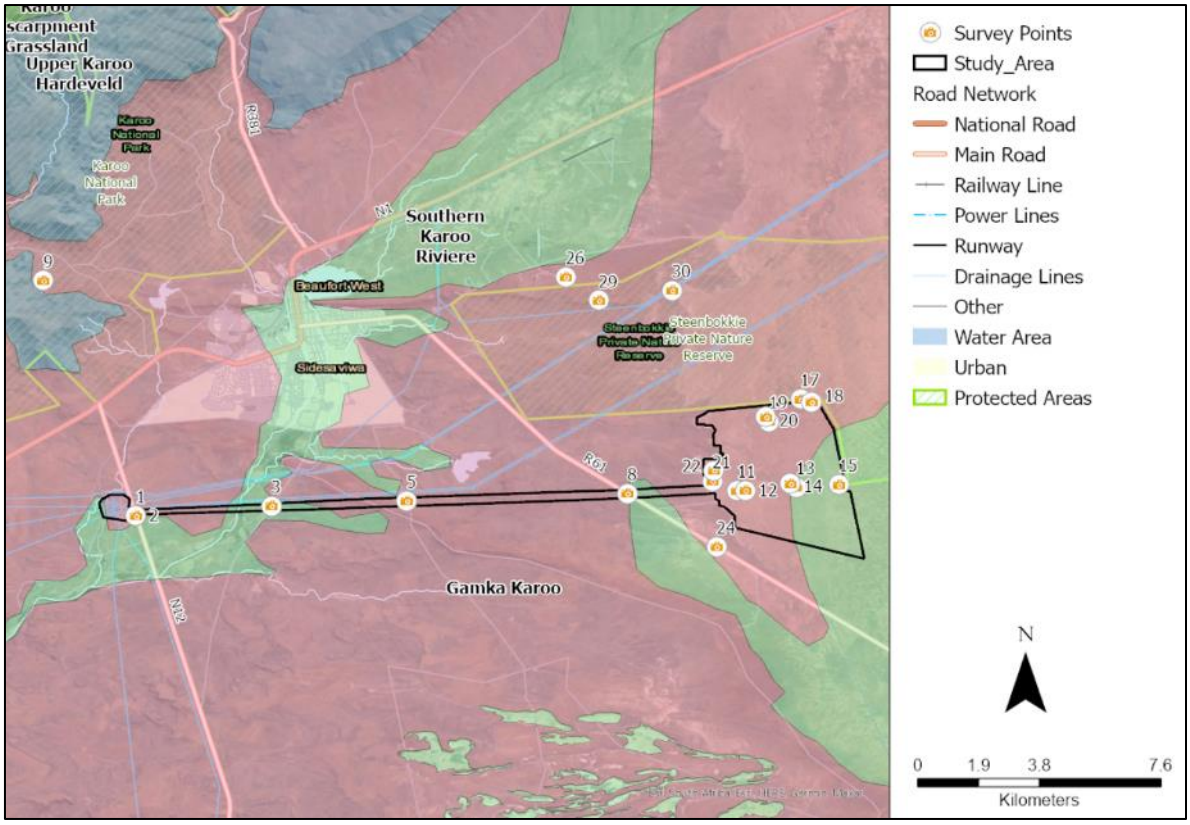


Figure 6. BGIS Vegetation Type Map (South African National Biodiversity Institute, 2018)

However, as depicted in the map below, there seems to be very little vegetation variation across the PV sites, with the likelihood that Southern Karoo Riviere is the dominant vegetation type for the PV site, with the grid connect crossing Gamka Karoo vegetation.

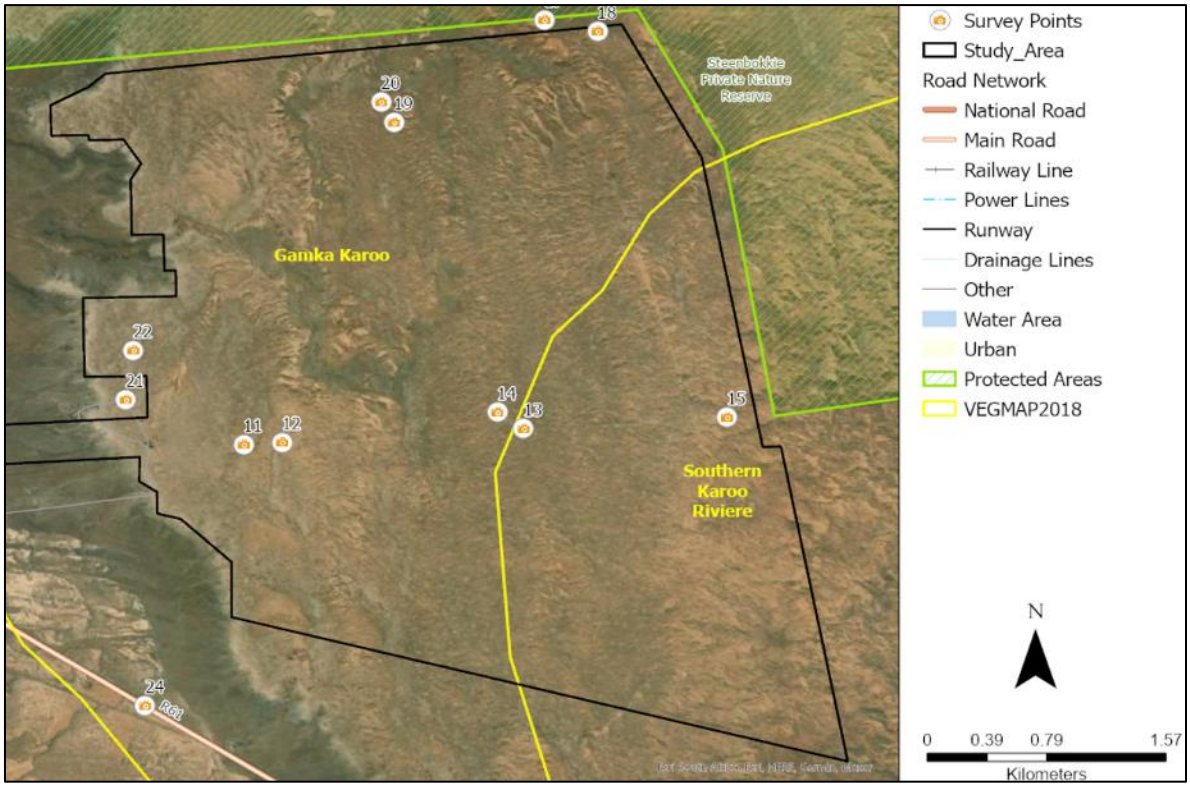


Figure 7. BGIS Vegetation Type Map focus area on proposed Hardeveld PV site.

It is important to note that the area is arid, with high summer temperature averages. The low rainfall of the region results in vegetation being low in profile, which in relation to the flat terrain creates a uniform vegetated landscape that has a low visual absorption capacity for flatter terrain areas. *As there is very little vegetation variation, the landscape will be described as Nama-Karoo*.

5.2.3 Mountain and Hill Features

As depicted in the photograph below, the Great Escarpment of the Great Karoo is visible to the north and reaches approximately 1000m above sea level above the plains to the south of the town of Beaufort West. This creates a significant visual resource which is located 14km to the north of the Bulskop Cluster

Figure 8: View of the Great Escarpment as seen from the N1 National Highway.

5.2.4 Infrastructure and Road Access

The N1, the main transport route from the Western Cape to Gauteng, is located 13km north of the PV area. The route passes through some of the most scenic areas of South Africa and is well used by tourists. As depicted in the photograph below, taken from the N1 in a SW direction, the views of the great escarpment are a significant feature in the landscape and do add value to the landscape character. The proposed Hardeveld PV is well set back from the N1 National Road, and any landscape changes on site would not be visible from these receptors. The other main road infrastructure is the R61. The R61 is located 3.5km to the west of the proposed PV site, where the receptor would be able to see the landscape change. As this route could include tourist traffic, it should be included as a Key Observation Point.

Figure 9: Photograph of N1 scenic route

With the location of the Eskom Droerivier Substation in the vicinity, a significant number of Transmission Power Lines are located in the area. On the western boundary of the proposed PV sites, is a double 400kV power line corridor. The lattice type structures do

assist in reduce the visual intrusion, but the size and scale of the pylons clearly dominate the attention of the casual observer and degrade the local sense of place.

Figure 10: Eskom Droerivier substation and transmission power line corridors

5.2.5 Other Renewable Energy Projects

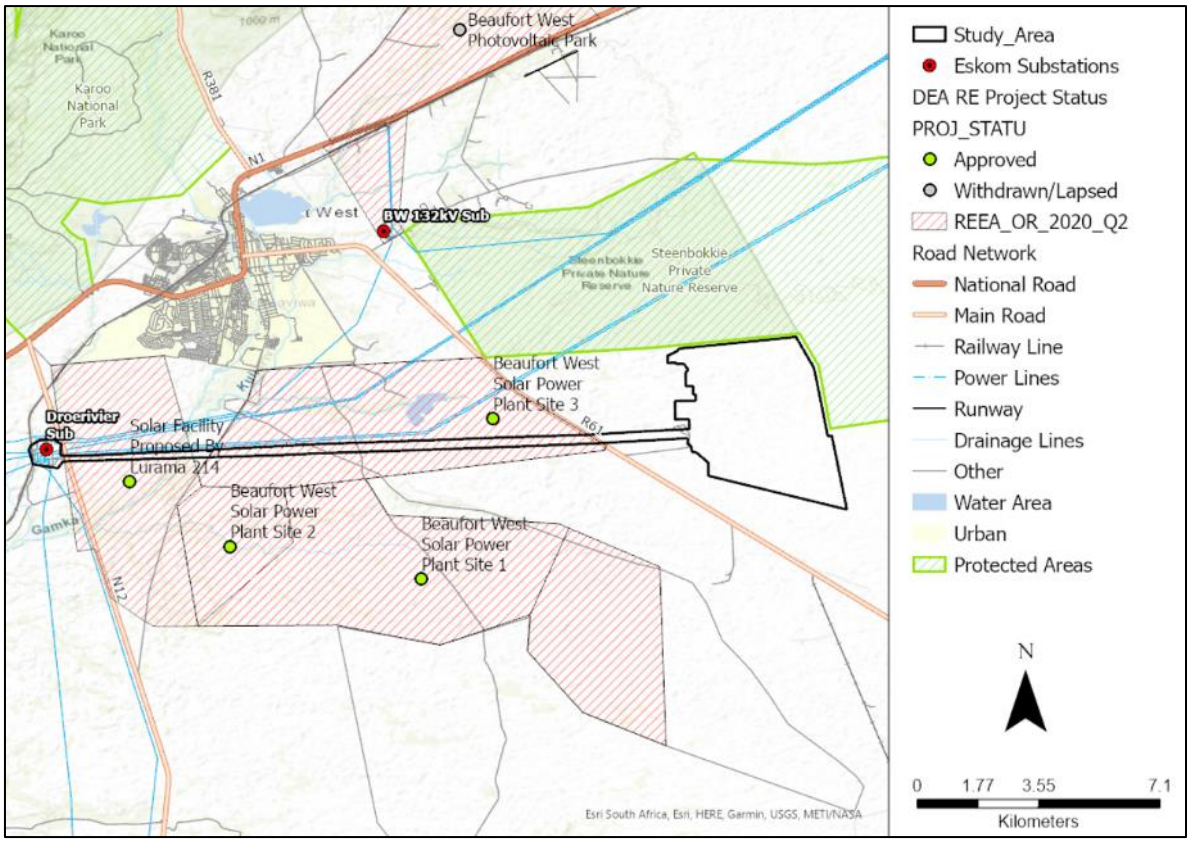


Figure 11: Map depicting DEA REEA Renewable Energy project status.

As identified in Figure 11 above, numerous other projects have been attracted to the site due to the solar energy potential of the region. The Beaufort West Solar Park is indicated on the map with the status lapsed. There are four other solar energy projects located around the town of Beaufort West that have been approved and none of them have been constructed. None are located within the proposed solar park zone of visual influence which reduced the potential for cumulative visual effects from combined views. Located further to the north is the proposed Beaufort West Wind Farm. As this wind farm is located more than 15km to the north, the combined views of the wind fam and the proposed solar plant are unlikely to result in visual clutter. None of the proposed developments that were authorised have been constructed. However, once these projects are developed, it is likely that the existing arid Karoo agricultural landscape will change to one more associated with renewable energy. This change is aligned with National RE policy planning, with the area falling with the Beaufort West REDZ. Care would need to be taken to ensure that areas also used for landscape-based tourism are also protected, where these activities make use of significant visual resources.

5.2.6 Nature and Tourism Activities

As depicted in the map above, two conservation areas are located around the proposed solar park site. The Karoo National Park (KNP) is located approximately 17km to the west, with the Steenbokkie Private Nature Reserve located adjacent to the north. While the Steenbokkie Private Nature Reserve is a minor conservation area, the KNP is a large national protection area and a major tourist attraction for the area. As depicted in the photographs below, the scenic vistas of the park have aesthetic value. However, the viewshed analysis indicates that this area falls outside of the project Zone of Visual Influence.

Figure 12: Karoo National Park *(Source: www.panoramio.com/Dean Gous)*

Located directly to the north of the proposed PV area, is the Steenbokkie Private Nature Reserve. The area is a proclaimed conservation area and offers recreational facilities including overnight and caravan accommodation. The reserve also offer walking and trails are posted along the low ridgeline that runs through the site. There is some game enclosed which can be viewed by vehicle. As depicted in Figure 7 two 400kV power lines corridors, each with 2 routings, is located to the east of the conservation area. There is also a servitude

in place for an additional 400kv powerline from a windfarm cluster 80km north of Bulskop PV. This does degrade the local sense of place, dominating the attention of the casual observer. The other key factor in protecting the western portion of the conservation area is the low ridgeline aligned north-south through the centre of the property. The accommodation areas are all located to the west of the ridgeline, screening the receptors from the power lines. The ridgeline would also obscure views of the proposed PV project. However, views from the hiking path along the ridgeline would allow for clear, medium exposure views of the PV site. However, the powerlines located within the foreground do reduce the scenic quality of this eastern vista. As this area does have conservation related receptors who could be sensitive to landscape change, this area would need to be included as a Key Observation Point.

Figure 13: Steenbokkie Private Nature Reserve


Figure 14: View from the Steenbokkie Private Nature Reserve ridgeline towards the PV site with the multiple Eskom power lines in the foreground.

The map below depicts the location of the power lines in relation to the proposed Bulskop PV cluster and the Steenbokkie Private Nature Reserve. Also depicted is the boundary of the proposed Beaufort West PV3 development, authorised but not yet built, that will also influence the sense of place of the reserve.

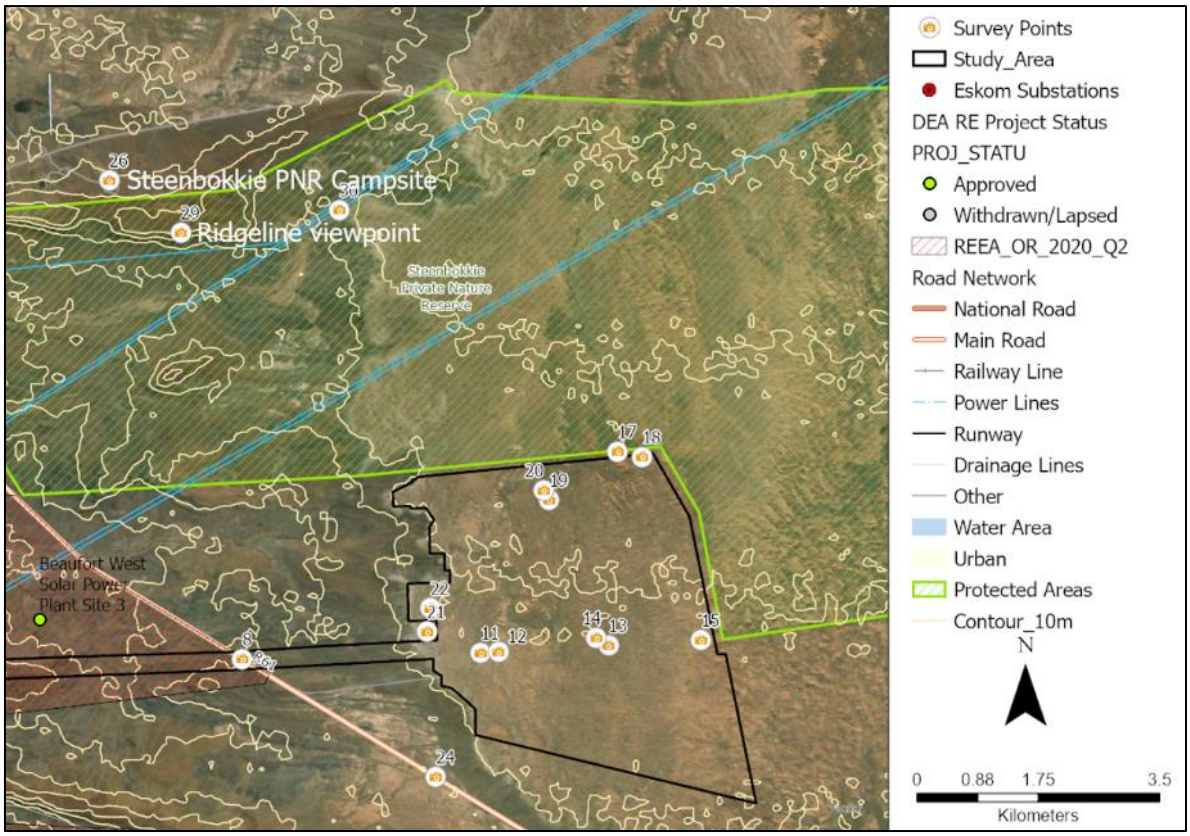


Figure 15: Steenbokkie Private Nature Reserve accommodation centre (Point 26), ridgeline (Point 28), Eskom power lines (Point 30) and other proposed PV developments that could influence the nature reserve sense of place.

5.3 Project Zone of Visual Influence

The visible extent, or viewshed, is "the outer boundary defining a view catchment area, usually along crests and ridgelines" (Oberholzer, 2005). In order to define the extent of the possible influence of the proposed project, a viewshed analysis was undertaken from the proposed site at a specified height above ground level as indicated in the Table 1 below, table making use of open-source NASA ASTER Digital Elevation Model data (NASA, 2009). 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, which takes the scale, and size of the proposed projects into consideration in relation to the natural visual absorption capacity of the receiving environment. The maps are informative only as visibility tends to diminish exponentially with distance, which is well recognised in visual analysis literature (Hull & Bishop, 1988). The viewshed is strongly associated with the regional topography and as such this topic is address before the viewshed analysis.

Making use of the NASA STRM digital elevation model, profile lines were generated for the area within 12km on either side of the project area. The map depicting the terrain model and the profile lines can be view in Figure 16 below. As can be seen in elevation profile

drawings on the following page, the terrain is predominantly flat with the zone of visual influence excluding the escarpment located 15km to the northwest. The North to South Profile ranges from 950mamsl in the north, to 875mamsl in the south, a drop in elevation of 75 over 31km. The proposed site is located in the mid-range. Elevated terrain to the south of the site is likely to reduce the viewshed in this direction. The East to West Profile ranges from 764mamsl in the West to 890mamsl in the East, a change on 126m over the 45km. Elevated terrain to the west is likely to reduce the viewshed in this direction.

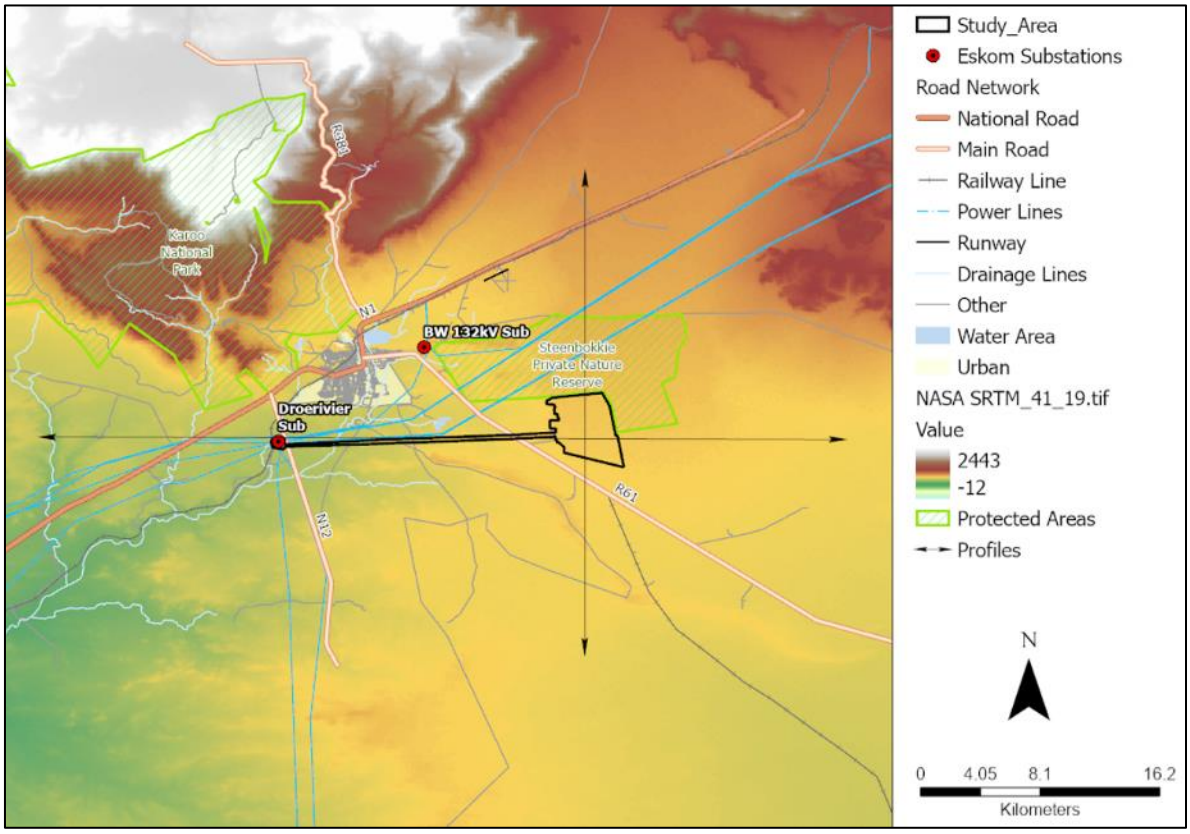


Figure 16: Regional Digital Elevation Model and Profile Line Locality Map

Figure 17: Google Earth North to South Terrain Profile Graph

Figure 18: Google Earth West to East Terrain Profile Graph

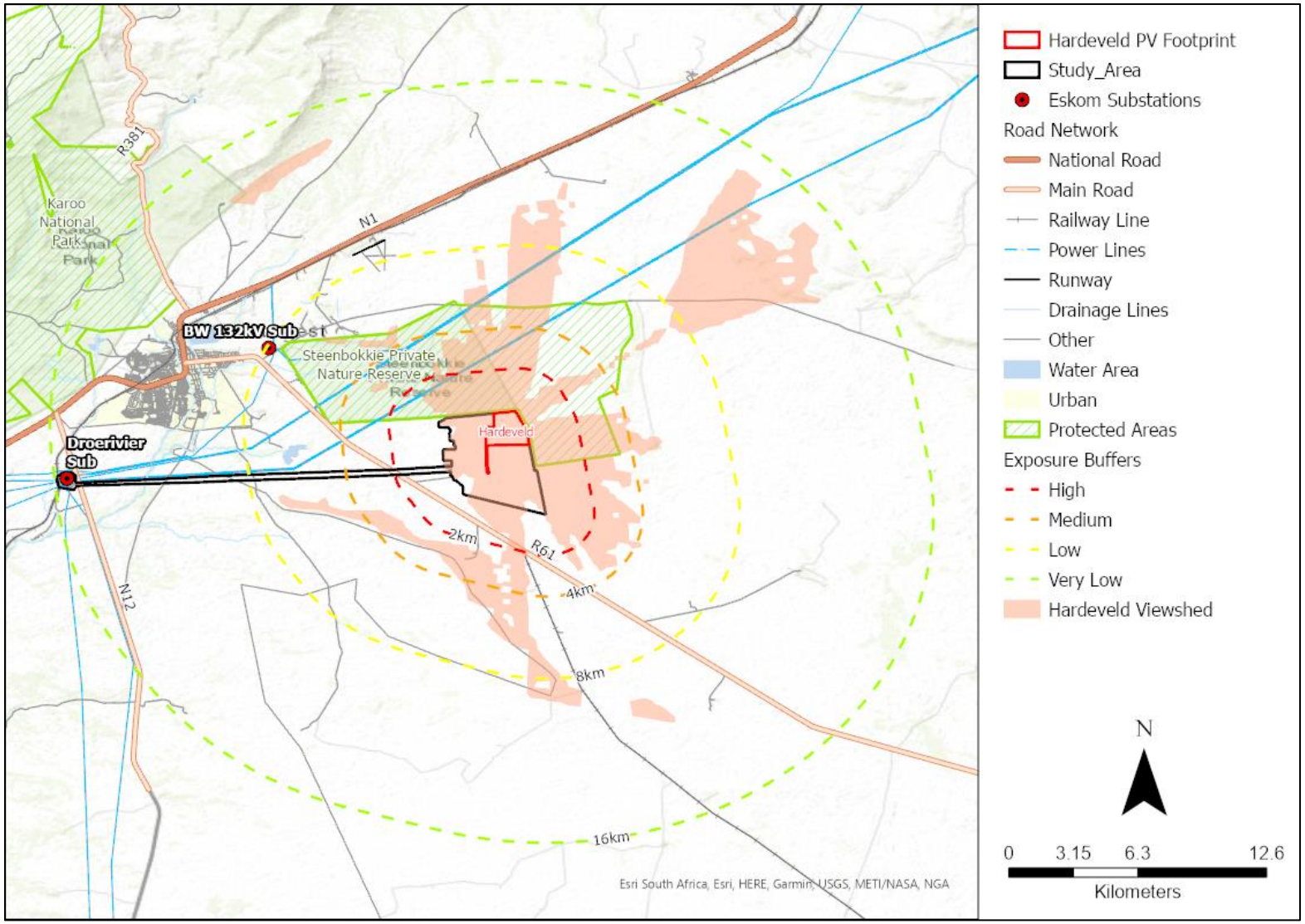


Figure 19: Hardeveld PV Project Viewshed with Offset 5.5m above ground capped at 14km.

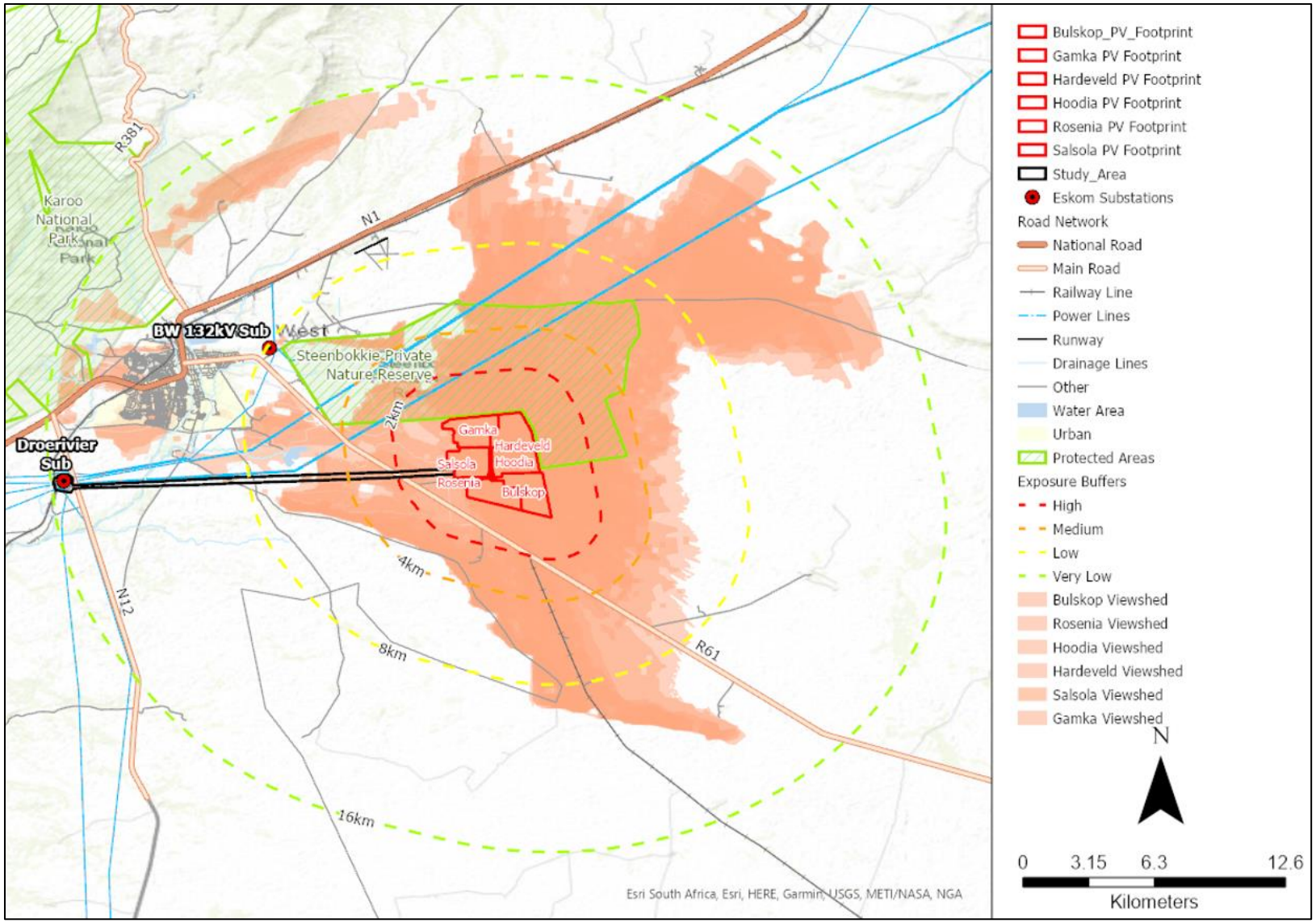


Figure 20: Combined PV Project Viewshed with Offset 5.5m above ground capped at 14km.

5.3.1 Viewshed Analysis

A viewshed analysis was undertaken for the site making use of NASA SRTM 30m Digital Elevation Model data. The Offset value for the PV was set above ground to represent the approximate height of the proposed as reflected in the table below.

Table 13: Proposed Project Heights Table

Proposed Activity	Approx. Height (m)	Terrain Model Extent
PV Option	5.5m	14km

As can be viewed in Figure 19, the viewshed is unfragmented but localised in extent. Within the High Exposure 1km area, there are two receptors, namely the R61 to the west and the Steenbokkie Private Nature Reserve to the north. Due to the fairly contained extent of the viewshed, where the eastern and elevated portions of the Steenbokkie PNR would have views of the landscape change, the Zone of Visual Influence is rated as Medium to Low in extent.

5.4 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. The following table identifies the receptors identified within the ZVI, as well as motivates if they have significance and should be defined as KOP for further evaluation in the impact assessment phase. The receptors located within the ZVI, and KOPs view lines are indicated in Figure 21 on the following page. As motivated below, the following receptors have been identified as Key Observation Points and should be used as locations to assess the suitability of the landscape change:

- Steenbokkie Private Nature Reserve.
- R61 District Road.

Table 14: Receptor and KOP Motivation Table.

Name	KOP	Motivation
Steenbokkie Private Nature Reserve Ridgeline Viewpoint	**Yes**	This is a tourist activity node located adjacent to the proposed project site. Game viewing takes place in the reserve, as well as hiking and overnight accommodation. However, as the southern portion of the reserve is dominated by two Eskom Power Line corridors with 4 400kV power lines and pylons, and that the campsite is topographically screened, only the ridgeline viewing point is used as a KOP.
R61 road	**Yes**	The R61 is a district road that links the towns of Beaufort West in the west to Aberdeen in the east. While tourist related traffic is unlikely, tourism is important to the regional planning, and view from this route include that of the escarpment.

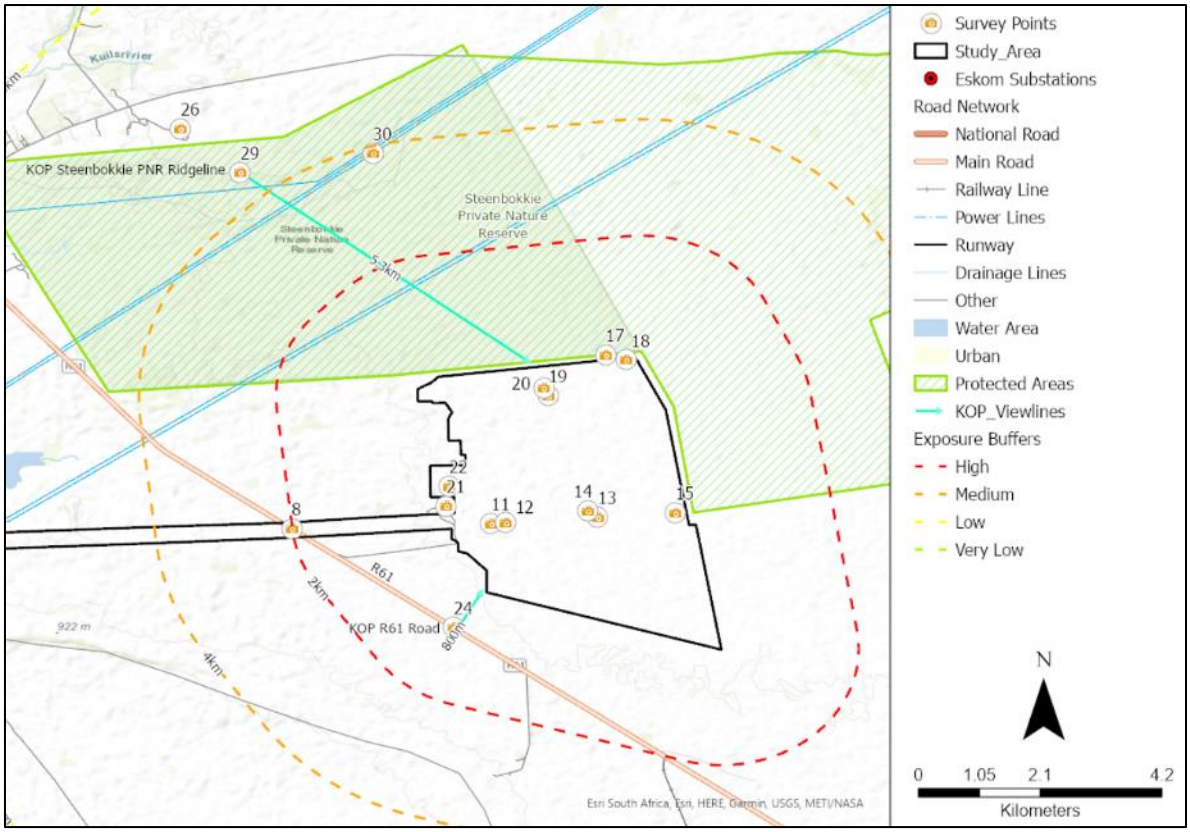


Figure 21: Key Observation Point Map with Point 29 the Steenbokkie PNR ridgeline viewpoint and Point 24 the closest viewpoint from the R61 District Road.

6 VISUAL RESOURCE MANAGEMENT

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

6.1 Physiographic Rating Units

The Physiographic Rating Units are the areas within the proposed PV 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 is Class I, which 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. Based on the SANBI mapping and the site visit to define key landscape features, the following broad-brush vegetation were tabled.

The Site Locality Map with a satellite image underlay, is located Figure 22 below. The property is currently zoned “Agriculture 1”, and the current land use of the proposed properties is agricultural with low intensity sheep farming carried out in this arid environment. Due to the low stock carrying capacity of the karoo vegetation, the farms are large in size. Man-made modifications associated with the sheep farming are isolated farmsteads, farm tracks, fences and water reservoirs. These features are small in scale in the landscape and do not detract from the sense of place. Only a single physiographic region is thus defined.

Table 15: Physiographic Landscape Rating Units.

Landscapes	Motivation
Nama-Karoo	Flat terrain with no significant man-made changes to the Nama-Karoo shrubland vegetation.

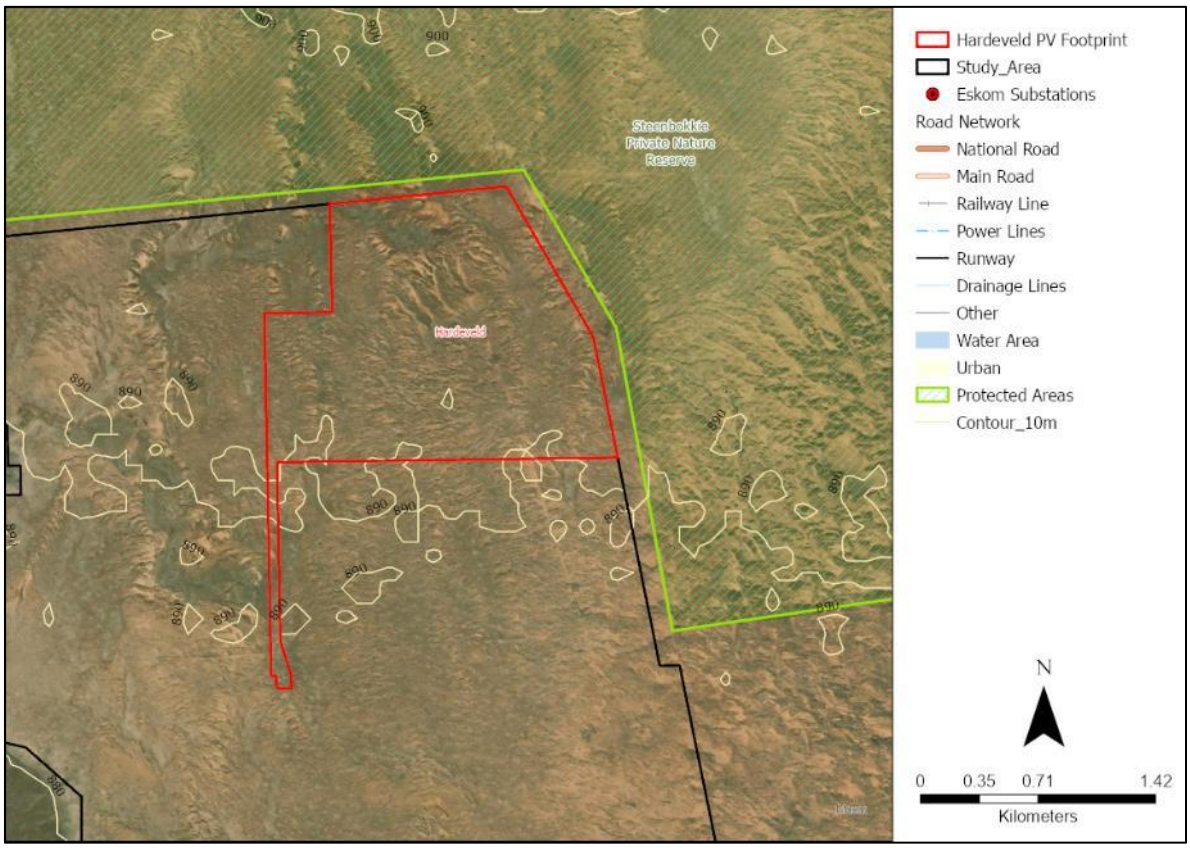


Figure 22: Site Satellite Image Map depicting uniform terrain and vegetation.

Table 16: Scenic Quality and Receptor Sensitivity Rating.

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							
Attribute	**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**
Ecologically Sensitive	**(Class I is not rated)**															**I**	**I**
Agriculturally transformed Nama-Karoo	1	1	1	2	1	2	0	**8**	**C**	M	L	L	H	L	**M**	**IV**	**III**

Red colour indicates change in rating from Visual Inventory to Visual Resource Management Classes motivated in the following section.

The ***Scenic Quality*** scores are totalled and assigned an A (High scenic quality), B (Moderate scenic quality) or C (Low scenic quality) category based on the following split: *A= scenic quality rating of ≥19; B = rating of 12 – 18, C= rating of ≤11* (USDI., 2004).
Receptor Sensitivity levels are a measure of public concern for scenic quality. Receptor sensitivity to landscape change is determined by rating the key factors relating to the perception of landscape change in terms of Low to High.

6.2 Scenic Quality Assessment

The scenic quality of the portions of the site transformed by agriculture is rated **Low**. This is due to the flat terrain that has no water features, limited vegetation and associated colours, is not a scarce visual resource and is degraded by agricultural practice. The only value element is the Adjacent Scenery which includes the escarpment which does have value. The overall sense of place is that of a rural, arid agricultural landscape that does not offer much in terms of scenic resources.

6.3 Receptor Sensitivity Assessment

Receptor sensitivity to landscape changes is rated **Medium**. It was found that receptor sensitivity to the current landscapes would be Moderate to High. This is mainly due to the close proximity of the Steenbokkie PNR. However, the area has limited visual resources and the strong presence of the adjacent Eskom power line does reduce the likelihood of the in receptor being sensitive to landscape change on the site.

6.4 Visual Resource Management (VRM) Classes

The BLM has defined four Classes that represent the relative value of the visual resources of an area and are defined making use of the VRM Matrix below:

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

6.4.1 Class I

Class I is assigned when legislation restricts development in certain areas. The visual 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. A Class I visual objective was assigned to the following features within the proposed development area due to their protected status within the South African legislation:

- Any river / streams and associated flood lines buffers identified as significant in terms of the WULA process.
- Any wetlands identified as significant in terms of the WULA process.
- Any ecological areas (or plant species) identified as having a high significance.
- Any heritage area identified as having a high significance.

6.4.2 VRM Class II

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.

- NA

As no significant visual resources were identified on the site, no Visual Management Class II was assigned.

6.4.3 VRM 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. Management activities 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. The following landscape was defined as having Class III Visual Objectives where development would be most suitable:

- Nama Karoo.

As mapped in Figure 23 below, although the Visual Inventory was assigned a Class IV due to low scenic quality and medium receptor sensitivity, a Visual Management Class III was assigned to the Nama-Karoo areas as the current zoning of the property is Agricultural and the setting is rural where scenic resource should be maintained in surrounding landscapes to some degree.

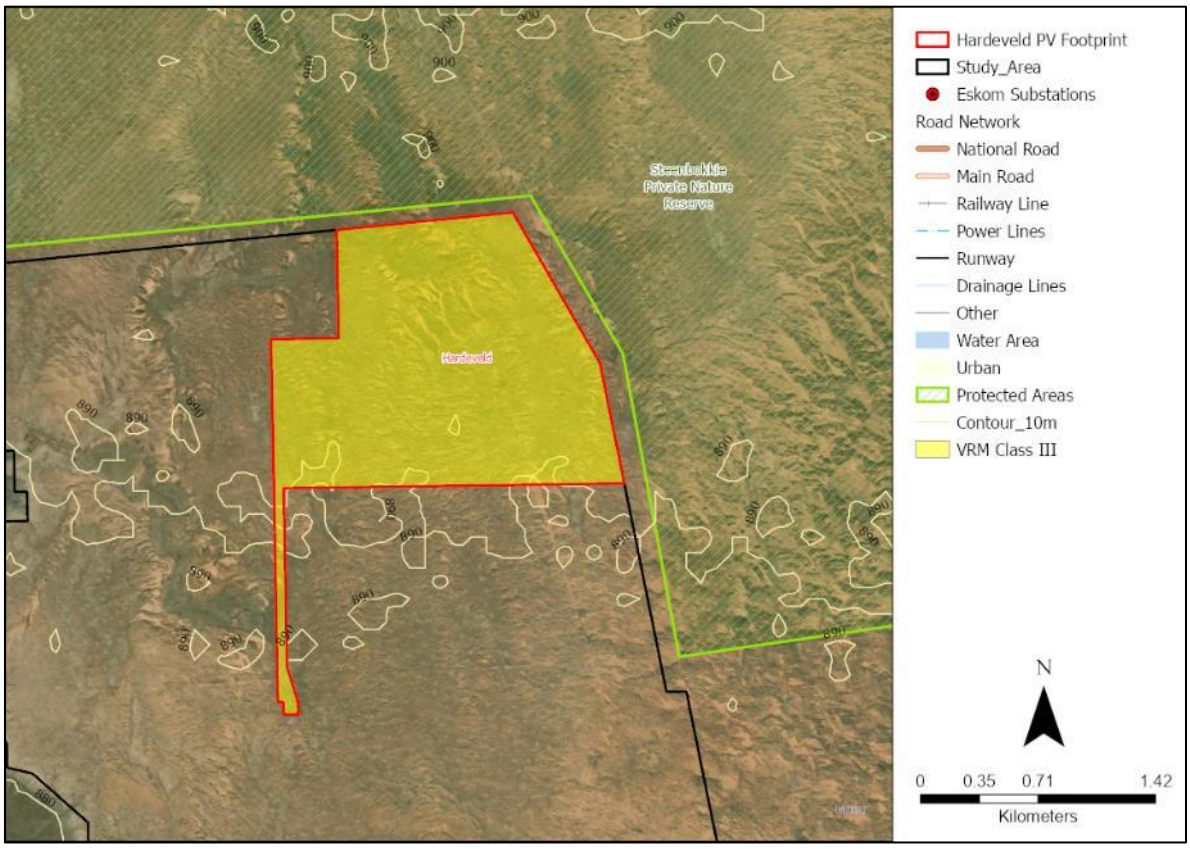


Figure 23: Visual Resource Management Class Map.

As the area is zoned agricultural and there are limited visual resources in the area region, no Class IV areas were defined.

7 VISUAL IMPACT ASSESSMENT

Impacts are defined in terms of the standardised impact assessment criteria provided by the environmental practitioner. Using the EAP impact assessment criteria, the potential environmental impacts identified for the project were evaluated according to severity, duration, extent and significance of the impact. The potential occurrence and cumulative impact (as defined in the methodology) was also assessed. In order to better understand the nature of the severity of the visual impacts, a Contrast Rating exercise was undertaken.

7.1 Contrast Rating

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

The following criteria are utilised in defining the DoC:

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

As this is a Basic Assessment in a landscape primarily defined by lower levels of scenic quality, no photomontages were generated for this Basic Assessment. The following generic images of the PV as a 3D model, depict a fixed PV structure of varying height.

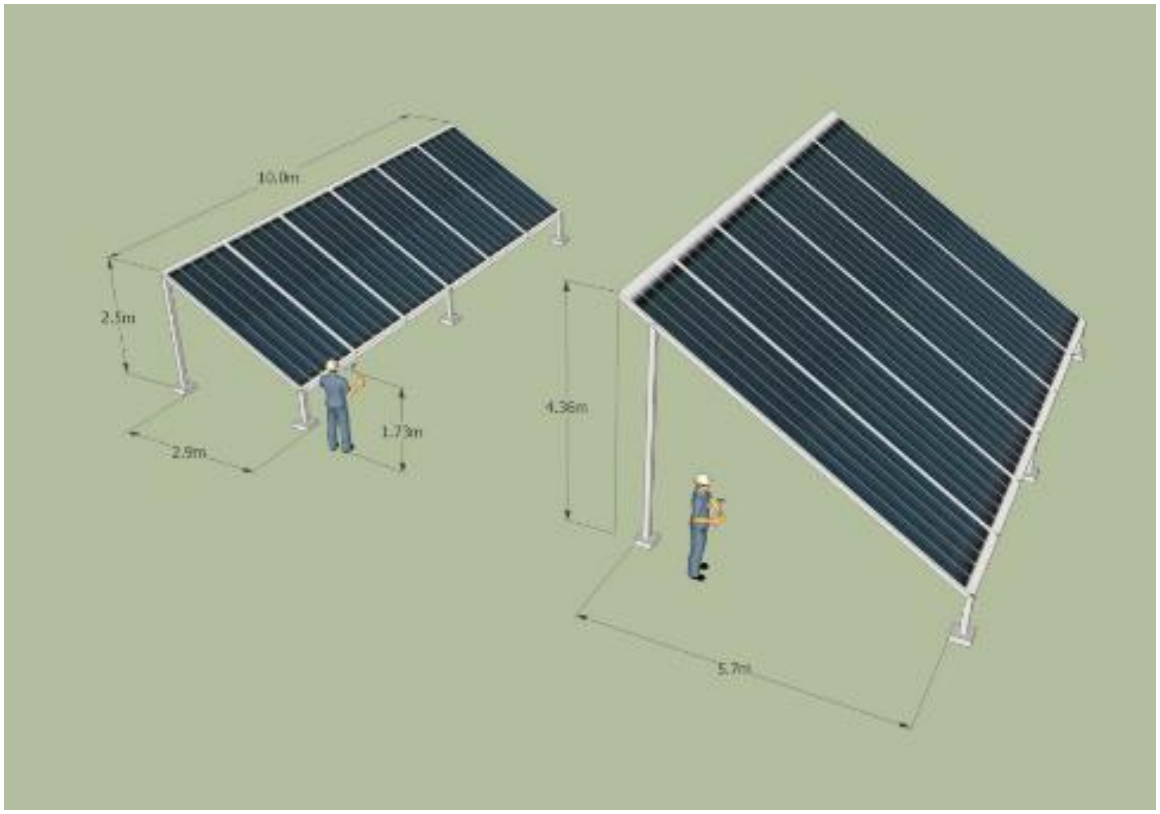


Figure 24: Photographic 3D model used to inform the photomontages showing 2.5m height versus 4.3m height.

Table 17: Contrast Rating Key Observation Points for VRM Class IV areas.

	Exposure			Landscape Elements					
Key Observation Point	**Distance**	**Exposure**	**Mitigation**	**Form**	**Line**	**Colour**	**Texture**	**Degree of Contrast**	**Visual Objectives Met?**
Steenbokkie PNR Ridgeline Viewpoint	5km	Medium to Low	W/Out	S	M	M	M	M	Yes
			With	S	M	M	M	M	Yes
R61 District Road	800m	Medium	W/Out	W	W	M	M	W	Yes
			With	W	W	M	M	W	Yes

** S = Strong, M = Medium, W = Weak, N = None*

As seen from Steenbokkie PNR ridgeline, Form and Line change would be moderated by the viewing distance, with the slight elevation of the ridgeline providing limited 3D perspective views. Viewed, toward the southeast, the north facing panels will appear as a dark diagonal shape in the distance. Colour and Texture from the black and glass faced panels are likely to create Medium levels of contrast to the mat browns of the natural landscape, moderated by atmospheric influence and higher dust content of the semi-arid environment.

Figure 25: View towards the proposed PV site as seen from the Steenbokkie PNR ridgeline with the *approximate* area of the combined PV site depicted.

The view from the R61 is at the same elevation as the proposed PV site, with a slight rise between the road the panels limited the base views. This is likely to result in Weak levels of Form and Line Contrast, with Colour and Texture also muted by the 800m distance to nearest panel structure. As the PV panels are located at a similar height to the R61 Receptor, the 5.5m panels are likely to generate some limited skyline intrusion.

Figure 26: View towards the proposed PV site as seen from the R61 District Road with the *approximate* area of the combined PV site depicted.

7.2 PV Project Impact Ratings and Motivation

The following visual impacts could take place during the lifetime of the ***proposed PV*** project:

Construction:

- Loss of site landscape character due to 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.
- Wind-blown litter from the laydown and construction sites.

Operation:

- Massing effect in the landscape from a large-scale modification.
- On-going soil erosion.
- On-going windblown dust.

Decommissioning:

- Movement of vehicles and associated dust.
- Wind-blown dust from the disturbance of cover vegetation / gravel.

Cumulative:

- A long-term change in land use setting a precedent for other similar types of solar energy projects.

Table 18: Preferred PV and Common Area Impact Table

Phase	Mitigation	Nature	Extent	Duration	Magnitude	Probability	Significance without	Significance with
Cons.	W/Out	-ve	Local	Short	Med	P	Med	
	With	-ve	Local	Short	Low	P		Low
Ops.	W/Out	-ve	Local	Long	Med	P	Med to High	
	With	-ve	Local	Long	Med	P		Med
Close	W/Out	-ve	Local	Short	Med	P	Med	
	With	-ve	Local	Short	Low	P		Low
Cuml. Risk	W/Out	-ve	Local	Long	Med	P	Med	
	With	-ve	Local	Long	Med	P		Med

7.2.1 Nature of the Impact

The nature of both the Preferred PV Option is rated **Negative**. The proposed PV landscape has the potential to generate higher levels of colour, form, texture and line contrast to the existing agricultural landscape. In the No-Go option the area is rated **Positive** as the agricultural landscape does add to the rural sense of place.

7.2.2 Extent of the Impact

Due to the flat terrain around the site, in relation to the medium height of the proposed PV panels, the Extent of the project is rated **Local**, pre and post mitigation. The Visual Extent of the status quo property is rated Local, as the property is remote with limited views from surrounding areas.

7.2.3 Duration of the Impact

The Construction and Decommissioning Phases are rated Short Term the development/ deconstruction is likely to be concluded within two years. Operation Phase is rated Long-Term as the project is likely to remain in the landscape for 20 years. Duration of the No-Go impacts of the rural landscape of the No-Go Option are expected to be Long Term as some active farm management is taking place on the property.

7.2.4 Magnitude of the Impact

The Magnitude of the PV project Construction and Decommissioning is rated Medium before mitigation, as dust generated from the removal of the vegetation has the potential to become a nuisance factor in the region. With management of wind blown and vehicle dust, the Magnitude of the impact would be reduced to Low for these phases. For Operational Phases, the Magnitude is rated Medium with and without mitigation. This is due to the limited potential to mitigate the PV structures, where views of the PV panels as seen from the adjacent receptors will generate Medium levels of visual contrast.

7.3 Probability of the Impact

Probability of the visual impacts taking place is defined as Probable. The proposed project is large in scale and will be noticeable to some degree within the local area, but with the intensity of the landscape change varying in relation to the mitigation applied.

7.3.1 Confidence of the Impact

The impact ratings for the Preferred Alternative were defined as Certain as sufficient information was provided regarding the nature of the landscape modification in relation to the main key observation points. Due to the lack of knowledge regarding the future changes to the status quo, the confidence was rated Unsure.

7.3.2 Reversibility of the Impact

Due to the limited necessity for major earthworks in the construction of the PV project, the PV project was defined as Reversible, as the existing agricultural landscape could be re-established to some degree with the removal of all the panels. It is likely that natural Nama-Karoo vegetation would re-establish over time.

7.3.3 Resource Irreplaceability of the Impact

The existing property is not degraded but has no resource significance as the terrain is flat, there are no obvious drainage lines and vegetation is homogenous. The nearest visual resource is the escarpment which is located 17km and outside of the project ZVI.

7.3.4 Mitigability of the Impact

Retaining a 50m to 100m buffer area between the Steenbokkie PNR border would assist in reducing the intensity of the PV views to some degree. However, this is unlikely to significantly reduce the moderated intensity views as seen from the main Steenbokkie PNR ridgeline viewpoint. Mitigation of dust is important and can effectively be implemented during construction and decommissioning phases. Mitigability is thus defined as Medium.

7.3.5 Visual Significance of the Impact

The Significance of the Visual Impact for Construction and Decommissioning Phases is rated Medium without mitigation, and Low with Mitigation. Dust impacts can be effectively mitigation, and the 100m setback from the Steenbokkie PNR would assist in reducing the intensity of the panels to some degree. Visual Impact Significance for Operational Phase is rated Medium to High, without mitigation but could be reduced to Medium with management of dust and lights. The landscape change will be clearly noticed by the receptors with limited potential for screening. The Significance is moderated by the lower scenic quality of the site and immediate surrounding landscapes, that do include High Exposure Views of multiple Eskom power lines.

The Visual Impact Significance of the No-Go option is rated Medium to Low, as the visual resources of the site are low with limited influence on regional scenic quality.

7.3.6 Cumulative Impact Assessment

Negative cumulative effects are mainly related to the degradation of the surrounding landscapes due to higher visual contrast generated by structural intrusion and visual massing where large areas of PV panels are viewed and where multiple PV projects with their semi-industrial landscape character are visible from a single location. In these instances, the sense of place in the landscape can be dominating, degrading the surrounding visual resources. If these visual resources are utilised for eco-tourism activities, land use conflict can occur.

Within the proposed project zone of visual influence, the landscape character is mainly dominated by flat rural agricultural landscape with limited visual resources. The Cumulative visual risk to scenic resources was rated **medium negative** with little opportunity for mitigation. The combined views of the multiple solar facilities, once constructed, are likely to create a strong, *local* visual massing effect within the agriculturally zoned area. However, site visual resources are low and with the proposed site located on low lying ground, the zone of visual influence will be contained by some elevated terrain to the north. The project is located within the REDZ11 area, where renewable energy projects of scale would be acceptable. With successful rehabilitation of the area back to an agricultural land use on closure, the cumulative visual risk could be reduced to **negligible in the long term**.

8 PRELIMINARY ENVIRONMENTAL MANAGEMENT PLAN

8.1 PV Solar Power Project Components

8.1.1 Construction Phase

- A 100m buffer should be retained between the Steenbokkie PNR to ensure that the reserve sense of place is not degraded any further.
- Following the removal of the vegetation, wind blown dust during construction should be monitored by the ECO to ensure that it does not become a nuisance factor to the local receptors. Should excessive dust be generated from the movement of vehicles on the roads such that the dust becomes visible to the immediate surrounds, dust-retardant measures should be implemented under authorisation of the ECO.
- Topsoil from the footprints of the road and structures should be dealt with in accordance with EMP.
- All proposed buildings should be painted a grey-brown colour.
- Fencing should be simple, diamond shaped (to catch wind-blown litter) and appear transparent from a distance. The fences should be checked on a monthly basis for the collection of litter caught on the fence.
- Signage on the R61 should be moderated.
- Lights at night have the potential to significantly increase the visual exposure of the proposed project. It is recommended that mitigations be implemented to reduce light spillage (refer to appendix for general guidelines).
- The height of the PV panels should not exceed 5.5m above ground level without further visual and landscape impact assessment.

8.1.2 Operation Phase

- Control of lights at night to allow only local disturbance to the current dark sky night landscape (refer to appendix for general guidelines).
- Continued erosion control and management of dust.

8.1.3 Decommissioning Phase

- All structures should be removed and where possible, recycled.
- Building structures should be broken down (including foundations).
- The rubble should be managed according to NEMWA and deposited at a registered landfill if it cannot be recycled or reused.
- All compacted areas should be ripped to a depth of 500cm to loosen the soil, and then rehabilitated according to a rehabilitation specialist
- Monitoring for soil erosion should be undertaken on a routine basis.

8.2 BESS and Substation Project Components

8.2.1 Construction Phase

- Topsoil from the footprints of the road and structures should be dealt with in accordance with EMP.
- The buildings should be painted a mid-grey, or grey-brown colour.
- To reduce colour contrast, *if permitted by the Original Equipment Manufacturer*, the BESS structure should preferably be painted a light-brown colour so as to blend with the surrounding arid region landscapes.
- Fencing should be simple, diamond shaped (to catch wind-blown litter) and appear transparent from a distance. The fences should be checked on a monthly basis for the collection of litter caught on the fence.
- No large signage on the BESS structures.
- Lights at night have the potential to significantly increase the visual exposure of the proposed project, therefore no up-lighting of BESS structures should take place.

8.2.2 Operation Phase

- Control of lights at night to allow only local disturbance to the current semi-rural night sky landscape context (Refer to Appendix for general guidelines).
- Light spillage management to ensure that security lighting at night is not visually intrusive. Lighting for security should be downward and inward facing and not include overhead security lighting options.
- Continued erosion control and management of dust.

8.2.3 Closure Phase

- All structures should be removed and recycled in terms of National best practice guidelines.
- Building structures should be broken down (including foundations).
- The rubble should be managed according to NEMWA and deposited at a registered landfill if it cannot be recycled or reused.
- All compacted areas should be ripped to a depth of 500cm to loosen the soil, and then rehabilitated according to a rehabilitation specialist.

9 PRELIMINARY OPPORTUNITIES AND CONSTRAINTS

9.1 PV Solar Power Project

9.1.1 Opportunities

- The ZVI is contained to some degree by elevated terrain to the north and west. This would result in a moderate zone of visual influence.
- The multiple Eskom power lines to the north of the site degrade the local sense of place to some degree.
- Receptor sensitivity to landscape change is expected to be Medium to Low due to the limited visual resources of the site and surrounds.
- No other Renewable Energy projects are currently visible from this location reducing potential cumulative effects from massing of PV infrastructures. This, however, is likely to change of time.
- Potential for Medium to Low magnitude visual impact.

- National energy objectives for renewable energy and job creation will be met with the site located within the REDZ11 area.
- Good alignment with regional and local planning.

9.1.2 Constraints

- The close proximity to the Steenbokkie PNR where views from the elevated ridgeline viewpoint are likely to change the sense of place to some degree, recognising that that the existing Eskom power line already dominate the site sense of place.

9.2 No-Go Option

9.2.1 Opportunities

- The current rural agricultural land uses of the property do not significantly add to the regional sense of place, due to the remoteness of the locality.
- Agricultural productivity from low intensity sheep farming requiring some employment opportunities.

9.2.2 Constraints

- The greater landscape is associated with Eskom power line landscape.
- The property visual resources are limited with Low existing scenic resources.
- National energy objectives for renewable energy and job creation will not be met.
- Limited water resources in the could reduce the productivity of the agricultural landscapes.

10 CONCLUSION

It is the recommendation that the proposed PV project should be authorised WITH Mitigation. Mitigation is required and would need to be implemented. With mitigation, the benefits of the PV related landscape change are likely to outweigh the landscape status quo, where scenic resources are limited. The following key reasons provide the motivation:

1. The site visual resources are limited with a Low rating for Scenic Quality and Medium rating for Receptor Sensitivity to landscape change.
2. Regionally, the viewshed is contained to some degree from topographic screening.
3. The predominantly flat terrain, result in receptor views having similar height and as such, the outside areas of the PV landscape modification will be mainly visible with the massing effects from the combined views of all the PV projects limited. The exception is Steenbokkie PNR, were there is a small ridgeline that would afford some 3D views, but at a distance.
4. While the adjacent Steenbokkie PNR does fall within the property ZVI, the accommodation centre is topographically screened, views from the main ridgeline viewpoint are 5.3km distance, and the western portions of the have limited visual exposure. The central areas (closest to the PV site) are strongly associated with Eskom transmission line power lines.
5. National energy objectives for renewable energy and job creation will be met with the site located within the REDZ11 area and there is a good alignment with regional and local planning.
6. Medium rating for Visual Impact Significance with mitigation.

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12 ANNEXURE A: SITE VISIT PHOTOGRAPHS AND COMMENTS

The following photographs were taken during the field survey. The text below the photograph describes the landscape and visual issues of the locality, if applicable.

OBJECTID	1
Name	Grid crossing over the N12 National Road
Date/Time	9/21/2021 8:43:07 AM
Bearing	350
X	22.537223
Y	-32.408383
Landscape	Medium

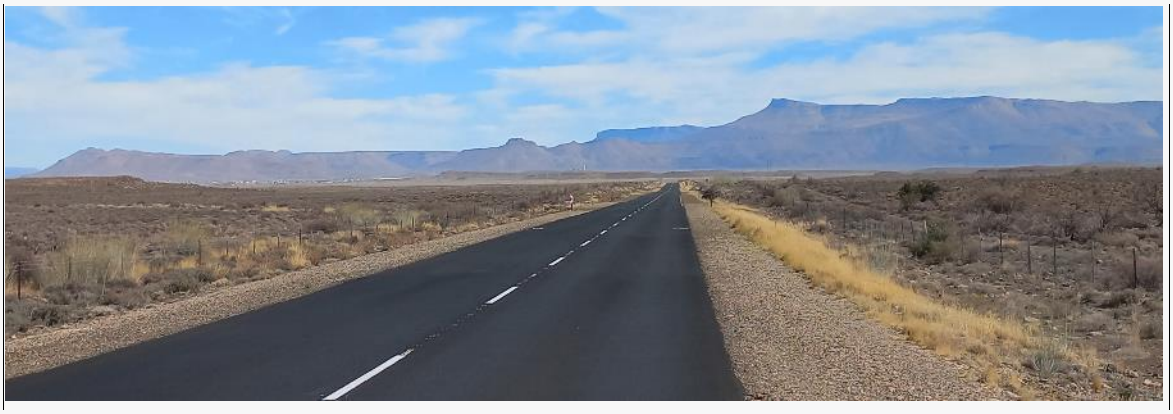
OBJECTID	2
Name	Droerivier Substation as seen from the N12 National Road
Date/Time	9/21/2021 8:43:45 AM
Direction	270
X	22.537275
Y	-32.408367
Landscape	Low

OBJECTID	3
Name	Grid connect crossing over a district road linking the N12 to Beaufort West.
Date/Time	9/21/2021 9:04:34 AM
Direction	90
X	22.575335
Y	-32.405477
Landscape	Low

OBJECTID	5
Name	Grid connect routed adjacent to existing Eskom 400kV power line.
Date/Time	9/21/2021 9:29:05 AM
Direction	300
X	22.613338
Y	-32.404115
Landscape	Medium

OBJECTID	8
Name	Grid connect crossing the R61 district road.
Date/Time	9/21/2021 9:49:09 AM
Direction	110
X	22.675301
Y	-32.401916
Landscape	Medium

OBJECTID	9
Name	View of the escarpment from the Karoo National Park that adds landscape character to the region.
Date/Time	9/21/2021 9:49:14 AM
Direction	290
X	22.6753
Y	-32.401918
Landscape	Medium to High



OBJECTID	11
Name	PV3 view of flat terrain with sparse vegetation.
Date/Time	9/21/2021 10:00:41 AM
Direction	270
X	22.707458
Y	-32.401123
Landscape	Medium to Low

OBJECTID	12
Name	PV3 view of similar flat terrain to the east.
Date/Time	9/21/2021 10:01:00 AM
Direction	90
X	22.707477
Y	-32.401115
Landscape	Medium to Low

OBJECTID	13
Name	PV4 site view northeast of flat terrain and escarpment in the background.
Date/Time	9/21/2021 10:04:58 AM
Direction	45
X	22.721838
Y	-32.400288
Landscape	Medium to Low

OBJECTID	14
Name	PV4 site view northwest of escarpment in the background that does add some landscape value to the site.
Date/Time	9/21/2021 10:05:02 AM
Direction	320
X	22.721795
Y	-32.400255
Landscape	Medium to Low

OBJECTID	15
Name	PV5 site view west of flat terrain and no proximate receptors.
Date/Time	9/21/2021 10:07:29 AM
Direction	80
X	22.732798
Y	-32.399665
Landscape	Low

OBJECTID	17
Name	PV2 site view north of the Steenbokkie Private Nature Reserve game fence.
Date/Time	9/21/2021 10:18:15 AM
Direction	350
X	22.723943
Y	-32.37501
Landscape	Medium

OBJECTID	18
Name	PV2 Site view east along the SBPNR boundary.
Date/Time	9/21/2021 10:18:23 AM
Direction	35
X	22.723973
Y	-32.375065
Landscape	Medium

OBJECTID	19
Name	PV1 Site view south at the flat terrain with few landscape features.
Date/Time	9/21/2021 10:21:29 AM
Direction	180
X	22.714308
Y	-32.380065
Landscape	Low

OBJECTID	20
Name	PV1 Site view north to the low ridgeline located in the background on SPNR property. Clear views of multiple power lines detract from the sense of place.
Date/Time	9/21/2021 10:21:33 AM
Direction	320
X	22.714305
Y	-32.380072
Landscape	Medium to Low

OBJECTID	21
Name	Zoomed view of adjacent traffic travelling on the R61 in the background.
Date/Time	9/21/2021 10:31:23 AM
Direction	270
X	22.699223
Y	-32.398396
Landscape	Low

OBJECTID	22
Name	Zoomed view of Beaufort West in background as seen from Site.
Date/Time	9/21/2021 10:31:34 AM
Direction	320
X	22.699292
Y	-32.398388
Landscape	Medium to Low

OBJECTID	24
Name	View towards PV project from R61 receptors.
Date/Time	9/21/2021 10:39:40 AM
Direction	15
X	22.700371
Y	-32.417229
Landscape	Medium

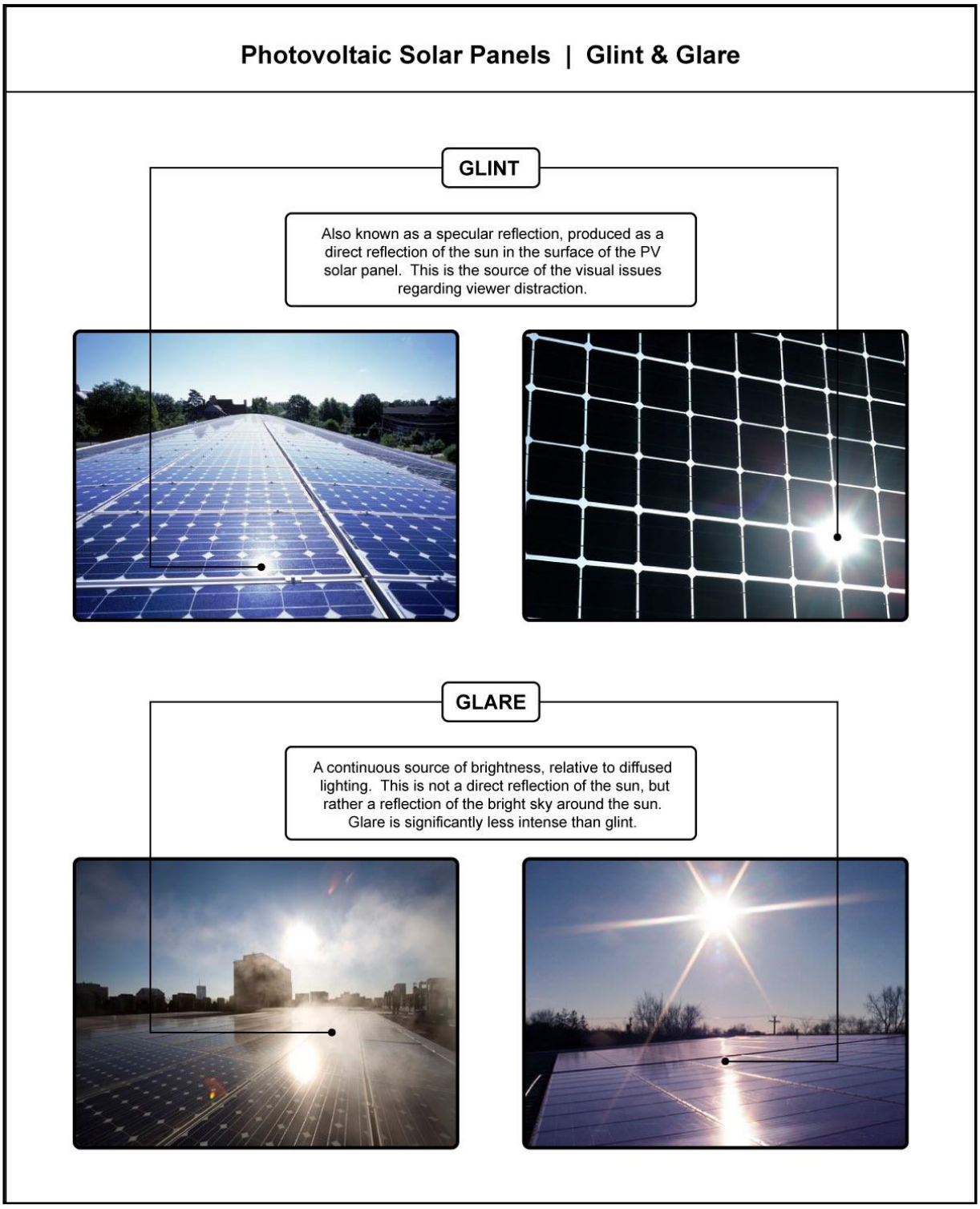
OBJECTID	26
Name	Photograph of the accommodation at the Steenbokkie Private Nature Reserve.
Date/Time	9/21/2021 11:01:20 AM
Direction	340
X	22.658028
Y	-32.339893
Landscape	Medium to High

OBJECTID	29
Name	View from Steenbokkie PNR ridgeline towards the proposed PV site with clear views of the 3 Eskom power lines in the foreground.
Date/Time	9/21/2021 11:21:30 AM
Direction	120
X	22.667297
Y	-32.346653
Landscape	Medium to Low

OBJECTID	30
Name	Close up view of the Eskom power lines located within the Steenbokkie PNV that do detract from the local sense of place.
Date/Time	9/21/2021 11:21:47 AM
Direction	120
X	22.667182
Y	-32.346755
Landscape	Low

13 ANNEXURE B: GLINT AND GLARE

This study does not include the impact of Glint and Glare. Diagram illustrating the potential effect of Glint and Glare from 'Sacramento Solar Highways Initial Study and Mitigated Negative Declaration.' (Sacramento Municipal Utility District)



14 ANNEXURE C: SPECIALIST INFORMATION

14.1 Professional Registration Certificate

14.2 Curriculum Vitae (CV)

1. **Position**: Owner / Director

2. **Name of Firm**: Visual Resource Management Africa cc *(www.vrma.co.za)*

3. **Name of Staff**: Stephen Stead

4. **Date of Birth**: 9 June 1967

5. **Nationality:** South African

6. **Contact Details:** **Tel: +27 (0) 44 876 0020**
   Cell: +27 (0) 83 560 9911
   Email: steve@vrma.co.za

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

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

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

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

11. **Continued Professional Development:**
    - Integrating Sustainability with Environment Assessment in South Africa (IAIAsa Conference, 1 day)

- Achieving the full potential of SIA (Mexico, IAIA Conference, 2 days 2011)
- Researching and Assessing Heritage Resources Course (University of Cape Town, 5 days, 2009)

12. Countries of Work Experience:

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

13. Relevant Experience:

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

14. Languages:

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

15. Projects:

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

Table 19: VRM Africa Projects Assessments Table

YEAR	NAME	DESCRIPTION	LOCATION
2020	Dysanklip & Re Capital 3C BESS	Battery Storage	Northern Cape (SA)
2020	Hotazel PV 2	Solar Energy	Northern Cape (SA)
2020	Hotazel PV Amend	Solar Energy	Northern Cape (SA)
2020	Penhill Water Reservoir	Infrastructure	Western Cape (SA)
2020	Kenhardt BESS x 6	Battery Storage	Northern Cape (SA)
2020	Humansdorp BESS	Battery Storage	Northern Cape (SA)
2020	Bloemsmond PV BESS x 5	Battery Storage	Northern Cape (SA)
2020	Mulilo Prieska BESS x 5	Battery Storage	Northern Cape (SA)
2020	Mulilo De Arr BESS x 3	Battery Storage	Northern Cape (SA)
2020	Sandpiper Estate	Residential	Western Cape (SA)
2020	Obetsebi Lampley Interchange	Infrastructure	Ghana
2019	Port Barry Residential	Settlement	Western Cape (SA)

2019	Gamsberg Smelter	Plant	Northern Cape (SA)
2019	Sandpiper Nature Reserve Lodge	Residential	Western Cape (SA)
2019	Bloemsmond PV 4 - 5	Solar Energy	Northern Cape (SA)
2019	Mphepo Wind (Scoping Phase)	Wind Energy	Zambia
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	Infrastructure	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	Transmission 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	Mpumalanga (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 Residential	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 Sulphur Handling Facility Walvis Bay	Mining	Namibia
2008	Walvis Bay Power Station	Structure	Namibia
2007	Calitzdorp Retirement Village	Residential	Western Cape (SA)
2007	Calitzdorp Visualisation	Visualisation	Western Cape (SA)
2007	Camdeboo Estate	Residential	Western Cape (SA)
2007	Destiny Africa	Residential	Western Cape (SA)
2007	Droogfontein Farm 245	Residential	Western Cape (SA)

2007	Floating Liquified Natural Gas Facility	Structure tanker	Western Cape (SA)
2007	George SDF Municipality Densification	GIS Mapping	Western Cape (SA)
2007	Kloofsig Development	Residential	Western Cape (SA)
2007	OCGT Power Plant Extension	Structure Power Plant	Western Cape (SA)
2007	Oudtshoorn Municipality SDF	GIS Mapping	Western Cape (SA)
2007	Oudtshoorn Shopping Complex	Structure	Western Cape (SA)
2007	Pezula Infill (Noetzie)	Residential	Western Cape (SA)
2007	Pierpoint Nature Reserve	Residential	Western Cape (SA)
2007	Pinnacle Point Golf Estate	Golf/Residential	Western Cape (SA)
2007	Rheebok Development Erf 252 Appeal	Residential	Western Cape (SA)
2007	Rossing Uranium Mine Phase 1	Mining	Namibia
2007	Ryst Kuil/Riet Kuil Uranium Mine	Mining	Western Cape (SA)
2007	Sedgefield Water Works	Structure	Western Cape (SA)
2007	Sulphur Handling Station Walvis Bay Port	Industrial	Namibia
2007	Trekkopje Uranium Mine	Mining	Namibia
2007	Weldon Kaya	Residential	Western Cape (SA)
2006	Farm Dwarsweg 260	Residential	Western Cape (SA)
2006	Fynboskruin Extention	Residential	Western Cape (SA)
2006	Hanglip Golf and Residential Estate	Residential	Western Cape (SA)
2006	Hansmoeskraal	Slopes Analysis	Western Cape (SA)
2006	Hartenbos Landgoed Phase 2	Residential	Western Cape (SA)
2006	Hersham Security Village	Residential	Western Cape (SA)
2006	Ladywood Farm 437	Residential	Western Cape (SA)
2006	Le Grand Golf and Residential Estate	Residential	Western Cape (SA)
2006	Paradise Coast	Residential	Western Cape (SA)
2006	Paradyskloof Residential Estate	Residential	Western Cape (SA)
2006	Riverhill Residential Estate	Residential	Western Cape (SA)
2006	Wolwe Eiland Access Route	Road	Western Cape (SA)
2005	Harmony Gold Mine	Mining	Mpumalanga (SA)
2005	Knysna River Reserve	Residential	Western Cape (SA)
2005	Lagoon Bay Lifestyle Estate	Residential	Western Cape (SA)
2005	Outeniquabosch Safari Park	Residential	Western Cape (SA)
2005	Proposed Hotel Farm Gansevallei	Resort	Western Cape (SA)
2005	Uitzicht Development	Residential	Western Cape (SA)
2005	West Dunes	Residential	Western Cape (SA)
2005	Wilderness Erf 2278	Residential	Western Cape (SA)
2005	Wolwe Eiland Eco & Nature Estate	Residential	Western Cape (SA)
2005	Zebra Clay Mine	Mining	Western Cape (SA)
2004	Gansevallei Hotel	Residential	Western Cape (SA)
2004	Lakes Eco and Golf Estate	Residential	Western Cape (SA)
2004	Trekkopje Desalination Plant	Structure Plant	Namibia (SA)

1995	Greater Durban Informal Housing Analysis	Photogrammetry	KwaZulu-Natal (SA)

15 ANNEXURE D: VRM CHECKLISTS AND TERMINOLOGY

Table 20: Scenic Quality Checklist

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

Table 21: Sensitivity Level Rating Checklist

FACTORS	QUESTIONS	
Type of Users	**Maintenance of visual quality is:**	
	A major concern for most users	High
	A moderate concern for most users	Moderate
	A low concern for most users	Low
Amount of use	**Maintenance of visual quality becomes more important as the level of use increases:**	
	A high level of use	High
	Moderately level of use	Moderate
	Low level of use	Low
Public interest	**Maintenance of visual quality:**	

	A major concern for most users	High
	A moderate concern for most users	Moderate
	A low concern for most users	Low
Adjacent land Users	**Maintenance of visual quality to sustain adjacent land use objectives is:**	
	Very important	High
	Moderately important	Moderate
	Slightly important	Low
Special Areas	**Maintenance of visual quality to sustain Special Area management objectives is:**	
	Very important	High
	Moderately important	Moderate
	Slightly important	Low

Table 22: VRM Terminology Table

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

Simple	Basic, composed of few elements	**Organic**	Derived from nature, occurring or developing gradually and naturally
Complex	Complicated; made up of many interrelated parts	**Structure**	Organised; planned and controlled; with definite shape, form, or pattern
Weak	Lacking strength of character	**Regular**	Repeatedly occurring in an ordered fashion
Strong	Bold, definite, having prominence	**Horizontal**	Parallel to the horizon
Dominant	Controlling, influencing the surrounding environment	**Vertical**	Perpendicular to the horizon; upright
Flat	Level and horizontal without any slope; even and smooth without any bumps or hollows	**Geometric**	Consisting of straight lines and simple shapes
Rolling	Progressive and consistent in form, usually rounded	**Angular**	Sharply defined; used to describe an object identified by angles
Undulating	Moving sinuously like waves; wavy in appearance	**Acute**	Less than 90°; used to describe a sharp angle
Plateau	Uniformly elevated flat to gently undulating land bounded on one or more sides by steep slopes	**Parallel**	Relating to or being lines, planes, or curved surfaces that are always the same distance apart and therefore never meet
Ridge	A narrow landform typical of a highpoint or apex; a long narrow hilltop or range of hills	**Curved**	Rounded or bending in shape
Valley	Low-lying area: a long low area of land, often with a river or stream running through it, that is surrounded by higher ground	**Wavy**	Repeatedly curving forming a series of smooth curves that go in one direction and then another
Plain	A flat expanse of land; fairly flat dry land, usually with few trees	**Feathered**	Layered, consisting of many fine parallel strands

Steep	Sloping sharply often to the extent of being almost vertical	**Indistinct**	Vague; lacking clarity or form
Prominent	Noticeable; distinguished, eminent, or well-known	**Patchy**	Irregular and inconsistent;
Solid	Unadulterated or unmixed; made of the same material throughout; uninterrupted	**Even**	Consistent and equal; lacking slope, roughness, and irregularity
Broken	Lacking continuity; having an uneven surface	**Uneven**	Inconsistent and unequal in measurement irregular
Smooth	Consistent in line and form; even textured	**Stark**	Bare and plain; lacking ornament or relieving features
Rough	Bumpy; knobbly; or uneven, coarse in texture	**Clustered**	Densely grouped
Fine	Intricate and refined in nature	**Diffuse**	Spread through; scattered over an area
Coarse	Harsh or rough to the touch; lacking detail	**Diffuse**	To make something less bright or intense

16 ANNEXURE E: 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" (bluer and greener) 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 Centre. 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.

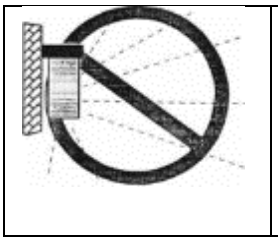
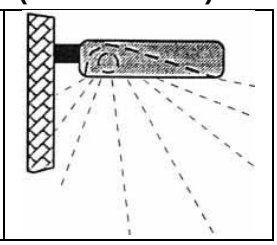
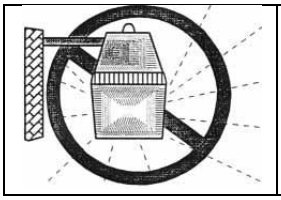
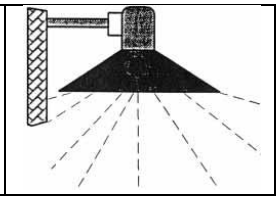
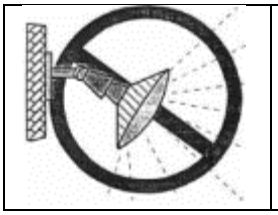
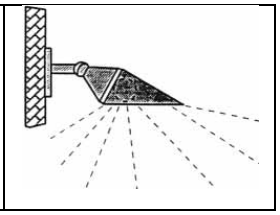
Glare Here's the basic rule of thumb: If you can see the bright bulb from a distance, it's a bad light. With a good light, you see lit ground instead of the dazzling bulb. "Glare" is light that beams directly from a bulb into your eye. It hampers the vision of pedestrians, cyclists, and drivers.

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

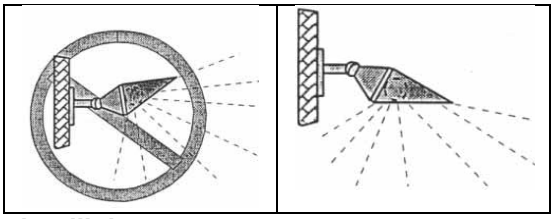
How do I switch to good lighting?

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.

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

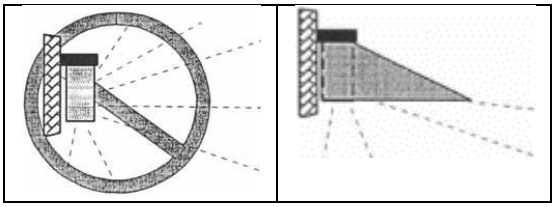
What You Can Do To Modify Existing Fixtures

Change this . . . to this (aim downward)



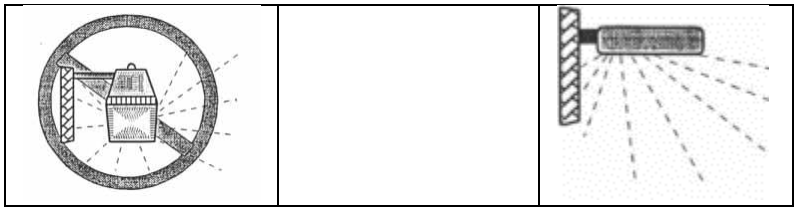
Floodlight:

Change this . . . to this (aim downward)



Wall Pack

Change this . . . to this or this



Yard Light | Opaque Reflector | 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.