THE PROPOSED SOVENTIX PHASE 3 SOLAR PHOTOVOLTAIC FACILITY AND ASSOCIATED INFRASTRUCTURE, NORTHERN CAPE PROVINCE, SOUTH AFRICA

Visual Impact Assessment Report

Final v_2

DATE: 19 September 2022

Document prepared for Soventix (Pty) Ltd
On behalf of Ecoleges Environmental Consultants cc

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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
RE	Renewable Energy
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.

All intellectual property rights and copyright associated with VRM Africa's services are reserved, and project deliverables, including electronic copies of reports, maps, data, shape files and photographs, may not be modified or incorporated into subsequent reports in any form, or by any means, without the written consent of the author. Reference must be made to this report, should the results, recommendations or conclusions in this report be used in subsequent documentation. Any comments on the Visual Impact Assessment (VIA) must be put in writing. Any recommendations, statements or conclusions drawn from or based upon this report, must make reference to it. 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

A specialist report prepared in terms of the Environmental Impact Regulations of 2014 (as amended in 2017) must contain:	**Relevant section in report**
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 16: Broad brush Physiographic Rating Units demarcated within the defined study area.
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 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	While the change to the landscape character will result in higher, local area impacts to the landscape, the impacts will be local and contained to some degree by the topography. Mitigations have been built into the design of the PV project to reduce massing effect as much as possible which will assist in reducing visual intrusion to some degree. As the visual resources of the site are not significant and receptors are few,

A specialist report prepared in terms of the Environmental Impact Regulations of 2014 (as amended in 2017) must contain:	**Relevant section in report**
	it is the recommendation of the assessment that the project should be authorised with mitigation.
A description of any consultation process that was undertaken during the course of carrying out the study	A 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	Comments regarding the neighbours' concerns with regards to property values in the remote rural area were received from the EIA Scoping Phase.
Any other information requested by the competent authority.	NA

1 EXECUTIVE SUMMARY

Visual Resource Management Africa CC (VRMA) was appointed by Ecoleges Environmental Consultants cc (hereafter referred to as EAP) to undertake a ***Visual Impact Assessment*** on the proposed Soventix 400 MW Solar Photovoltaic (PV) facility and Associated Infrastructure, on behalf of Soventix South Africa (Pty) Ltd. (Proponent). The proposed development site is located in the Northern Cape Province, Pixley Ka Seme District Municipality and Emthanjeni Local Municipality.

The finding of this assessment:

- Moderate Zone of Visual Influence with no tourism activities or tourist view-corridors.
- The area is remote, and few receptors were identified. However, as the area is remote, two adjacent farms have indicated sensitive to landscape change.
- Wide buffer areas and fragmented design elements have been utilised to reduce the massing effects of a single large area PV blocks. Four smaller areas with wide corridors between the PV areas reduce visual intensity to some degree.
- Intervisibility between the Phase 1(Authorised unbuilt) and Phase 2 (in assessment process) is limited by making use of topographic elements to reduce visual prominence. The low ridgeline between the proposed Phase 2 and Phase 3 would assist in reducing intervisibility between the two PV projects.
- Due to the remote locality, Medium to High Post Mitigation Impacts are likely where residual effects could degrade *local* landscape resources.

The visual recommendations from the scoping phase reporting were all incorporated into the layout design, accommodating a wide buffer on the adjacent properties, as well as accommodating wide ecological corridors between the four PV blocks. While the local sense of place will be modified, the impacted visual resources are localised to some degree and are not highly significant such that a No-go Option would be preferred. Good Hope Farmstead *could* experience partial views of the panels at 4.5km (the dwelling is at the fringe of the viewshed analysis), with direct views from Skilpadskuil Farmstead screened by local vegetation. As such, the Preferred PV development option is recommended with mitigation.

It is important to note that should the project be authorised, the Relevant Authority would need to recognise that the existing Medium to High levels of Scenic Quality of the locality would be degraded in the Foreground distance area around the PV site, with potential for further degradation should PV development become more established in the area.

POLICY FIT **Medium**

In terms of regional and local planning, the ***expected visual/ landscape policy fit of the landscape change is rated Medium.*** Local and District Municipality guidelines are in favour of Renewable Energy (RE) for economic development opportunities. Planning also emphasises the value of eco-tourism, but no tourism activities were located within the project Zone of Visual Influence (ZVI). The limitation to planning is that the project does not fall with a REDZ, where RE development is encouraged. The area is rural and

remote, where the large scale semi-industrial type development has the potential to degrade the existing Medium to High levels of scenic quality.

METHODOLOGY **Bureau of Land Management's Visual Resource Management (VRM) method**

The methodology for determining landscape significance is based on the United States Bureau of Land Management's Visual Resource Management (VRM) method (USDI., 2004). This GIS-based method allows for increased objectivity and consistency by using standard assessment criteria to classify the landscape type into four VRM Classes, with Class I being the most valued and Class IV, the least. The Classes are derived from *Scenic Quality*, *Visual Sensitivity Levels*, and *Distance Zones*. Specifically, the methodology involved: site survey; review of legal framework; determination of Zone of Visual Influence (ZVI); identification of Visual Issues and Visual Resources; assessment of Potential Visual Impacts; and formulation of Mitigation Measures.

ZONE OF VISUAL INFLUENCE **Local region**

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. The location of some prominent landforms within the study area has the potential to extend the project zone of visual influence over a wider area. However, with mitigations, this effect would be limited as the PV panels would be located on lower lying areas and not wrap over prominent topography. Without mitigation, both the concerned neighbour dwellings are likely to have Mid-ground views of the PV panels, but with mitigation, this effect is reduced and there would be more fragmented views around the dwellings and along the access roads. Good Hope Farmstead could have partial views of the panels at 4.5km, with direct views from Skilpadskuil Farmstead screened by local vegetation.

RECEPTORS AND KEY OBSERVATION POINTS **8 Receptors and 3 Key Observations Points (no tourism of tourism road view corridors)**

Key Observation Points (KOPs) are 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 viewshed analysis found three rural farmsteads located within the project ZVI. Preliminary discussions with some of the neighbouring property owners indicated High levels of sensitivity to landscape change and concerns regarding loss in property value with the potential development of three PV projects in the vicinity. While the N10 does fall within the viewshed, the Low level of exposure would reduce the visibility of the proposed landscape change as seen from this receptor. As such, it was not defined as a Key Observation Point.

SCENIC QUALITY **Medium to High**

Adjacent scenery is rated medium to high due to the undulating karoo landscape that includes low hills and wide valleys where a clear absence of manmade modifications enhances the visual quality of the locality. Landscape Scarcity is rated medium as the scenic quality of the landscape with its distinctive colour is similar to the surrounding landscape within the region. As there are no dominating manmade modifications in the landscape, the category for Cultural Modification is rated as a positive landscape element as the existing rural agricultural land uses favourably enhance visual harmony and add to the Medium to High levels of Scenic Quality.

RECEPTOR SENSITIVITY TO LANDSCAPE CHANGE	**Medium to High**

Maintenance of visual quality to sustain adjacent land uses is rated Medium to High as eastern property owners have indicated concern regarding the semi-industrial type of development in a deep rural setting. The maintenance of visual quality to sustain special area management objectives is rated Medium as the area is zoned for agriculture and is not located within a REDZ area. The area also has Medium to Higher levels of scenic quality that add to the local landscape character, with the proposed development likely to result in a strong change to the sense of place. The letters from the I&APs indicating concern for their adjacent property values are listed in Annexure F.

VISUAL RESOURCE MANAGEMENT ASSESSMENT

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:

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

Class I (No-go) – For PV with the exception of roads, power lines, underground pipelines and underground cables)	• 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.
Class II (Not recommended for PV) with the exception of roads, fences, underground pipelines and cables, the powerline and quarry	• Visual sensitivity and massing buffers, and SSV setbacks for ridgelines and steep slopes

Class III (suitable for PV with mitigation)

- Lower lying topographic areas defined as grasslands

Class IV (not applicable)

- As the area is zoned agricultural and located adjacent to an area that does have scenic value and could carry tourist receptors in the area region, no Class IV areas were defined.

EXPECTED IMPACT SIGNIFICANCE

High *(without mitigation)*

Without mitigation the proposed development is likely to result in Strong levels of visual contrast and will exceed the carrying capacity of the rural landscape, degrading the Medium to High levels of Scenic Quality. As the area is not within a REDZ, massing effects resulting from multiple large scale semi-industrial projects could significantly degrade the current rural sense of place.

Medium to High *(with mitigation)*

With mitigation, the visual intrusion of the proposed semi-industrial landscape can be moderated to some degree, with the ZVI contained to lower lying, less prominent areas of the study area with suitable buffers on eastern property boundaries. The change to the current sense of place will be strongly experienced by the adjacent non-developing property owners, resulting in some local landscape degradation.

Cumulative Effects

Without mitigation, a negative precedent would be set for large PV area coverage in remote, rural areas that have Medium to High levels of Scenic Quality. With mitigation, the massing effect can be reduced to some degree, with no PV development on prominent ridgelines and a suitable buffer to reduce intervisibility between the adjacent Phase 2 PV development.

KEY MITIGATIONS MEASURES

Landscape Element	Mitigation	Motivation
Farm boundary setback	250m buffer	A 250m setback from the two sensitive receptors.
PV Intervisibility	470m buffer	A 470m buffer needs to be retained between the proposed Soventix Phase 2 & Phase 3 PV areas to allow the low rise between the two development parcels to assist in topographic screening.
Massing effects	Break up the PV parcels into four smaller area.	To reduce the massing effect created by a large area development, the PV development area needs to be broken up

		into smaller PV parcels. Each area should be fenced separately and the areas between operate as ecological corridors.
PV Height Restriction	4m	The PV panel height should not exceed 4m above ground level.

2 SITE SENSITIVITY VERIFICATION

In terms of Part A of the Assessment Protocols published in GN 320 on 20 March 2020, site sensitivity verification (SSV) is required relevant to the DFFE Screening Tool. The following table outlines the relevance of the risks raised in the SSV as informed by the site visit.

Table 3. DEFF SSV PV and Landscape Risk table.

DFFE Feature	DFFE Sensitivity	Risk Verification	Motivation
Slope between 1:4 and 1:10	*High*	**Medium to High**	The northeastern portion of the site does include prominent ground that forms the western portion of a ridgeline. Development on this prominent ground is likely to result in landscape degradation. As such the higher risk to the landscape identified by DFFE is confirmed for this portion of the study area.

A field survey was undertaken on 21 March 2022 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 DFFE Sensitivity mapping, the site survey locations map and photographs are located in Annexure A.

The site investigation 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:

- Medium to Higher levels of Scenic Quality with the hills to the northeast adding to the local scenic quality.
- Receptor sensitivity to landscape change located to the north-east of the proposed development site.
- As confirmed by the DFFE SSV mapping, there is some landform prominence that should be avoided, with preferred location within the lower lying areas to reduce visual intrusion.

- Breaking up of massing effects created by large expanses of PV panels such that that the development parcels are more reflective of the landscape carrying capacity and less dominating to sensitive receptors located to the eastern areas.

3 INTRODUCTION

Visual Resource Management Africa CC (VRMA) was appointed by Ecoleges Environmental Consultants cc (hereafter referred to as EAP) to undertake a ***Visual Impact Assessment*** on the proposed Soventix 400 MW Solar Photovoltaic (PV) facility and Associated Infrastructure, on behalf of Soventix South Africa (Pty) Ltd. (Proponent).

3.1 Project Locality

The proposed development site is located in the Northern Cape Province, Pixley Ka Seme District Municipality and Emthanjeni Local Municipality. The Proponent proposes to construct a Photovoltaic (PV) solar energy facility and associated infrastructure on the Remainder of Farm Goede Hoop 26C and Portion 3 of Farm Goede Hoop 26C, between De Aar & Hanover. This forms the third phase of a cluster of PV areas, with Phase 1 authorised but unbuilt and Phase 2 & 3 undergoing an EIA process. Visual and Landscape impacts for Phase 2 will not addressed in this report, however due to the adjacent locality of the Phase 2 site, cumulative effects will need to be addressed.

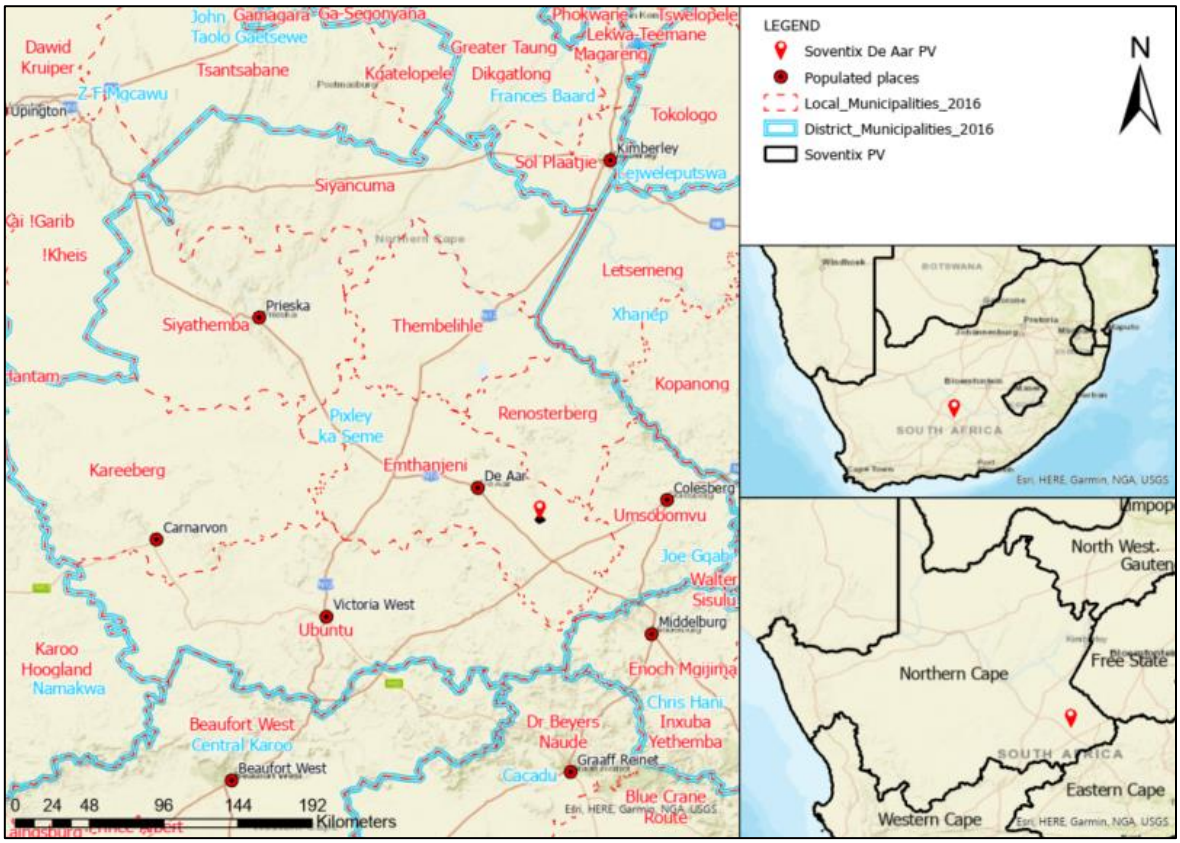


Figure 1: National locality map with the project location identified.

3.2 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 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).

3.3 Study Team

Contributors to this study are summarised in the table below.

Table 4: 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 Practitioners • 16 years of experience in visual assessments including renewable energy, power lines, roads, dams across southern Africa. • Registered with the Association of Professional Heritage Practitioners since 2014.

3.4 Visual Assessment Approach

The full methodology used in the assessment can be found in Annexure B, with this section outlining the key elements of the assessment process. 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.

- *"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).

Baseline Phase Summary

The VRM process involves the systematic classification of the broad-brush landscape types within the receiving environment into one of four VRM Classes. Each VRM Class is associated with management objectives that serve to guide the degree of modification of the proposed site. The Classes are derived by means of a simple matrix with the three variables being the scenic quality, the expected receptor sensitivity to landscape change, and the distance of the proposed landscape modification from key receptor points. The Classes are not prescriptive and are utilised as a guideline to determine visual carrying capacity, where they represent the relative value of the visual resources of an area. Classes I and II are the most valued, Class III represents a moderate value; and Class IV is of least value. The VRM Classes are not prescriptive and are used as a guideline to determine the carrying capacity of a visually preferred landscape as a basis for assessing the suitability of the landscape change associated with the proposed project.

Table 5: VRM Class Matrix Table

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

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

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

- The Class I objective is to preserve the existing character of the landscape and 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.

Impact Phase Summary

To determine impacts, a degree of contrast exercise is undertaken. This is an assessment of the expected change to the receiving environment in terms of the form, line, colour and texture, as seen from the surrounding Key Observation Points. This determines if the proposed project meets the visual objectives defined for each of the Classes. If the expected visual contrast is strong, mitigations and recommendations are made to assist in meeting the visual objectives. To assist in the understanding of the proposed landscape modifications, visual representation, such as photomontages or photos depicting the impacted areas, can be generated. There is an ethical obligation in the visualisation process, as visualisation can be misleading if not undertaken ethically.

3.5 VIA Process Outline

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 6: 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.

Action	*Description*
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.

3.6 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 7. 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.

3.7 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 has taken 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 Maps, 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.
- As access to farms and private property is often limited due to security reasons, which limits where photographs from specific locations are taken.

4 PROJECT DESCRIPTION

The following background information was provided by Ecoledges.

In 2016 Ecoleges undertook a S&EIA for the development of a 225 MW Solar PV facility between Hanover and De Aar in the Northern Cape. Three alternative footprints (PV01, PV02, PV03) were investigated during the assessment process. The central fotprint (PV02) was identified as the preferred option because of its lower environmental impact and proximity to an existing 400kV Eskom powerline when compared with PV01 and PV03. The National Department of Environmental Affairs granted an environmental authorisation (DEA Reference: 14/12/16/3/3/2/998) on 16th April 2018. The activity must commence on the PV02 footprint within a period of five years from the date of issue. An amendment to increase the capacity (not the footprint) of the facility to 300 MW due to technological advancements in solar photovoltaic efficiency and electrical output was granted on 24th November 2020.

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.

Table 8: Project Information Table

PROPONENT SPECIFICATIONS	
Applicant Details	**Description**
Applicant Name	Soventix South Africa Pty (Ltd)
Project Name	Soventix 400 MW Solar Photovoltaic Facility and associated infrastructrue Phase 3
Property Name	Remainder of Farm Goede Hoop 26C and Portion 3 of Farm Goede Hoop 26C, and other properties between De Aar & Hanover
Project Description	The size of the proposed development footprint for a 400 MW solar PV facility is approximately 600 ha (1.5 ha per MW). Parts of the solar PV facility may be within 100 m and 500 m of a watercourse and wetland/pan, respectively (**S21(c) and (i)**).
PV System	The PV system is made up of the following components: solar panels or modules are connected to form arrays. The arrays are mounted onto a single-axis tracker and supported by steel or aluminium racks approximately 9.5 m apart. The panels would only incline to a position of 50 degrees when facing East and West. At full tilt the ground clearance will be 0.6 m with a **maximum height of 4 m** (3.4 m +0.6 m). Several arrays are then connected to an inverter. Approximately 2000 inverters will be cabled to 40 field transformers (twenty-five inverters are connected to a field transformer). The field transformers then transfer and increase (step up) the voltage of the alternating-current circuit to Eskom's electrical grid. Some of the underground cables from the field transformers to the on-site substation may cross a watercourse (**S21(c) and (i)**).

	The current land use is sheep farming, which will continue within the solar PV facility to ensure minimal reduction (if any) on the agricultural potential of the land as well as a management tool to control vegetation growth.
On-site Substation and Distribution Line	The solar PV facility will be connected to Eskom's electrical grid via an onsite substation and a 66 to 132 kV overhead distribution line. The distribution line is approximately 20 m high, and the servitude width is approximately 32 m. The planned 66 kV to 132 kV distribution line will intersect an existing Eskom distribution line; Bletterman/Taaibos 1, 132 kV Overhead Line. A 10 to 15 m lightning mast will be erected within proximity to the on-site substation.
Lighting	The facility will not be lit up at night. The fence line will be secured using multiple FLIR PTZ cameras which have a 2 km range in absolute darkness (pers. comm. JP De Villiers, Managing Director Soventix). The obvious areas that would have lights is the control and security office, as well as the on-site substation, as it is a legal requirement.
Fencing	The facility will be fenced off with a galvanised diamond razor mesh security fence. The fence is embedded 300 mm into the ground and is 1.8 m high. Access will be controlled using a security gate. A 4 to 5 m-wide fire break road, comprising a two-track dirt road with mowed vegetation will be created inside the perimeter fence.
Construction	Heavy delivery vehicles will use the same staging area as for Phase 1 and 2. Materials, machinery and equipment will then be transferred onto lighter vehicles so that they can pass underneath Transnet's railway line unhindered and transported to the laydown area in the construction camp. No accommodation facilities will be provided at the construction camp. Staff will be required to leave the site at the end of the day. It is anticipated that the construction equipment will include at least: Water tankers, Graders, Tipper trucks, Drilling rigs, Mobile pile ramming machines, Excavators, TLBs, Concrete mixers, Compaction equipment, Light delivery vehicles, and Heavy delivery vehicles (for the transformers).
Vegetation Clearance	Vegetation will be cleared from the physical footprint of the construction camp (no more than 4 ha including laydown area), inverters, field transformers, on-site substation, rack foundations, pylon footings, underground cables and water pipes, roads (circa 400 km), a fire-break road and fencing posts, operational area (1 ha, but within the construction camp footprint), borrow pit (no more than 2 ha), water storage tanks and deionization plant(s).

(Hawaii Renewable Energy, n.d.)

Figure 2: Photographic example of what the proposed PV could look like as fixed and single portrait model on a tracker.

(Source: Jawatha, India. www.nccprojects.com)

Figure 3: Monopole photographic examples

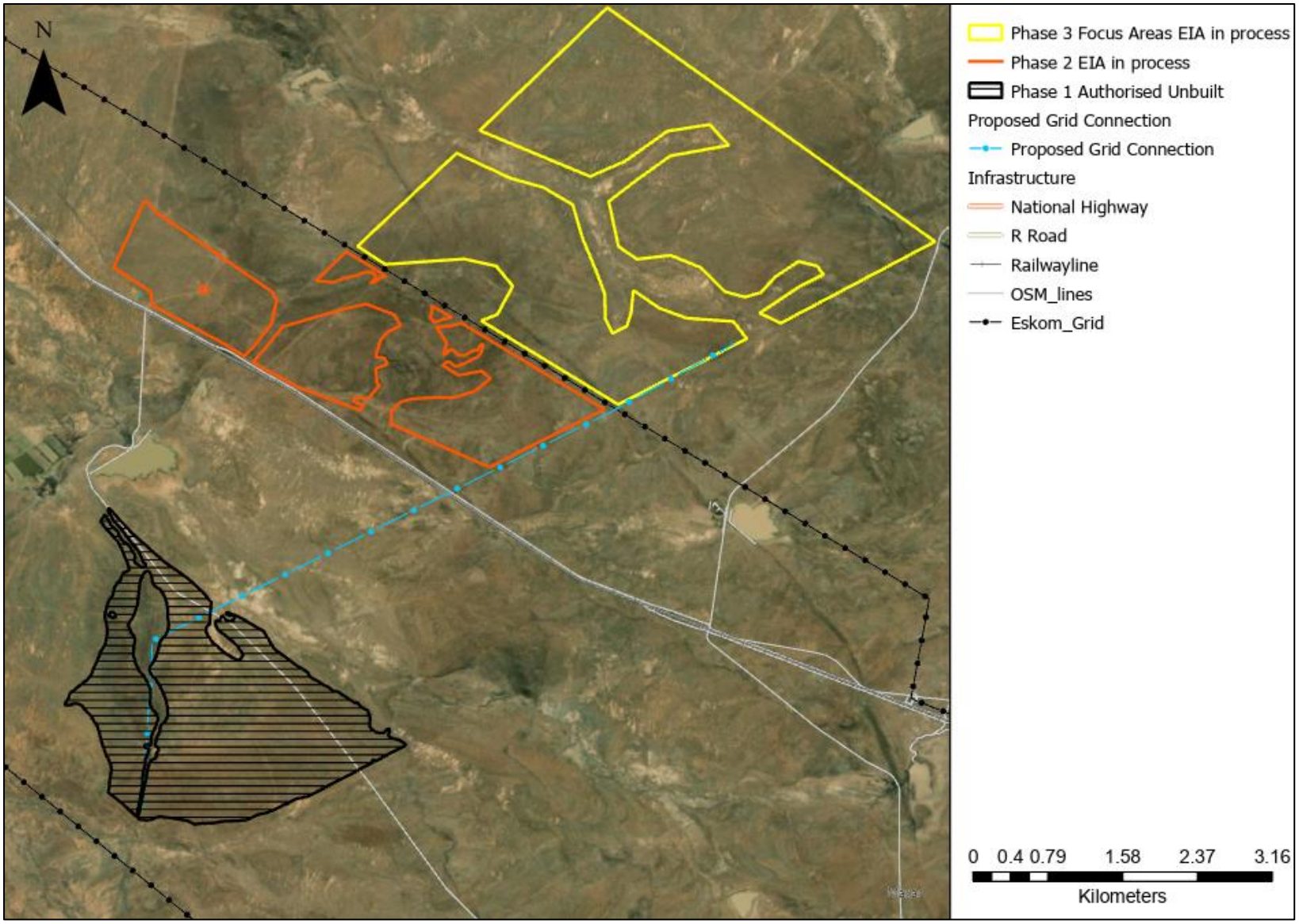


Figure 4: Study area (yellow) map of the authorised and proposed PV projects in the area with this study focussing on ***Phase 3***.

5 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 International, National and Regional best practice, 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.

5.1 International 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).

5.1.1 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).

5.1.2 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).

5.1.3 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)

5.2 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 as mapped in Figure 5: Planning locality map depicting the location of the project outside of a defined REDZ.Figure 5 below.

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

Table 9: List of key planning informants to the project.

Theme	Requirements
Province	Northern Cape Province
District Municipality	Pixley ka Seme District Municipality
Local Municipality	Emthanjeni Municipality
National Energy Planning REDZ	The study area is not located within a REDZ area but is located in a Strategic Transmission Corridor.

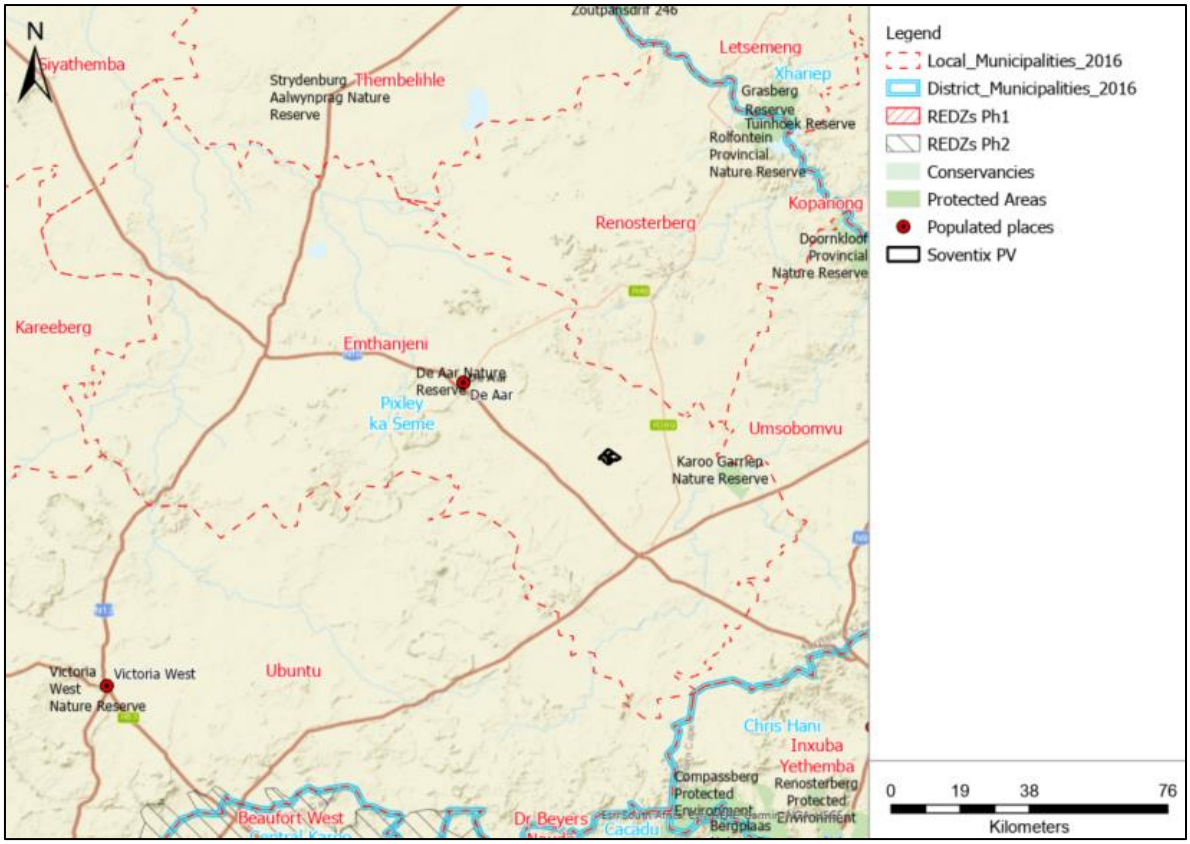


Figure 5: Planning locality map depicting the location of the project outside of a defined REDZ.

5.2.1 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)

5.2.2 REDZ Planning

A Strategic Environmental Assessment commissioned by the Department of Environmental Affairs, undertaken by the CSIR, identified Renewable Energy Development Zones (REDZs). These are gazetted geographical areas in which several wind and solar PV development projects will have the lowest negative impact on the environment while yielding the highest possible social and economic benefit to the country. The project is not situated within a Renewable Energy Development Zone (REDZ) but is located within a Strategic Power Line Corridor

5.2.3 Local and Regional Planning

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

Table 10: Pixley ka Seme District Municipality IDP 2022 (Pixley ka Seme District Municipality, 2022)

Theme	Requirements	Page
Opportunities	• Eco Tourism • Solar and Wind Farms • Position of being strategically situated (National Roads) • SKA	12
Biophysical Context	• Possible demand for development that will influence the transformation of land uses • SKA • Renewable Energy	34
Renewable Energy	Potential and impact of in renewable energy resource generation	45
	South Africa has embarked in a process of diversifying its energy-mix to enhance energy security while also lowering green-house gas emissions. The country is blessed with a climate that allows Renewable Energy (RE) technologies like solar photovoltaic (PV) and Wind generation to be installed almost anywhere in the country. By successfully attracting a share of the IPPPP portfolio investment, Emthanjeni, Siyathemba, Ubuntu and Renosterberg and Umsobomvu, is benefitting from substantial socio-economic development (SED) and Enterprise development (ED) contributions leveraged by the IPPPP commitments.	75

Table 11: Emthanjeni Municipality IDP 2007 (Emthanjeni Municipality, 2007)

Theme	Requirements	Page
Mission	• To create a viable economic development plan that is relevant to the characteristics of the Emthanjeni Municipal area, designed to create and maintain a sound and healthy local economy, drawing upon local strengths and resources. • Emthanjeni Municipality, specifically De Aar, is the seat of Pixley ka Seme District Municipality which hosts all Government Departments	Pg 33
Energy Consumption	The Karoo area is dependent upon boreholes for its water supply. Energy consumption will potentially also increase by 10% and a similar strategy for alternative energy will have to be identified for both cooling in summer and heat in winter. The alternative of solar energy will be needed to reduce pressure placed on the existing grid.	Pg 34
Renewable Energy	Emthanjeni has in recent time seen the influx of investment in renewable energy projects and is a potential industrial growth point with ample industrial sites, reasonable prices and tariffs, affordable labour and the necessary infrastructure.	Pg 46

Theme	Requirements	Page
Economic Development/ Tourism	Other future planning and projects which Emthanjeni will concentrate on to increase Economic Development include the Development of N10 Corridor, linked to the National Solar Corridor (Northern Cape) These thrusts are aimed at exploring the potential of Emthanjeni Local Municipality to become a leading tourism destination.	Pg 56

Table 12: Emthanjeni Municipality Spatial Development Framework (SDF) 2007 (Emthanjeni Municipality)

Theme	Requirements	Page
Environment	It is the intention of the SDF to arrange development activities and the built environment in such a way and manner that it can accommodate and implement ideas and desires of people without compromising the natural environment.	Pg 1
Industry	The industrial area of De Aar is located to the eastern side of the railway lines, north-east of the CBD of the town. This area was developed in this specific location, due to the development potential that the railway intersections in De Aar provided.	Pg 7
Tourism	The farms alongside the N1, the N10 and the N12 have all started to open guesthouses on the farms for tourists in order to provide a sleepover location for people traveling from the north to the south and vica versa.	Pg 12

5.3 Landscape 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 would not trigger any best practice guidelines as there are no significant cultural/ landscape resources on the site or immediate surrounds.

In terms of regional and local planning, the ***expected visual/ landscape policy fit of the landscape change is rated Medium.*** Local and District Municipality guidelines are in favour of RE for economic development opportunities. Planning also emphasises the value of eco-tourism, but no tourism activities were located within the project Zone of Visual Influence (ZVI). The limitation to planning is that the project does not fall with a REDZ, where RE development is encouraged. The area is rural with large scale semi-industrial type development having the potential to degrade the existing Medium to High levels of scenic quality.

6 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.

6.1 Landscape Context

The proposed Soventix Phase 3 Solar Facility is located 37 km southeast of the town of De Aar in the Northern Cape Province of South Africa, with the nearest town of Hanover located 22km to the southeast of the study area. Within the regional context, the property is located in a rural karoo landscape predominantly related to low intensity sheep farming.

De Aar is a primary commercial distribution centre for a large area of the central Great Karoo. Major production activities include wool production, livestock farming and is part of the Green Kalahari initiative *(www.de-aar.co.za)*. The region has some of the highest renewable energy resource levels in the world, with good existing road infrastructure and accessibility to the national grid. The De Aar PV projects are not within the proposed project ZVI.

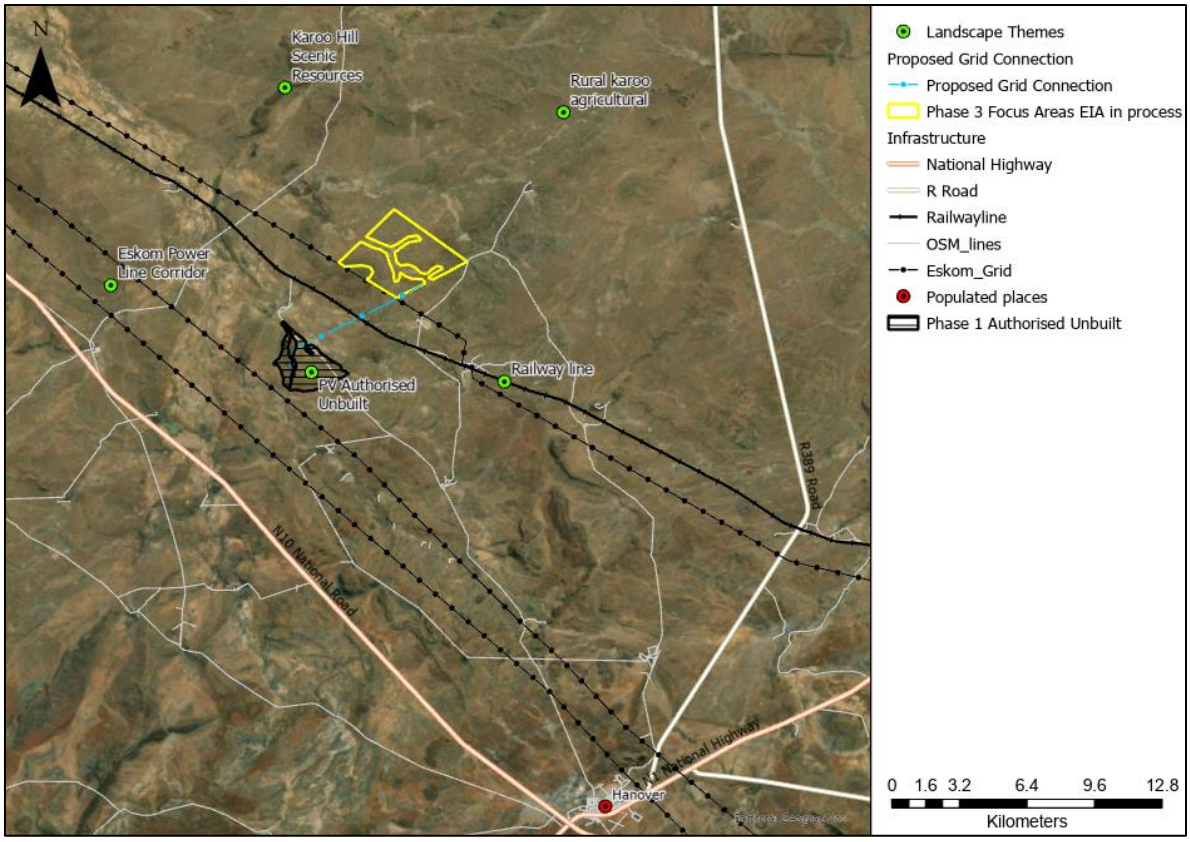


Figure 6: Local landscape themes map.

6.1.1 Other Renewable Energy Projects

Numerous other renewable energy projects are located in the region around the town of De Aar as mapped in Figure 7 below. The only project listed on the DFFE database is 12/12/20/2258/4, referring to the Soventix PV Phase 1 that has status Authorised but remains unbuilt. This project is located 3km to the southwest of the Phase 3 study area, and with a low ridgeline separating the two projects, therefore massing effects from multiple PV project visible from a single location is reduced. Located directly to the southwest of the study area, the Soventix Phase 2 assessment is also being undertaken. Due to the close proximity of the two projects, a wrap over visual effect could transpire if located in close proximity, increasing potential for visual intrusion as the two projects will be viewed as a single element in the landscape. The ridgeline location between the two projects does create the opportunity to allow for visual buffering, and this would need to be addressed in the VIA phase. The cluster of PV projects around the town of De Aar to the northwest of the project are located further than 12km were the intervisibility would not take place. Also located in the landscape and visible from the property, are the wind farm lights at night. Set in the background, this effect is limited and as PV does not require Aircraft Warning Lights at Night (ALW), intervisibility of lights at night is likely to be a limited effect. To reduce localised massing effects from the authorised Soventix PV Phase1 and Phase 2 (in assessment), buffers between the different projects should be maintained, especially on more prominent areas.

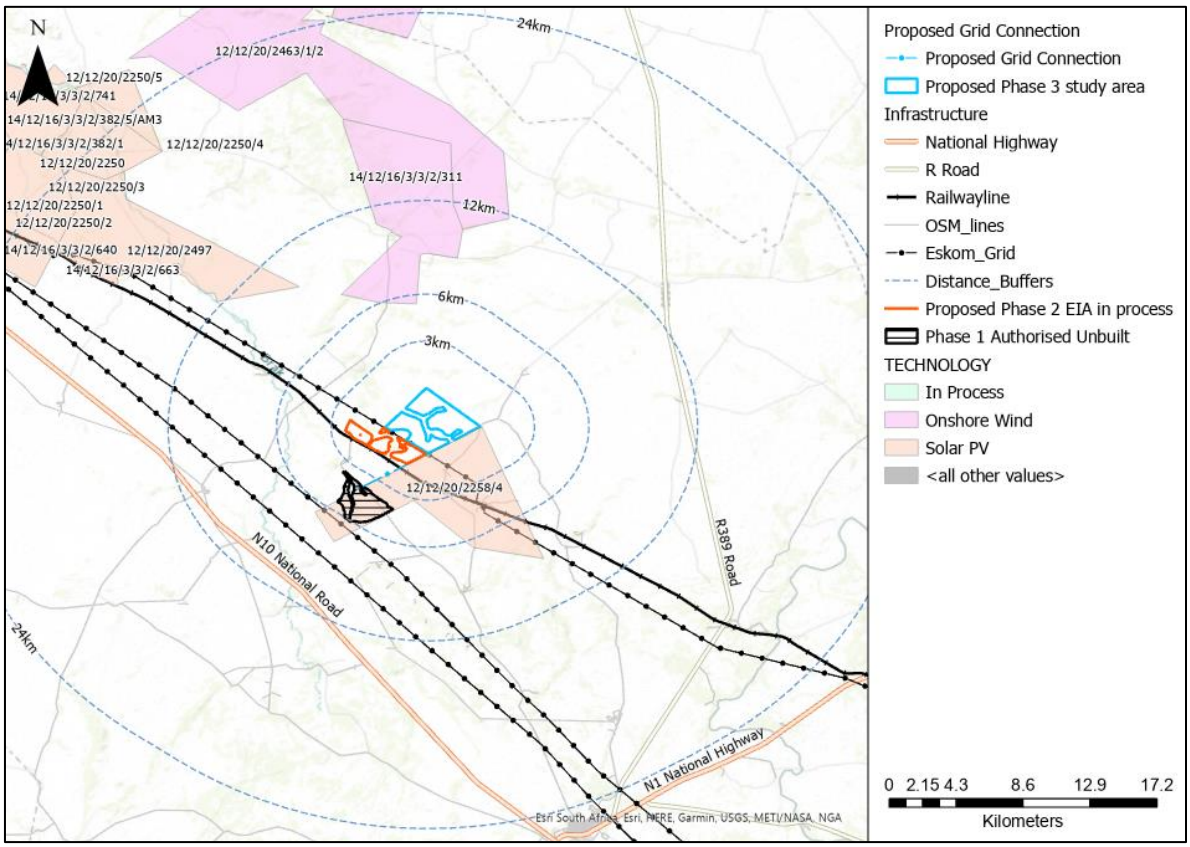


Figure 7: Map depicting DEA Renewable Energy project status.

6.1.2 Nature and Tourism Activities

As depicted in Figure 5 the nearest Nature Reserves to the proposed project are the De Aar Nature Reserve to the northwest and the Karoo Gariep Nature Reserve to the east. Both of these conservation areas are located outside of the project viewshed.

Eco-tourism is emphasised in the local and regional planning, but no tourist related activities or tourist view corridors were located within the project viewshed.

6.1.3 Vegetation

Vegetation type is 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 outlines the broad vegetation biome and type.

The De Aar area falls within the Nama Karoo biome. The Nama-Karoo Biome occurs on the central plateau of the western half of South Africa, at altitudes between 500 and 2000m, with most of the biome failing between 1000 and 1400m. It is the second-largest biome in the region.

Due to the underlying geology, the biome is varied, and primarily influenced by rainfall. The rain falls in summer and varies between 100 and 520mm per year. This also determines the predominant soil type - over 80% of the area is covered by a lime-rich, weakly developed soil over rock. Although less than 5% of rain reaches the rivers, the high erodibility of soils poses a major problem where overgrazing occurs.

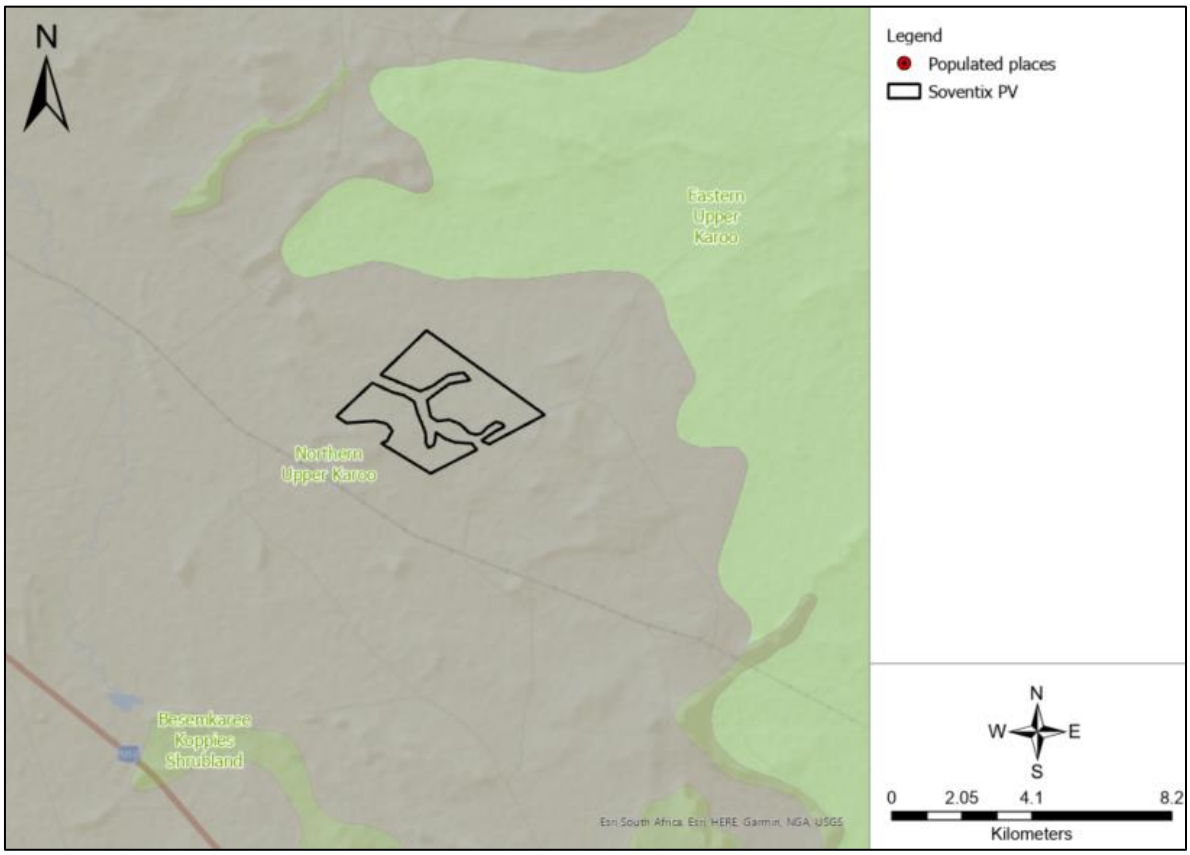


Figure 8: Vegetation Mapping.

According to the SANBI Plantzafrica website, the project area falls within the Northern Upper Karoo vegetation type in the Nama Karoo Biome, as depicted in Figure 8. This vegetation type is characterised by shrubland, dominated by dwarf karoo shrubs, grasses and *Acacia mellifera* subsp. *Detinens*. The conservation status is indicated as "least threatened". Although none of this vegetation type is conserved in statutory conservation areas, very little has been cleared for cultivation or irreversibly transformed through human settlement or infrastructure development.

Given the nature of the low-growing vegetation on the site, and the nature of the installation, there is little to no opportunity for visual screening presented by indigenous vegetation on the site, nor would it be possible to cultivate an effective vegetation screen, due to the constraints of climate and soils.

6.2 Project Zone of Visual Influence

The visible extent, or viewshed, is "the outer boundary defining a view catchment area, usually along crests and ridgelines" (Oberholzer, 2005). 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 below, which makes 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.

6.2.1 Regional Landscape Topography

Making use of the NASA STRM digital elevation model, profile lines were generated for the area within 3km on either side of the project area. The map depicting the regional elevation profile lines can be view in Figure 10 below, with the regional terrain model and profile line located below the map.

The regional topography is flat to gently undulating rising towards defined ridgelines. Within the immediate regional topographic context (.i.e within a 15km radius of the site), the minimum elevation is 1296 mamsl, with a maximum elevation of around 1420 mamsl, roughly 15km to the south of the site. A regional watershed (at ~1400 mamsl) lies immediately east and within 5-10km of the site

The site, located at an elevation of between 1375 mamsl and 1330 mamsl, slopes very gently in a north-westerly direction. It is drained via a clearly defined, northwest trending ephemeral drainage line which effectively bisects the proposed development area. The average slope across the site is about 1:60. In terms of the DFFE SSV mapping, steep slope areas to the east of the site are buffered.

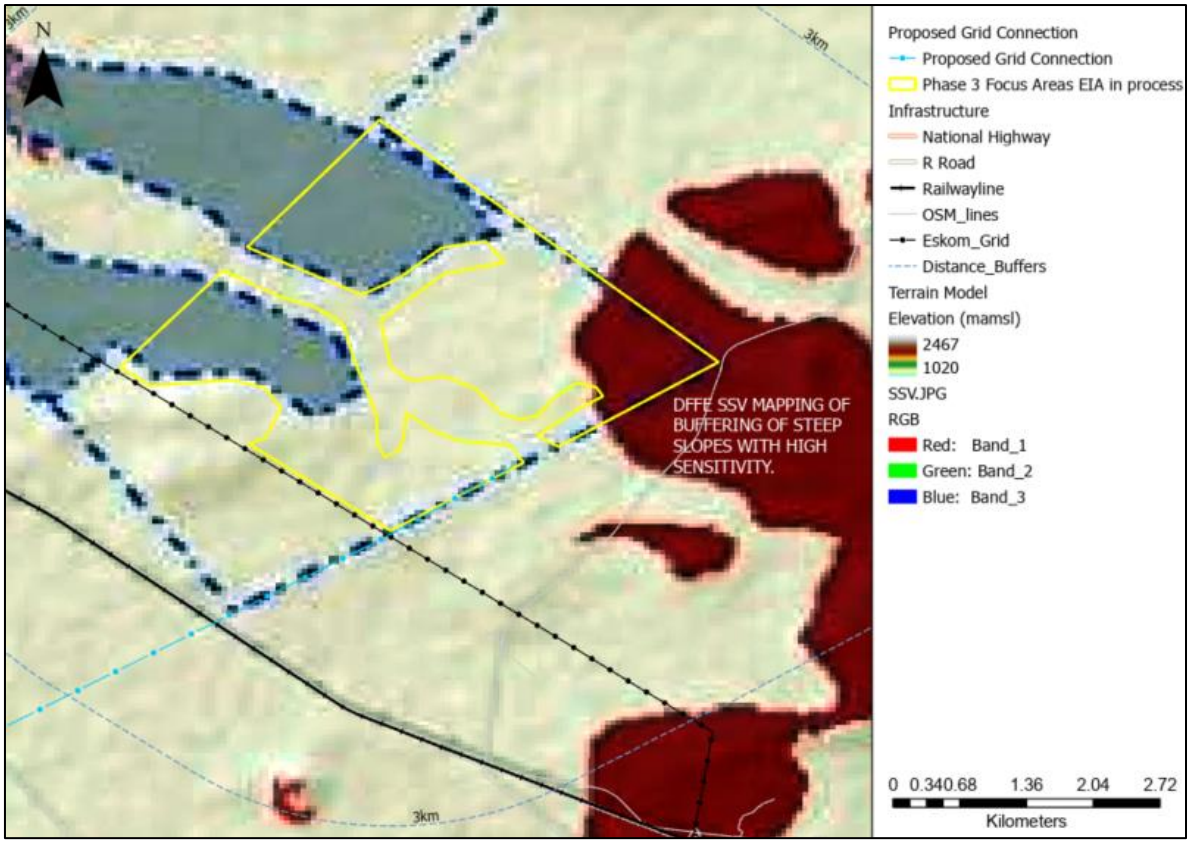


Figure 9. DFFE SSV Buffer of steep slopes map.

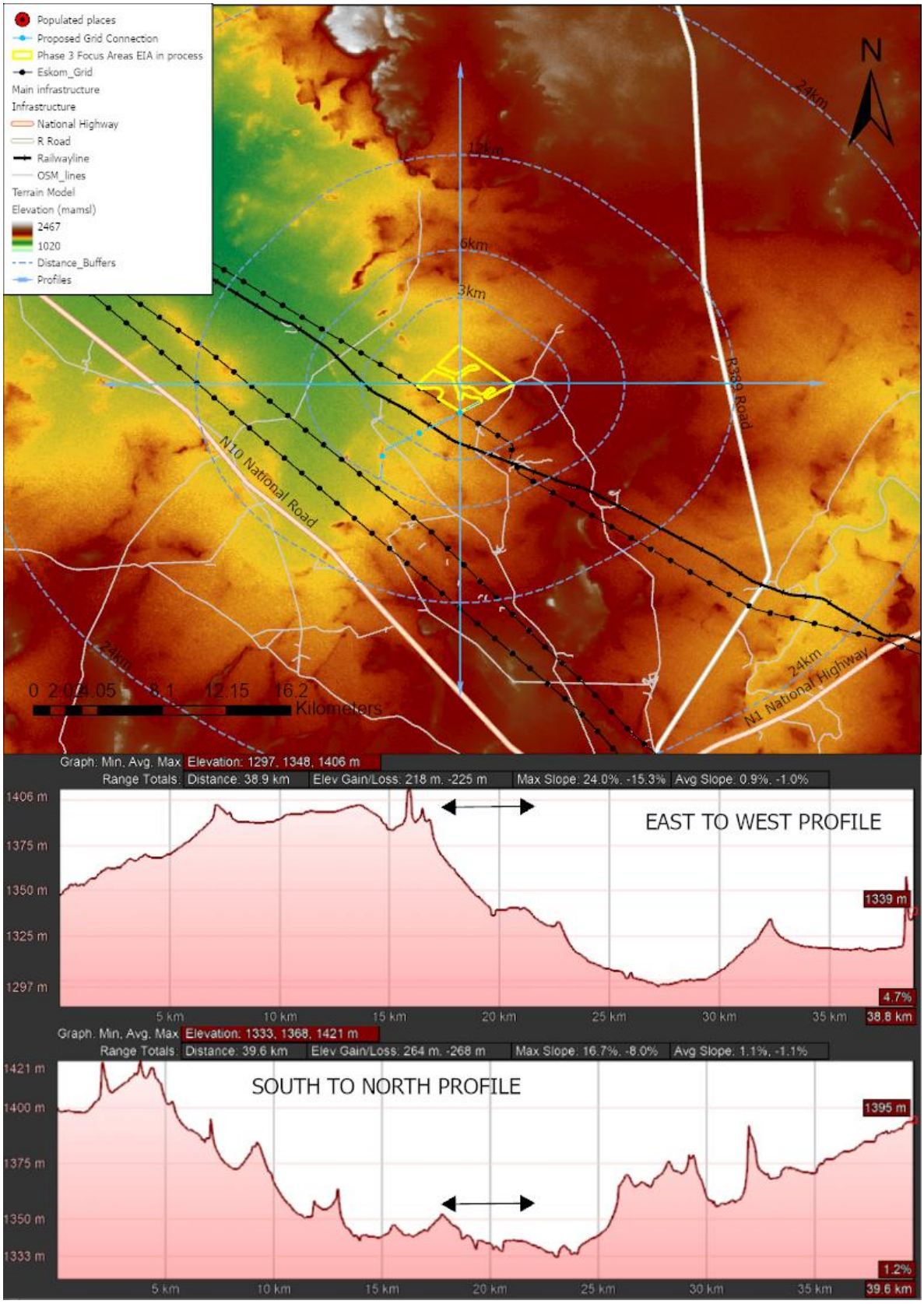


Figure 10: Regional Terrain Model and Elevation Profiles East to West and North to South profiles.

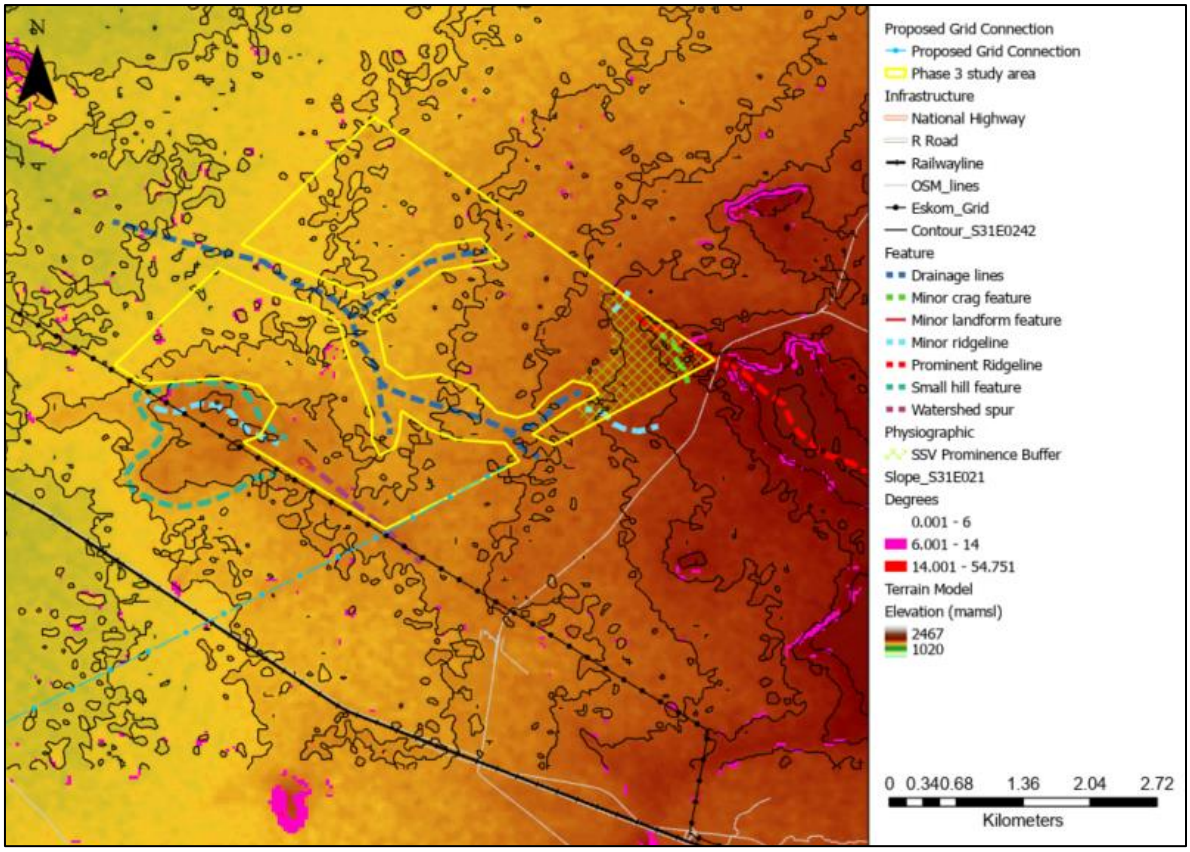


Figure 11: Study area topographic informed landforms.

As depicted in the map above, landforms on the site include:

- Drainage lines
- Minor crag features to the east.
- Several minor landform features.
- Minor ridgelines
- As highlighted by the DFFE SSV mapping, buffering of the single prominent ridgeline located outside of the study area, but forming a prominent landform feature that aligns with the northern border of the study area.
- A small hill feature to the west of the site with a low ridgeline that runs within the study area along the southern boundary.

Drainage lines have already been excluded from the development area, as well as portions of the low hill to the west. As flagged by the DFFE SSV, the eastern ridgeline needs to be excluded from the development area, as well as the small landforms that have gradient steeper than 1 in 10m. The area is rural agricultural with medium to high levels of scenic quality. To reduce the massing effects created by the location of the adjacent Phase 2, the low ridgeline between the two projects should be excluded from development to allow for visual buffering.

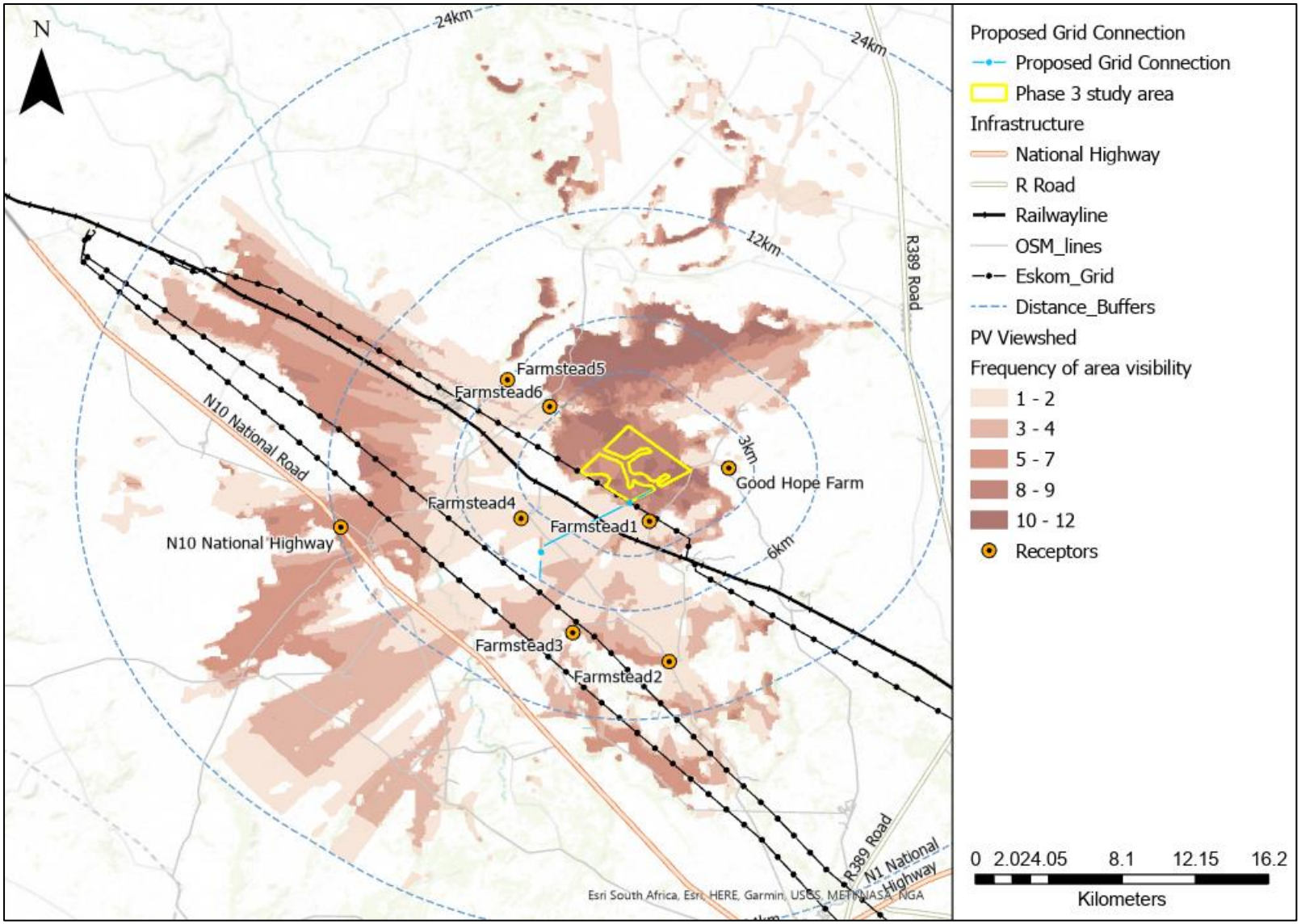


Figure 12: Viewshed analysis with receptor locations map.

6.2.2 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 Soventix Phase 3 Solar Facility was set at 4m above ground to represent the approximate height of the proposed development as reflected in the table below.

Table 13: Proposed Project Heights Table

Proposed Activity	Approx. Height (m)	Terrain Model Extent
PV Panels	4m	24km

As can be viewed in Figure 12 on the previous page, the viewshed is most pronounced towards the north, and within 6km of the site, beyond which topographical screening reduces the viewshed to isolated, high points. The viewshed extends up to 24km in westerly and south-westerly direction, albeit at a lower frequency. The site will not be visible from the N1 National Highway, nor the R389 regional road to the east. It will, however, be visible at a low frequency, from the N10 National Road for roughly 15km of its length. The corridor between the N10 and the site, however, is also occupied by three Eskom powerlines, which would further mitigate the visual influence of the facility.

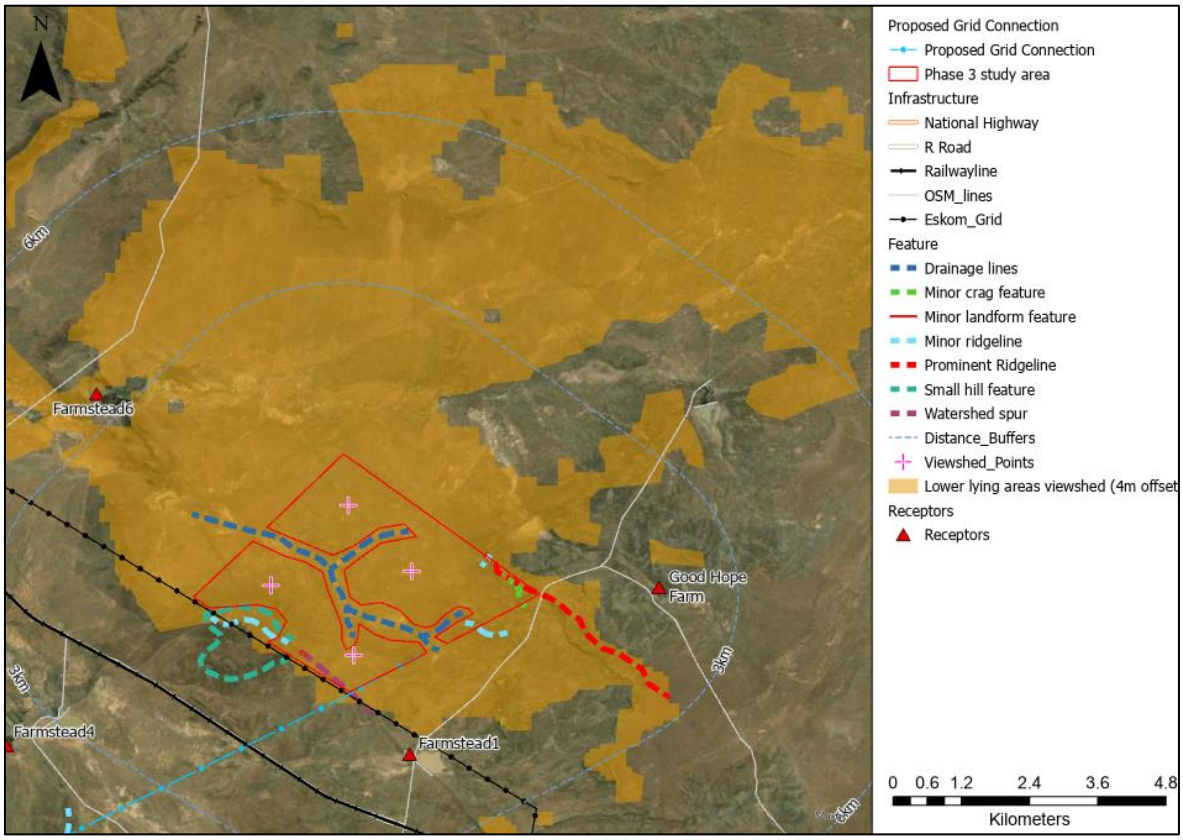


Figure 13. Lower lying areas viewshed with offset 4m above ground.

While the viewshed does extend over a wide area, the bulk of the development can be effectively screened from High Exposure Receptors as depicted in the viewshed analysis generated in Figure 13 above, where the four lower lying points depict the visually contained extent of these portions of the property. Given the rural nature of the locality that does have

Medium to High Scenic Quality, care needs to be taken when locating tall structures on locally prominent features within the proposed development footprint.

With the location of the PV panels in lower lying areas, and with a visual set back from the concerned receptor borders, the viewshed is reduced to some degree, especially at the local level where the viewshed is more fragmented, and less likely to have incidence with the concerned receptor's dwellings. This visual fragmentation is depicted in Figure 14 below, with the mitigation viewshed overlaid onto the non-mitigated viewshed.

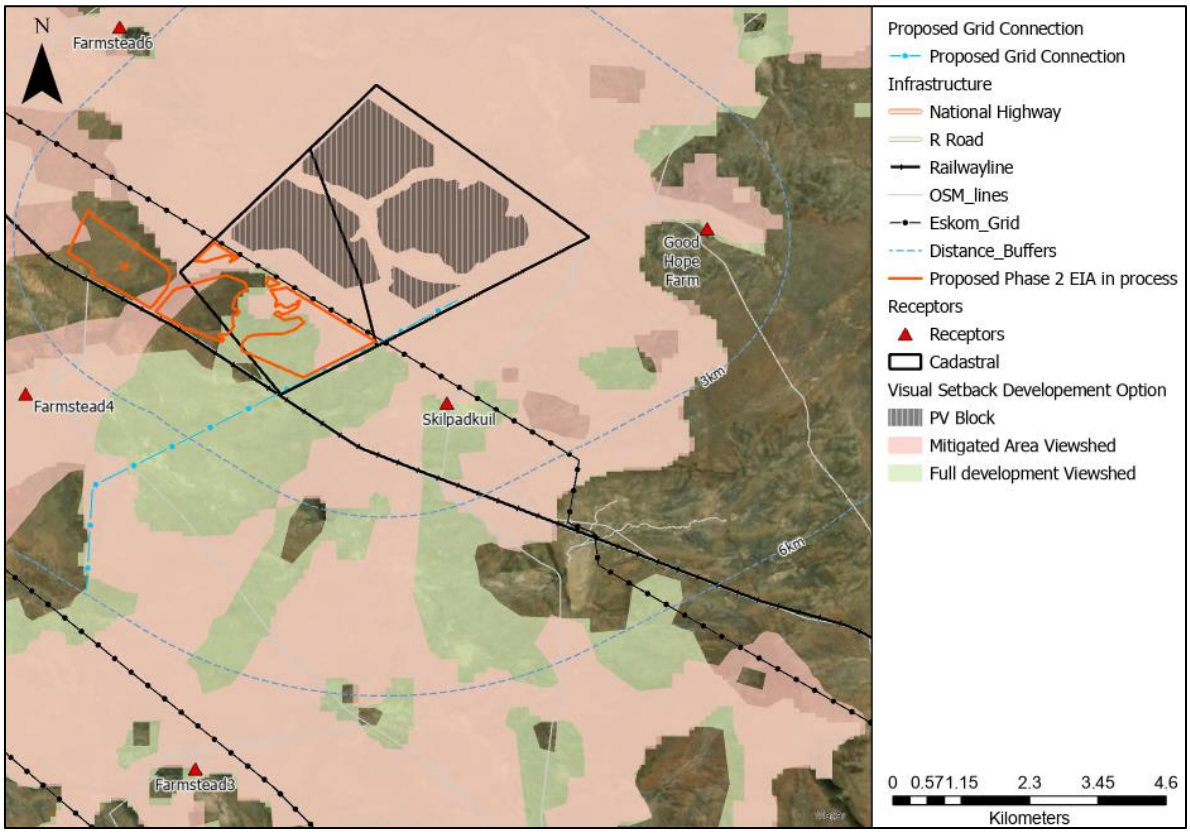


Figure 14. Un-mitigated compared to mitigation viewshed area maps.

6.3 Receptors and Key Observation Points

As defined in the methodology, KOPs are defined by the Bureau of Land Management as the people (receptors) located in strategic locations surrounding the property that make consistent use of the views associated with the site where the landscape modifications are proposed. Table 14 identifies the receptors identified within the ZVI, as well as motivating their significance and whether they should be defined as KOPs for further evaluation in the impact assessment phase. The receptors located within the ZVI and KOPs view lines are indicated in Figure 15 below.

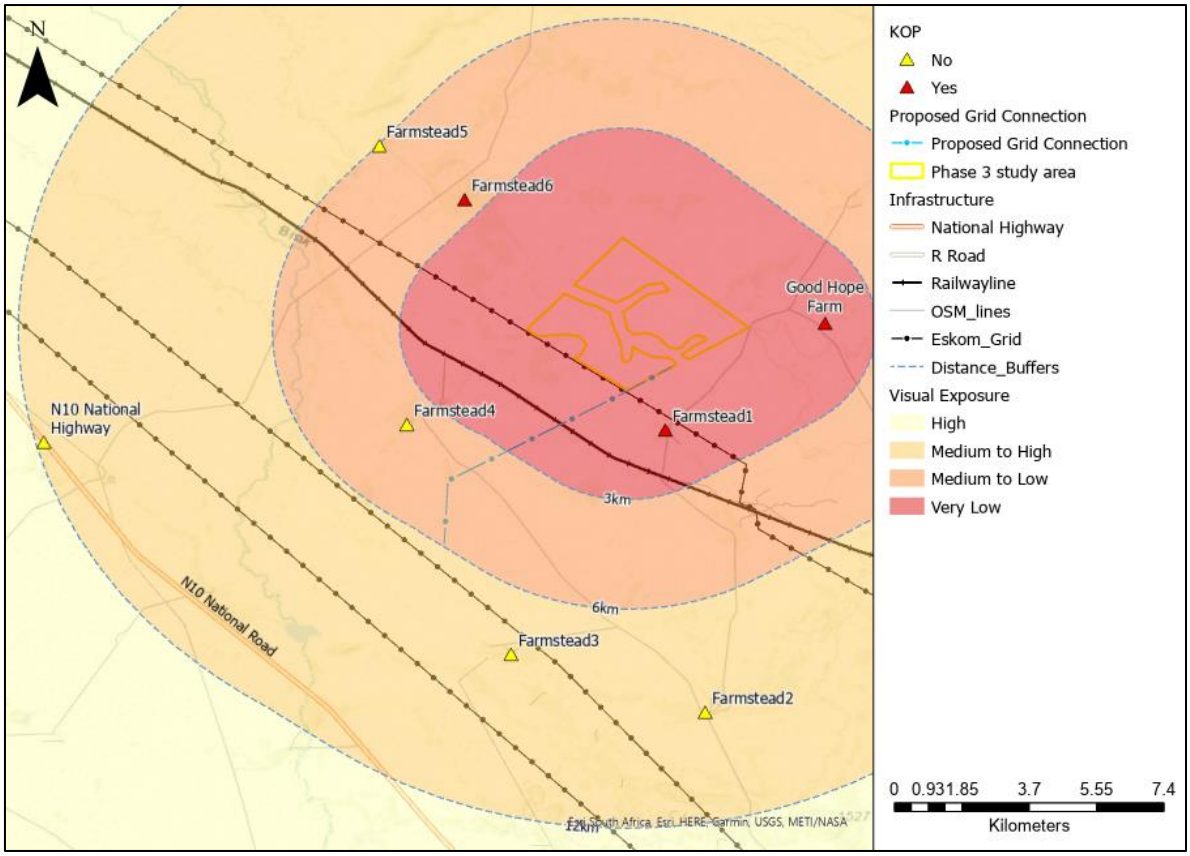


Figure 15: Receptor and Key Observation Point exposure map.

Table 14. Receptor and KOP Motivation Table.

Name	Exposure	KOP	Category	Motivation
Farmstead 4	High	No	Farmstead	Property owner and proponent
Farmstead 3	Medium to Low	No	Farmstead	Low Exposure and limited potential for visual intrusion.
Farmstead 2	Medium to Low	No	Farmstead	Low Exposure and limited potential for visual intrusion.
N10 National Highway	Low	No	Road	Low Exposure and limited potential for visual intrusion.
Good Hope Farm	Very High	Yes	Farmstead	High Exposure to PV landscape change is rural agricultural setting with medium to high scenic quality.
Farmstead 1	Very High	Yes	Farmstead	High Exposure to PV landscape change is rural agricultural setting with medium scenic quality.
Farmstead 6	Medium to High	Yes	Farmstead	Medium to High Exposure with possible clear views towards PV project higher scenic quality.
Farmstead 5	Medium	No	Farmstead	Medium Exposure with local tree screening.

The following receptors have been identified as Key Observation Points and should be used as locations to assess the suitability of the landscape change: Good Hope Farm; Farmstead 1; and Farmstead 6. These location points would need to be used in the Contrast Rating

and should be interviewed by the Social Impact Assessment specialist for comment on the proposed landscape change that will be clearly visible and is likely to change the existing rural agricultural sense of place.

7 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.

7.1 Physiographic Rating Units

The Physiographic Rating Units are the areas within the study 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 areas were tabled and mapped in Figure 16 below.

Table 15: Physiographic Landscape Rating Units.

ID	Name	Motivation
1	Drainage	A small drainage line was mapped along the grid connect line. These areas should be excluded from the development area.
2	Grasslands	Three areas were identified as lower prominence grasslands
3	Grasslands	
4	Grasslands	
5	Grasslands	
6	Grasslands	
7	Massing buffer	The scenic quality of the locality is Medium to High, with undulating grasslands, ridgelines and low hills to the northwest. A large-scale project creating long lines of PV that wrap over prominent landform would degrade local landscape resources in this rural landscape. To reduce this effect, it is recommended that the PV is developed in lower lying lands that reflect pockets of development aligning with the hydrology drainage of the site. Also of relevance is the close proximity of the Phase 2 PV. A buffer along the low ridgeline is provided to ensure a visual gap between the two projects.
8	Massing buffer	
9	Massing buffer	
10	SSV Ridgeline Buffer	The DFFE SSV mapping buffer informs a more topographically aligned setback from the eastern ridgeline.

11	SSV Ridgeline Buffer	The grid connect corridor includes a low ridgeline. Routing of the power line should not result in the location of monopoles on top of the ridgeline.
12	Visual buffer 200m	The area is rural agricultural with low intensity sheep farming / game farming taking place. The scenic quality of the locality is Medium to High, with undulating grasslands, ridgelines and low hills to the northwest. Other than the existing lattice power line to the south, there are no other large scale man-made modifications. The eastern farm owners have indicated sensitivity to landscape change. The 200m corridor visually buffers these farms, allowing for less dominating landscape change created by the semi-industrial nature of the PV project (subject to permission from the adjacent land owner).
13	Visual buffer 200m	
14	Visual buffer 200m	

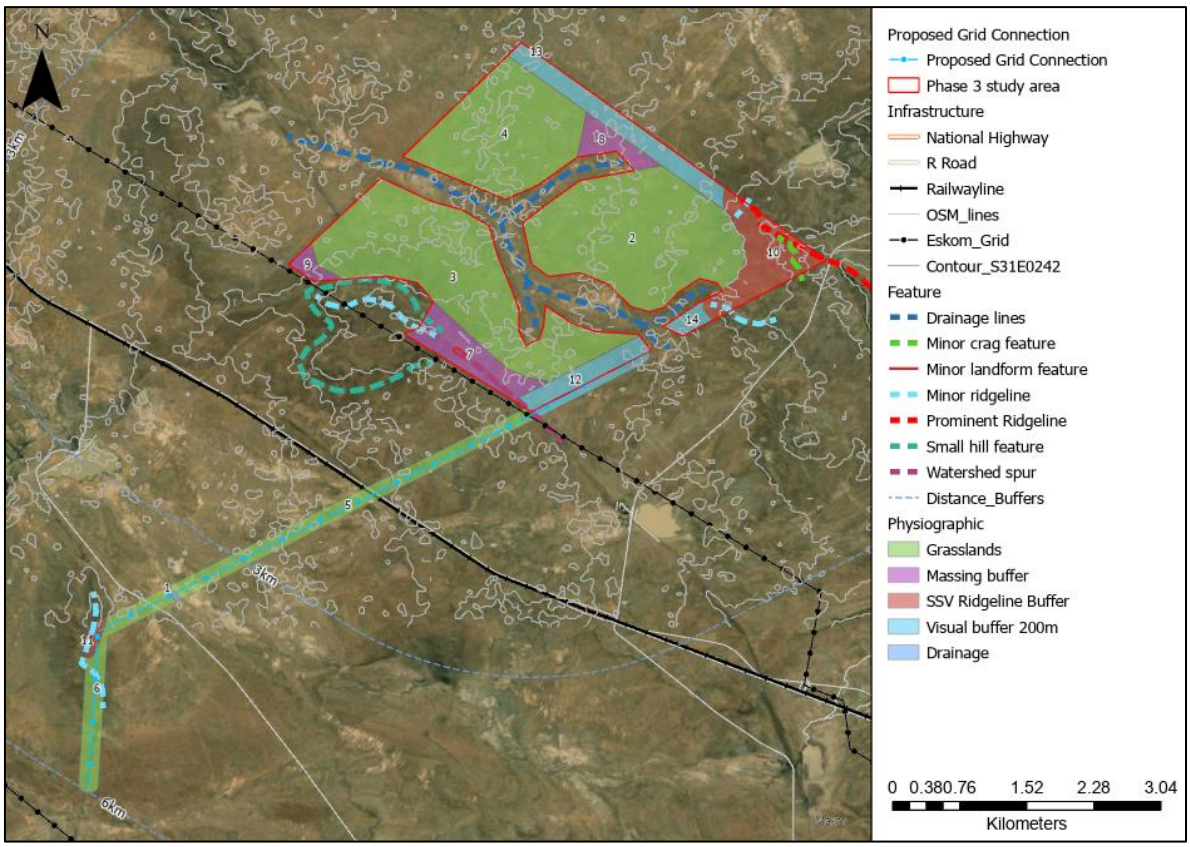


Figure 16: Broad brush Physiographic Rating Units demarcated within the defined study area.

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**
High Significance areas: • Hydrological • Botanical • Heritage	**(Class I is not rated)**																**I**
Visual sensitivity and massing buffers, and SSV setbacks	3	2	0	3	3	4	2	**15**	**B**	H	L	L	H	M	**H**	**II**	**II**
Grasslands	1	2	0	3	3	4	2	**15**	**B**	H	L	L	M	L	**M**	**III**	**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.

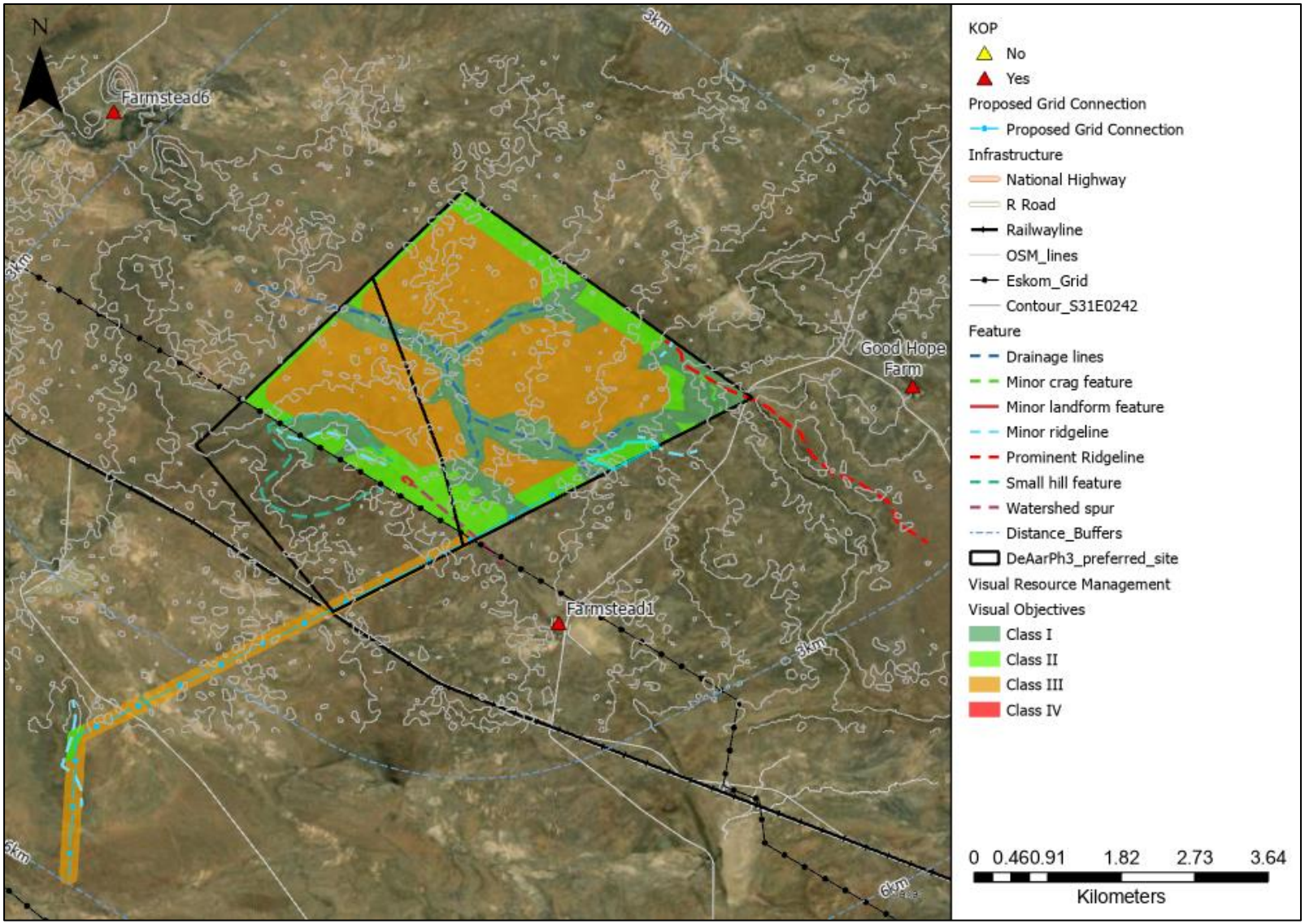


Figure 17: Detailed Visual Resource Management Classes map updated with ecological setback areas.

7.2 Scenic Quality Assessment

The scenic quality of the proposed development site is rated Medium to High. Landform is rated medium for the more prominent areas of the property as the landform shapes and sizes are moderate in scale and are interesting, though not dominant or exceptional. The lower lying areas of the grasslands is rated as low as they occupy the valley bottom that has limited landscape features. Vegetation for the entire area was rated medium to low as it is primarily covered by grasslands and, while offering some variety of vegetation, only one or two major types are visually dominant. As water features are absent or not noticeable in the landscape, scenic quality for water is rated nil. Colours in the landscape are mainly provided by the vegetation and, while there is some variety and colour contrast, this is not a dominant scenic element. Adjacent scenery is rated medium to high due to the undulating karoo landscape that includes low hills and wide valleys where a clear absence of manmade modifications enhances the visual quality of the locality. Landscape Scarcity is rated medium as the scenic quality of the landscape with its distinctive colour is similar to the surrounding landscape within the region. As there are no dominating manmade modifications in the landscape, the category for Cultural Modification is rated as a positive landscape element as the existing rural agricultural landuse favourably enhances visual harmony and adds to the Medium to High levels of Scenic Quality.

7.3 Receptor Sensitivity Assessment

Receptor sensitivity to landscape changes is rated Medium to High. As the area is rural and remote with the adjacent property owners who are farmers, maintenance of visual quality was rated High for the more prominent and bordering areas of the site. Both close proximity neighbours are concerned that the proposed semi-industrial PV landscape change, will result in a reduction in property price. As the area is remote, the amount of use is rated Low and with Medium regional visual resources, public interest in maintaining the site visual resources is also rated low. Maintenance of visual quality to sustain adjacent land uses is rated Medium to High as eastern property owners have indicated concern regarding the semi-industrial type of development in a deep rural setting. The maintenance of visual quality to sustain special area management objectives is rated Medium as the area is zoned for agricultural and is not located within a REDZ area.

7.4 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:

iv. **Classes I and II** are the most valued
v. **Class III** represent a moderate value
vi. **Class IV** is of least value

7.4.1 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.

***These areas are not suitable for development (*with the exception of roads, power lines, underground pipelines and underground cables)**

7.4.2 VRM Class II

The Class II objective is to retain the existing character of the landscape with a low level of change to the characteristic landscape. 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. VRM Class II areas include:

- **Visual sensitivity and massing buffers, and SSV setbacks.**

***This area is not suitable for development (*with the exception of roads, fences, underground pipelines and cables, the powerline and quarry).**

7.4.3 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:

- **Lower lying grasslands**

This area is suitable for development with height mitigation.

7.4.4 VRM Class IV

As the area is zoned agricultural and located adjacent to an area that ***does have some scenic value, no Class IV areas were defined***.

8 VISUAL IMPACT ASSESSMENT

Impacts are defined in terms of the standardised impact assessment criteria provided by the environmental practitioner. Using the defined 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.

Two development scenarios are proposed for inclusion in the Impact Assessment, *both options exclude the ecological No-go areas*:

- Full Development Option - 4m PV panels without Visual Setbacks.
- Visual Setback Development Option – 4m PV panels with Visual Setback.

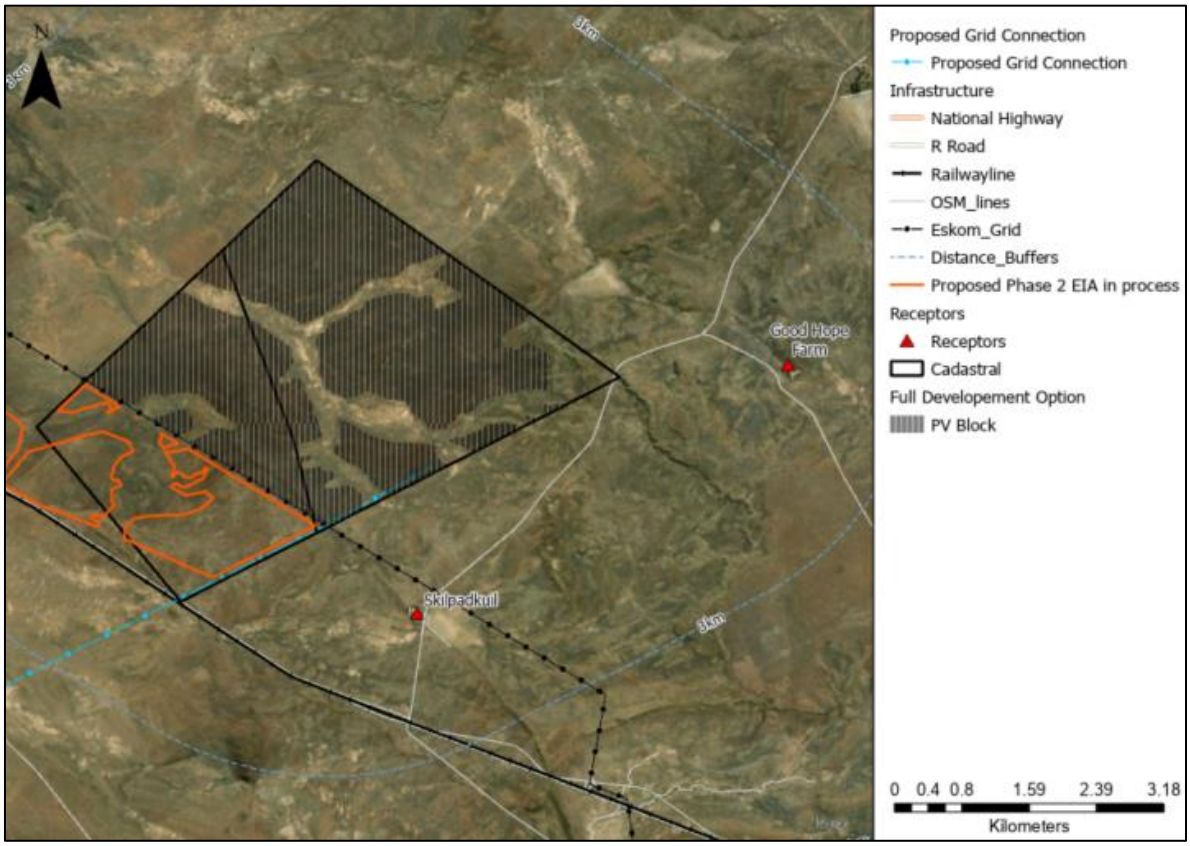


Figure 18: Full Development Option.

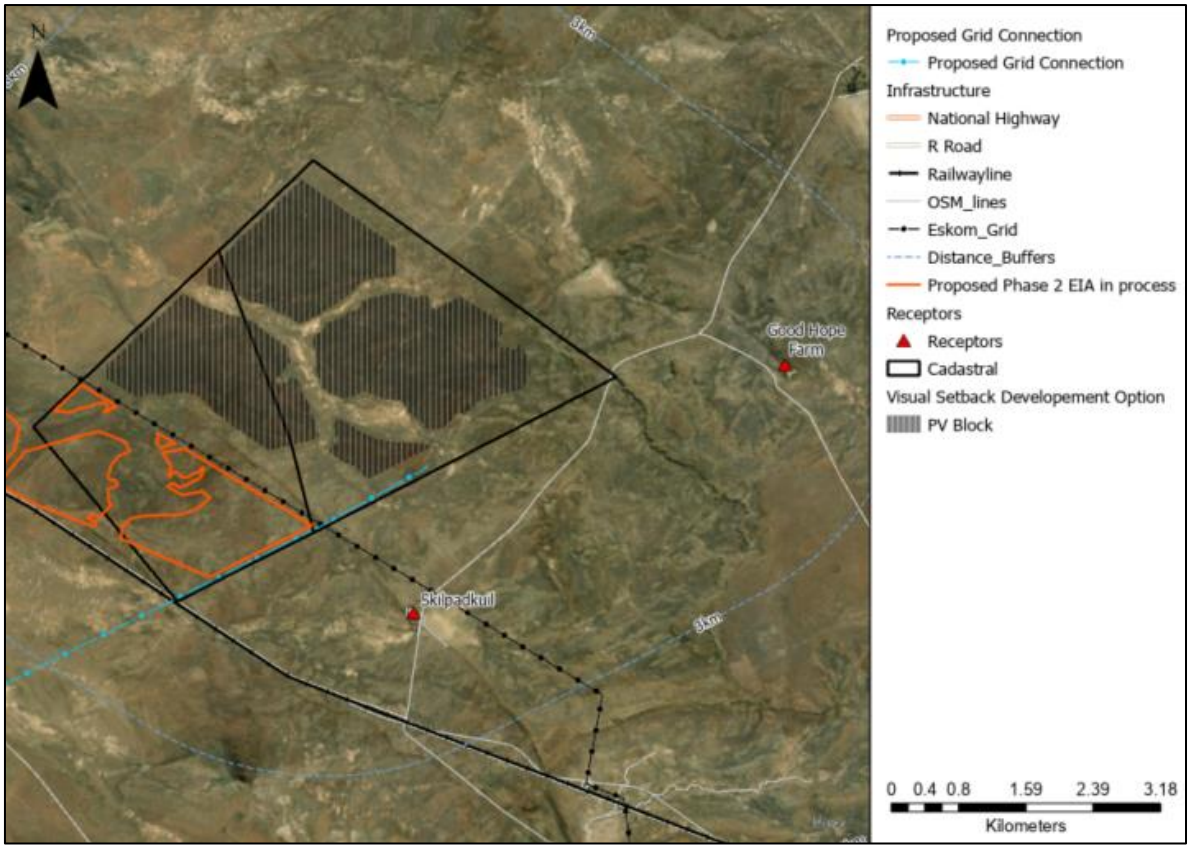


Figure 19: Visual Setback Development Option.

8.1 Contrast Rating from Key Observation Points

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.

The expected positioning of the PV area in the landscape was provisionally depicted on KOP photographs in the Annexure. The following table identifies the KOPs that are used to assess the suitability of the landscape change.

Table 17: Contrast Rating Key Observation Points Table

	Exposure			Landscape Elements					
Key Observation Point	**Distance**	**Exposure**	**Develop. Option**	**Form**	**Line**	**Colour**	**Texture**	**Degree of Contrast**	**Visual Objectives Met?**
Good Hope Farm	2.5km	High	Full Area	S	S	S	S	S	No
			Visual Setback	MS	S	MS	MS	MS	Yes
Skilpadskuil	1.6km	High	Full Area	S	S	S	S	S	No
			Visual Setback	MS	S	MS	MS	MS	Yes

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

The ratings are the same for both receptors, with both neighbours having raised concern regarding their property values. Neither of the receptors have clear views from their residential areas but would have clear views from their properties, therefore the contrast rating motivation will be addressed to the two receptors collectively.

Without visual mitigation and the development of all the areas, except those set aside for maintaining ecological integrity, the contrast generated from Form, Line, colour and Texture is rated Strong. As seen from the areas adjacent to the development at similar terrain elevation, the 4m PV panels located 30m from the boundary will create a wide rectangular form for almost 3km along the north-eastern border, the vertical units of the panels creating Strong vertical line contrast as well as Strong contrast from texture and colour. The sections of the property within close proximity to the development will become degraded with a long-term, semi-industrial sense of place well established. Views from southern elevated viewpoints on the neighbouring properties will depict a large massing effect, with a visual link to the proposed Soventix PV Phase 2 site to the southwest of the development, increasing the visual massing effect from the wrap-over PV panels.

With mitigation and the incorporation of a 250m buffer from the two southern neighbouring properties, the Form effect from the 4m PV panels will be reduced and take on less of a dominating 3D effect. While line contrast is still likely to be Strong and dominating, the Colour and Texture will also be slightly reduced. A key factor of the setback is that the massing effect of the PV development is broken up into four distinct blocks, with the interior lines following the organic pattern of the defined ecological corridors. The long 3km wall of PV effect created by the full development option, as seen from the north-eastern receptors, is also broken by a 700m ecological setback area and the eastern extent of the PV pushed back from the raised ridgeline located to the east of the property. A 400m buffer between Phase 3 and Phase 2 is created, with the low topographic ridgeline located between the two development areas used for topographic screening of Phase 2 development, thus further reducing the massing effect from intervisibility of the two PV projects.

While the change to the existing landscape will still be strongly experienced by the neighbouring receptors, both of the dwellings will not have views overlooking the PV development areas. As such, the Medium to Strong outcomes for the mitigation visual

setback option, would be acceptable as the main domains and the key views are focussed away from the development, with some moderation of the views from the remainder of the property areas.

8.2 PV Project Impact Ratings and Motivation

The following visual impacts could take place during the lifetime of the proposed PV Solar Facility 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 changing the local rural sense of place.
- On-going soil erosion.
- On-going windblown dust.

Decommissioning:

- Movement of large 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: Construction Phase Impacts Table

Project phase	**Construction Phase**	
Impact	**Short-term landscape change from the current rural agricultural sense of place to the semi-industrial RE landscape.**	
Description of impact	• 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 and large earth moving equipment. • Possible soil erosion from temporary roads. • Wind-blown litter from the laydown and construction sites.	
Mitigation Viability	Medium	The mitigation will partially reduce the significance of the visual and landscape impacts
Potential mitigation	• Wind blown dust mitigation. • Dust from moving vehicles. • Fencing around the PV parcels and not around the total project. • Structures need to be painted mid-grey colour. • 250m setback from the Good Hope Farm and Skilpadskuil Farm boundaries.	

Assessment	Without mitigation		With mitigation	
Nature	Negative		Negative	
Duration	Short term	Impact will last approximately 12 months.	Short term	Impact will last approximately 12 months.
Extent	Local	Contained within the Foreground/ Mid Ground (approx. 6km from site)	Local	Contained within the Foreground/ Mid Ground (approx. 6km from site)
Intensity	High	Natural and/ or social functions and/ or processes are clearly altered.	Medium to High	Natural and/ or social functions and/ or processes are partially altered.
Probability	Likely	The impact is likely to occur	Likely	The impact is likely to occur.
Confidence	Sure	Substantive supportive data exists to verify the assessment	Sure	Substantive supportive data exists to verify the assessment
Reversibility	Medium	The landscape change is reversible but only with time and rehabilitation.	Medium	The landscape change is reversible but only with time and rehabilitation.
Significance	**High (-ve)**		**Medium to High (-ve)**	
Comment on significance	Although for a shorter time period, the full extent development with close proximity to the receptors, will result in Strong levels of visual contrast, with landscape resource degraded resulting in High Visual Significance and is not recommended.		With mitigation and the reduction in the development area with visual setbacks, the construction phase impact will be Medium to High, with dust likely to be a residual nuisance factor to some degree.	
Cumulatives	**High (-ve)**		**Low (-ve)**	
Cumulative impacts	The development without mitigation will set a negative precedent for development of PV projects in remote, rural areas, creating clear intervisibility with the proposed Phase 2 PV development area. With mitigation and retaining the visual setback buffers, intervisibility is reduced with large block massing effects reduced.			

Table 19: Operation Phase Impacts Table

Project phase	Operation Phase			
Impact	**Short-term landscape change from the current rural agricultural sense of place to the semi-industrial RE landscape.**			
Description of impact	• Loss of site landscape character due to the operation of the PV structures and associated infrastructure.			
Mitigation Viability	Medium	The mitigation will partially reduce the significance of the visual and landscape impacts		
Potential mitigation	• Lights at night management and no overhead lighting. • Continued dust suppression as required.			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Long term	Impact will last approximately 20 years	Long term	Impact will last approximately 20 years

Extent	Local	Contained within the Foreground/ Mid Ground (approx. 6km from site)	Local	Contained within the Foreground/ Mid Ground (approx. 6km from site)
Intensity	Strong	Natural and/ or social functions and/ or processes are clearly altered.	Medium to Strong	Natural and/ or social functions and/ or processes are partially altered.
Probability	Likely	The impact is likely to occur	Likely	The impact is likely to occur.
Confidence	Sure	Substantive supportive data exists to verify the assessment	Sure	Substantive supportive data exists to verify the assessment
Reversibility	High	The affected landscape will be able to recover from the impact.	Medium	The affected landscape will be able to recover from the impact.
Significance	**High (-ve)**		**Medium to High (-ve)**	
Comment	Over a long-time period, the full extent development with close proximity to the receptors, will result in Strong levels of visual contrast, with landscape resource degraded resulting in High Visual Significance and is not recommended.		With mitigation and the reduction in the development area with visual setbacks, the Operational Phase impact will be moderated to some degree, with careful use of lights at night to ensure that the current dark-sky sense of place is retained.	
Cumulatives	**High (-ve)**		**Medium (-ve)**	
Comment	The development without mitigation will set a negative precedent for development of PV projects in remote, rural areas, creating clear intervisibility with the proposed Phase 2 PV development area. With mitigation and retaining the visual setback buffers, intervisibility is reduced with large block massing effects reduced. A large PV precedent will be set in place that could attract other RE projects, but a suitable setback and massing-reduction precedent would be set.			

Table 20: Decommissioning Phase Impacts Table

Project phase	**Decommissioning Phase**	
Impact	**Short-term landscape change from the removal of the PV structures, followed by rehabilitation of the impacted areas back to agricultural lands.**	
Description of impact	• Movement of large vehicles required for the removal of the PV panels, power lines, mono-poles and substations. • Wind-blown dust from impacts to vegetation. • Wind-blown litter from the laydown and construction sites.	
Mitigation Viability	Medium	The mitigation will reduce the significance of the visual and landscape impacts
Potential mitigation	• Dust suppression measures. • Litter management measures. • Removal of all structures and processing in terms of according to NEMWA specifications. • Rehabilitation of impacted areas to veld grasses.	
Assessment	**Without mitigation**	**With mitigation**
Nature	Negative	Negative

Duration	Short term	Impact will last approximately 8 months.	Short term	Impact will last approximately 8 months.
Extent	Local	Contained within the Foreground/ Mid Ground (approx. 6km from site)	Local	Contained within the Foreground/ Mid Ground (approx. 6km from site)
Intensity	Medium	Natural and/ or social functions and/ or processes are moderately altered.	Medium	Natural and/ or social functions and/ or processes are moderately altered.
Probability	Likely	The impact is likely to occur	Likely	The impact is likely to occur.
Confidence	Sure	Substantive supportive data exists to verify the assessment	Sure	Substantive supportive data exists to verify the assessment
Reversibility	Medium	The affected landscape will be able to recover from the impact.	Medium	The affected landscape will be able to recover from the impact.
Significance	**Medium (-ve)**		**Low (-ve)**	
Comment on significance	The dust and vehicle movement impacts are short-term in Duration, and outside the main views of the receptor residences.		Visual Intrusion from wind blown dust and from vehicle movement is limited and short-term in Duration.	
Cumulatives	**Medium (-ve)**		**Low (-ve)**	
Cumulative impacts	Without rehabilitation, the return of the vegetation to the site and the associated visual impacts would last a longer time period.		Effective management of rehabilitation can result in the return of the landscape to that of a functional agricultural area.	

8.3 Substation and Power Line Impact Ratings and Motivation

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

- An onsite substation.
- A 132kV overhead powerline (7.8km).

Construction:

- The use of large vehicles and a crane to raise the power line monopoles. Small maintenance access routes would be created along the proposed power line route which could result in soil erosion if not adequately managed.
- Due to the small footprint of the substation, monopole site and access small track, windblown dust is likely to be limited. However, wind blown dust as a nuisance value could occur.

Operation:

- Occasional maintenance vehicles travelling down the access track to check on possible soil erosion and the power lines.
- Movement of vehicles to the substation along the access route.

Decommissioning:

- Not applicable

Cumulative:

- Cumulative impacts are caused mainly by multiple power lines being routed adjacent to each other, or converging on a specific area, resulting in a massing effect and subsequent landscape degradation.

The impact considered below is therefore the visual obstruction of the landscape to sensitive receptors (-).

Table 21: Construction Phase Visual Impacts

Project phase	**Construction**			
Impact	**Loss of landscape character due to the construction of monopoles and cabling, and substation.**			
Description of impact	**Change in sense of place to rural landscape character from the placement of monopoles and associated cabling using large vehicles and cranes. Levelling of the substation platform by cut/ fill and then construction of the substation infrastructure.**			
Mitigability	Medium	Mitigation does not exist; or mitigation will slightly reduce the significance of impacts		
Potential mitigation	• **Management of dust from moving vehicles.** • **Utilisation of the existing roads for maintenance.** • **Effective rehabilitation of the cut/ fill areas after construction.**			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Short term	Impact will last between 1 and 5 years	Short term	Impact will last between 1 and 5 years
Extent	Local	Extending across the site and to nearby settlements	Local	Extending across the site and to nearby settlements
Intensity	Moderate	Natural and/ or social functions and/ or processes are moderately altered	Moderate	Natural and/ or social functions and/ or processes are moderately altered
Probability	Almost certain / Highly probable	It is most likely that the impact will occur	Almost certain / Highly probable	It is most likely that the impact will occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	High	The affected environmental will be able to recover from the impact	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	**Minor – negative**		**Minor - negative**	
Comment on significance	Due to the Low Magnitude, Local Extent, and shorter time periods, the Visual Significance is rated Minor - negative.			

Cumulative impacts	The area reflects higher VAC levels as a result of the existing Eskom power lines in the vicinity. With mitigation the visual intrusion is likely to be reduced and the landscape change is unlikely to result in undue intervisibility impacts to the receptors.

Table 22: Operation Phase Visual Impacts

Project phase	**Operation**			
Impact	**Loss of landscape character due to the operation of the transmission line and substation.**			
Description of impact	**Change in sense of place to rural landscape character from the long-term monopoles and associated cabling in the landscape, as well as the substation infrastructure.**			
Mitigability	Low	Mitigation does not exist; or mitigation will slightly reduce the significance of impacts		
Potential mitigation	**Soil erosion needs to be adequately monitored on a Bi-Annual basis.**			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Permanent	Impact may be permanent, or in excess of 20 years	Permanent	Impact may be permanent, or in excess of 20 years
Extent	Local	Extending across the site and to nearby settlements	Local	Extending across the site and to nearby settlements
Intensity	Moderate	Natural and/ or social functions and/ or processes are moderately altered	Minor	Natural and/ or social functions and/ or processes are minimally altered.
Probability	Almost certain / Highly probable	It is most likely that the impact will occur	Probable	It is most likely that the impact will occur
Confidence	High	Substantive supportive data exists to verify the assessment.	Medium	Substantive supportive data exists to verify the assessment.
Reversibility	High	The affected environmental will be able to recover from the impact	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	**Moderate - negative**		**Minor - negative**	
Comment on significance	The existing Eskom power lines already defines the landscape along of the routing. Local impacts could occur with low probability from soil erosion. Limited receptors are included in the project ZVI.			
Cumulative impacts	The existing landscape is already defined by power line corridors. This will be moderately enhanced with the addition of the new power line. Intervisibility is likely but will be locally contained by the undulating topography.			

9 PRELIMINARY ENVIRONMENTAL MANAGEMENT PLAN

9.1 PV Project

9.1.1 Design Phase

- Retain a 250m buffer from Good Hope Farm and Skilpadskuil Farm boundaries for PV panels and structural development (excluding roads, power lines and cabling).
- To allow ecological and associated landscape integrity, the PV Panel blocks should each be fenced separately, with the existing farm fences retained along the outside farm boundaries.

9.1.2 Construction Phase

- The laydown and building structures should be located away from neighbouring property farmsteads and banked into the ground to the eastern areas as much as possible.
- 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.
- The buildings should be painted a grey-brown colour.
- Fencing around the construction camp 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 main access roads 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). No overhead lighting to be used for security purposes.
- Limit the height of the PV panels to maximum of 4m above ground level.
- All internal power line cables need to be buried so as to reduce visual intrusion to the local landscape.

9.1.3 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.

9.1.4 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 rehabilitated according to a rehabilitation specialist.

- Monitoring for soil erosion should be undertaken on a routine biannual basis for one year following the completion of the Decommissioning Phase.

9.2 Substation and Power Line

9.2.1 Construction Phase

- Windblown dust during construction should be monitored by the ECO. 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.
- Soil erosion measures along the construction roads need to be adequately implemented and routinely monitored by the ECO (monthly).
- Littering should be a finable offence.
- Any impacted areas used in the laydown for the construction, not incorporated into the development footprint, would need to be rehabilitated and restored to natural vegetation.
- Topsoil from the footprints of the structures should be dealt with in accordance with EMP.
- The substation 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 main access roads 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). No overhead lighting to be used for security purposes.

9.2.2 Operation Phase

- Soil erosion along the maintenance road needs to be adequately monitored on a Bi-Annual basis.
- Continuation of monitoring to ensure that the rehabilitated areas are restored.

9.2.3 Closure Phase

- Structures should be taken down and removed (including foundations).
- The rubble should be managed according to the National Environmental Management: Waste Act (Act 59 of 2008) (NEMWA) and deposited at a registered landfill if it cannot be recycled or reused.
- All compacted areas should be ripped and then rehabilitated according to a rehabilitation specialist specification.
- Shaping of all impacted areas to ensure natural hydrological drainage occurs and the terrain appears natural.
- Monitoring for soil erosion should be undertaken on a bi-annual basis for a year following the completion of closure phase.

10 OPPORTUNITIES AND CONSTRAINTS

10.1 PV Project

10.1.1 Opportunities

- The ZVI is contained to the local area with Foreground/ Mid Ground distancing due to slightly undulating terrain that results in a moderate zone of visual influence.
- No tourist activities or tourist view-corridors were located within the project ZVI.
- National energy objectives for renewable energy and job creation will be met.
- Minimal receptors x 2.

10.1.2 Constraints

- High Exposure views from adjacent farms with potential for change to the local landscape character without mitigation.
- The area is not within the REDZ area.
- Receptors have concerns regarding their property values.

10.2 PV Project No-Go Option

10.2.1 Opportunities

- The current rural agricultural land uses of the property do add to the rural agricultural landscape character.
- Agricultural productivity from sheep farming creates some employment opportunities.

10.2.2 Constraints

- National energy objectives for renewable energy and job creation will not be met.

10.3 Substation and Powerline

10.3.1 Opportunities

- National energy objectives for renewable energy and job creation will be met.

10.3.2 Constraints

- Some grassland vegetation would be lost to the substation development footprint.

10.4 Substation and Powerline No-Go Option

10.4.1 Opportunities

- National energy objectives for renewable energy and job creation will not be met.

10.4.2 Constraints

- NA

11 CONCLUSION

It is the recommendation that the proposed development should commence WITH MITIGATION for the following key reasons:
The finding of this assessment:

- Moderate Zone of Visual Influence with no tourism activities or tourist view-corridors.
- The area is remote, and few receptors were identified. However, as the area is remote, two adjacent farms have indicated sensitive to landscape change.
- Wide buffer areas and fragmented design elements have been utilised to reduce the massing effects of a single large area PV blocks. Four smaller areas with wide corridors between the PV areas reduce visual intensity to some degree.
- Intervisibility between the Phase 1(Authorised unbuilt) and Phase 2 (in assessment process) is limited by making use of topographic elements to reduce visual prominence. The low ridgeline between the proposed Phase 2 and Phase 3 would assist in reducing intervisibility between the two PV projects.
- Medium to High Post Mitigation Impacts are likely where residual effects could degrade *local* landscape resources.

The visual recommendations from the scoping phase reporting were all incorporated into the layout design, accommodating a wide buffer on the adjacent properties, as well as accommodating wide ecological corridors between the four PV blocks. While the local sense of place will be modified, the impacted visual resources are localised to some degree and landscape resource is not highly significant such that a No-go Option would be preferred. Good Hope Farmstead *could* experience partial views of the panels at 4.5km (the dwelling is at the fringe of the viewshed analysis), with direct views from Skilpadskuil Farmstead screened by local vegetation. As such, the Preferred PV development option is recommended with mitigation.

It is important to note that should the project be authorised, the Relevant Authority would need to recognise that the existing Medium to High levels of Scenic Quality of the locality would be degraded in the Foreground distance area around the PV site, with potential for further degradation should PV development become more established in the area.

12 BIBLIOGRAPHY

De Aar Solar . (n.d.). *www.deaarsolar.co.za*.

Department of Environment Affairs. (2013). *DEA National Wind and Solar PV Strategic Environmenal Assessment.*

Emthanjeni Municipality. (2007). *Emthanjeni Municipality IDP 2007 .*

Emthanjeni Municipality. (n.d.). *Emthanjeni Municipality Spatial Development Framework (SDF) 2007.*

Hawaii Renewable Energy. (n.d.). *www.hawaiirenewableenergy.org/Villamesias2*.

Hull, R. B., & Bishop, I. E. (1988). *Scenic Impacts of Electricity Power Mine: The Influence of Landscape Type and Observer Distance. Journal of Environmental Management.(27) Pg 99-108.*

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

IFC. (2012). *International Finance Corporation (IFC) prescribes eight performance standards (PS) on environmental and social sustainability. Millennium Ecosystem Assessment. 2005.*

Millennium Ecosystem Assessment. (2005). *Ecosystems and Human Well-Being: Synthesis.* Washington D.C: Island Press.

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

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

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

Pixley ka Seme District Municipality. (2022). *Pixley ka Seme District Municipality IDP 2022.*

SANBI. (n.d.). *http://pza.sanbi.org/vegetation/nama-karoo-biome*.

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

South African National Biodiversity Institute. (2018). *Vegetation Map of South Africa, Lesotho and Swaziland.*

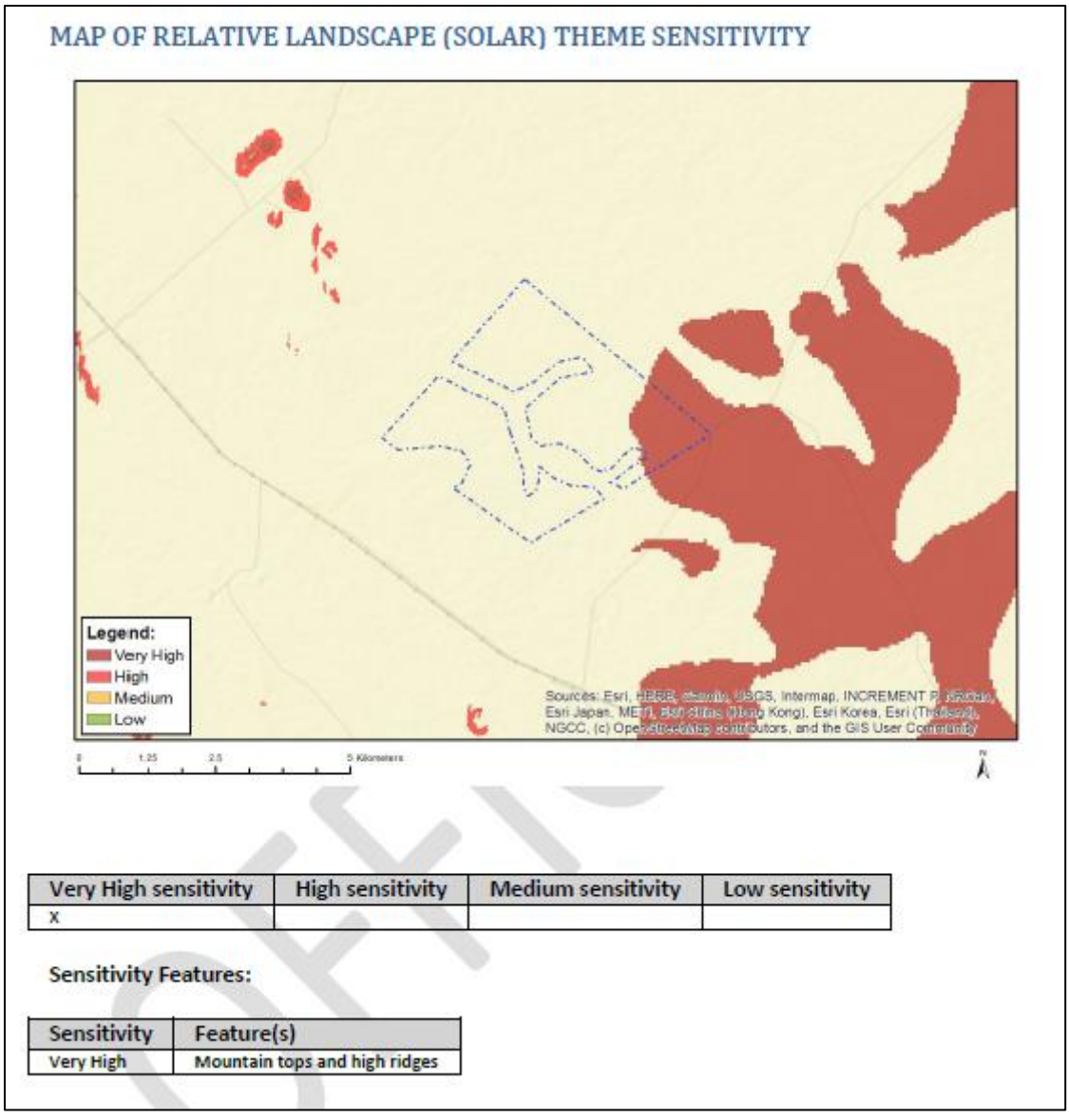
The Landscape Institute. (2003). *Guidelines for Landscape and Visual Impact Assessment* (Second ed.). Spon Press.

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

13 ANNEXURE A: SSV AND 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.

In terms of Part A of the Assessment Protocols published in GN 320, site sensitivity verification is required relevant to the DFFE Screening Tool. As indicated in Figure 20 below, the Map of Relative Landscape (Solar) Theme Sensitivity is rated Very High Sensitivity as mapped below.



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
Very High	Mountain tops and high ridges

Figure 20. DFFE Site Sensitivity Verification mapping.

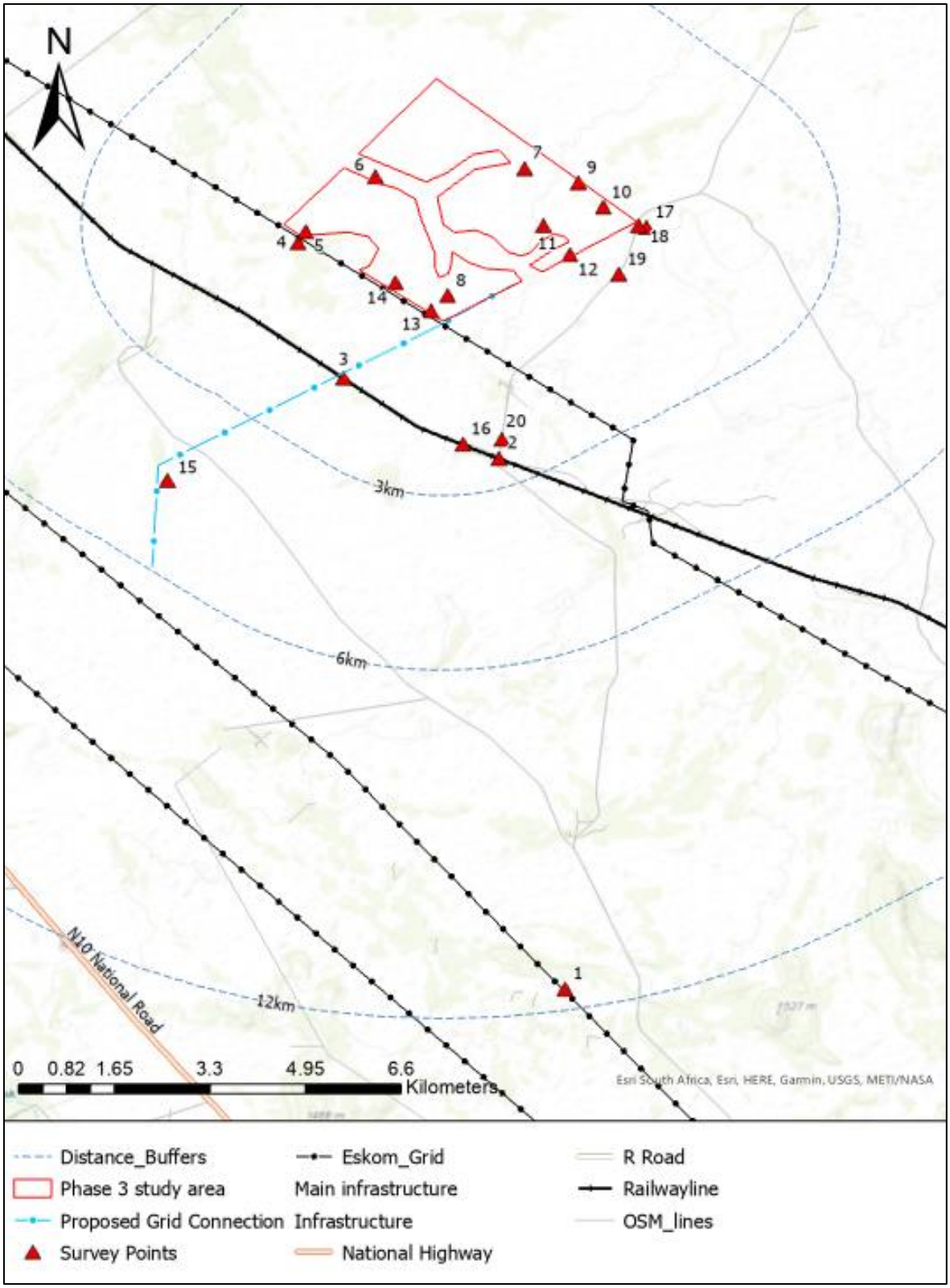


Figure 21: Site Survey Point Map

Field Survey Photographs.

ID	1
LATITUDE	24,41324833
LONGITUDE	-30,99215
REMARKS	Eskom 400kv powerline x 2. Limited landscape intrusion due to suitable routing off prominent positions and lattice type structures with wide spacing between the lines.
DIRECTION	NE
THEME	Context

ID	2
LATITUDE	24,367255
LONGITUDE	-30,872845
REMARKS	Railway line located east of the site outside of the main project area but influencing the local landscape character to the areas adjacent to the infrastructure.
DIRECTION	NW
THEME	Context

ID	3
LATITUDE	24,34314833
LONGITUDE	-30,86035167
REMARKS	Proposed powerline crossing over from road.
DIRECTION	NW
THEME	Site

ID	4
LATITUDE	24,336125
LONGITUDE	-30,83937167
REMARKS	Eskom 132kv powerlines routing with lattice structures located south of the site with some influence on landscape character around locality.
DIRECTION	E
THEME	Context

ID	5
LATITUDE	24,33731
LONGITUDE	-30,837645
REMARKS	Photo depicting wide depression of western site landscape with veld grasses in foreground and small hills in background. Higher levels of scenic quality to east of site.
DIRECTION	N
THEME	Site

ID	6
LATITUDE	24,34810167
LONGITUDE	-30,82911667
REMARKS	Drainage line excluded from development
DIRECTION	N
THEME	Site

ID	7
LATITUDE	24,37123474
LONGITUDE	-30,82787495
REMARKS	Western portions of the site with wide plain and low ridgeline to the west reducing visual extent. Scenic but not significant.
DIRECTION	N
THEME	Site

ID	8
LATITUDE	24,35929287
LONGITUDE	-30,8475668
REMARKS	Southern portion of the property with wide grassland plain in the foreground and low ridgeline to south restricting views further south. Scenic but not significant.
DIRECTION	S
THEME	Site

ID	9
LATITUDE	24,37956635
LONGITUDE	-30,83004487
REMARKS	Photo depicting the elevated areas to the north of the site with steeper terrain and less suitable for PV development. Development of this ridgeline would also extend the ZVI north to adjacent receptors, creating landscape incongruity.
DIRECTION	N
THEME	Site

ID	10
LATITUDE	24,38342333
LONGITUDE	-30,83383667
REMARKS	Photo of the ridgeline to north of site not suitable for development
DIRECTION	E
THEME	Site

ID	11
LATITUDE	24,37414125
LONGITUDE	-30,83672245
REMARKS	North eastern portion of site well topographically contained at the local context. Suitable for PV development excluding steeper terrain. Interesting but not significant.
DIRECTION	S
THEME	Site

ID	12
LATITUDE	24,37824436
LONGITUDE	-30,84122563
REMARKS	Rocky outcrop not suitable for development.
DIRECTION	SE
THEME	Site

ID	13
LATITUDE	24,35671795
LONGITUDE	-30,84994985
REMARKS	Shallow ridgeline that would contain the ZVI to local levels upon exclusion from development zone. Also located off local highpoints and contains development in the wide basin (red dashed line), would be effective in reducing inter-visibility between the Phase 2 and Phase 3 projects.
DIRECTION	W
THEME	Site

ID	14
LATITUDE	24,3511859
LONGITUDE	-30,84557143
REMARKS	Local prominence not suitable for wrap over development that forms part of the low ridgeline to the west of the property.
DIRECTION	NE
THEME	Site

ID	15
LATITUDE	24,31585819
LONGITUDE	-30,876234
REMARKS	Photo view south towards low ridgeline along which the proposed Transmission lines would be routed. Suitable routing but care needed on crossing and visual landscape prominence.
DIRECTION	S
THEME	Site

ID	16
LATITUDE	24,36168667
LONGITUDE	-30,87063167
REMARKS	Farm road receptor via northwest with skyline views located on the southwestern study area boundary. Mitigation setback required as per viewshed from receptor.
DIRECTION	NW
THEME	Receptor

ID	17
LATITUDE	24,39011849
LONGITUDE	-30,83696772
REMARKS	Ridgeline landform adding value to the local landscape context.
DIRECTION	E
THEME	Context

ID	18
LATITUDE	24,38888167
LONGITUDE	-30,83675333
REMARKS	Prominent development high exposure to farm road receptors. Not suitable for development. Also potential for skyline intrusion.
DIRECTION	N
THEME	Receptor

ID	19
LATITUDE	24,38583232
LONGITUDE	-30,84424269
REMARKS	View east from the farm access road with the proposed PV area located in the mid-ground in the lower lying portions of the vista. Wrap over western ridgeline likely to result in higher levels of visual intrusion.
DIRECTION	SW
THEME	Receptor

ID	20
LATITUDE	24,36769389
LONGITUDE	-30,86988235
REMARKS	Farmstead access road receptor
DIRECTION	N
THEME	Receptor access with the project located in the mid-ground on the skyline.

14 ANNEXURE B: METHODOLOGY DETAIL

14.1 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.

14.1.1 Scenic Quality

The scenic quality is determined making use of the VRM Scenic Quality Checklist that 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.

14.1.2 Receptor Sensitivity

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.

14.1.3 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, R.B. and Bishop, I.E., 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.

14.1.4 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.

14.2 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.

14.2.1 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.

14.2.2 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).

15 ANNEXURE C: SPECIALIST INFORMATION

15.1 Professional Registration Certificate

APHP

Association of Professional Heritage Practitioners

MEMBERSHIP CERTIFICATE

THIS CERTIFIES THAT

Stephen Stead

MEMBERSHIP NUMBER: 0063

has been awarded membership as a

PROFESSIONAL HERITAGE PRACTITIONER (PHP)

This membership is subject to the *Standards for Membership* and *Code of Conduct*, referred to in Sections 2 and 3 of the APHP Constitution respectively. The definition of a PHP may be found at: www.aphp.org.za/membership

Please contact us via info@aphp.org.za should further information be required.

THIS CERTIFICATE IS VALID FROM 1 JUNE 2022 – 1 JULY 2023

CHAIRPERSON

[Issued by the Association of Professional Heritage Practitioners Executive Committee]
Image Source: Photographer G McLachlan at central Kouga Mountains

Association of Professional Heritage Practitioners
info@aphp.org.za
www.aphp.org.za

15.2 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 eighteen 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, NamSolar 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 23: VRM Africa Projects Assessments Table

YEAR	NAME	DESCRIPTION	LOCATION
2022	Sea Vista St Francis Bay	Resort	Eastern Cape (SA)
2022	Houthaalboomen PV	Solar Energy	North West (SA)
2022	Pofadder Wind x 3	Wind Energy	Northern Cape (SA)
2022	Lunsklip Wind Amend	Wind Energy	Western Cape (SA)
2022	Lunsklip Wind Grid Connect	Power line	Western Cape (SA)
2022	Elandsfontein PV	Solar Energy	North West (SA)
2022	Erf 1713 1717 UISP	Settlement	Western Cape (SA)
2022	Roan PV x 2	Solar Energy	North West (SA)
2021	Avondale Gordonia 132kV Power Line	Infrastructure	Northern Cape (SA)
2021	Maitland Mines Wedding Venue	Resort	Eastern 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	Wolvedans Megadump Facility	Mining	Mpumalanga (SA)
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	Northern Cape (SA)
2015	Dyasonsklip and Sirius Grid TX	Solar Energy	Northern Cape (SA)
2015	Dyasonsklip PV	Solar Energy	Northern Cape (SA)
2015	Zeerust PV and transmission line	Solar Energy	North West (SA)
2015	Bloemsmond SEF	Solar Energy	Northern Cape (SA)
2015	Juwi Copperton PV	Solar Energy	Northern Cape (SA)
2015	Humansrus Capital 14 PV	Solar Energy	Northern Cape (SA)
2015	Humansrus Capital 13 PV	Solar Energy	Northern 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	Northern Cape (SA)
2014	AEP Mogobe SEF	Solar Energy	Northern 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 Residental	Residential	Western Cape (SA)
2010	Onifin(Pty) Ltd Hartenbos Quarry Extension	Mining	Western Cape (SA)
2010	Still Bay East	GIS Mapping	Western Cape (SA)
2010	Vale Moatize Coal Mine and Railway	Mining / Rail	Mozambique
2010	Vodacom Mast	Structure	Western Cape (SA)
2010	Wadrif Dam	Dam	Western Cape (SA)
2009	Asazani Zinyoka UISP Housing	Residential Infill	Western Cape (SA)
2009	Eden Telecommunication Tower	Structure	Western Cape (SA)
2009	George SDF Landscape Characterisation	GIS Mapping	Western Cape (SA)
2009	George SDF Visual Resource Management	GIS Mapping	Western Cape (SA)
2009	George Western Bypass	Road	Western Cape (SA)
2009	Knysna Affordable Housing Heidevallei	Residential Infill	Western Cape (SA)
2009	Knysna Affordable Housing Hornlee Project	Residential Infill	Western Cape (SA)
2009	Rossing Uranium Mine Phase 2	Mining	Namibia
2009	Sun Ray Wind Farm	Wind Energy	Western Cape (SA)
2008	Bantamsklip Transmission Lines Scoping	Transmission	Western Cape (SA)
2008	Erf 251 Damage Assessment	Residential	Western Cape (SA)
2008	Erongo Uranium Rush SEA	GIS Mapping	Namibia
2008	Evander South Gold Mine Preliminary VIA	Mining	Mpumalanga (SA)
2008	George SDF Open Spaces System	GIS Mapping	Western Cape (SA)
2008	Hartenbos River Park	Residential	Western Cape (SA)
2008	Kaaimans Project	Residential	Western Cape (SA)
2008	Lagoon Garden Estate	Residential	Western Cape (SA)
2008	Moquini Beach Hotel	Resort	Western Cape (SA)
2008	NamPower Coal fired Power Station	Power Station	Namibia
2008	Oasis Development	Residential	Western Cape (SA)
2008	RUL Sulpher Handling Facility Walvis Bay	Mining	Namibia
2008	Stonehouse Development	Residential	Western Cape (SA)
2008	Walvis Bay Power Station	Structure	Namibia
2007	Calitzdorp Retirement Village	Residential	Western Cape (SA)

2007	Calitzdorp Visualisation	Visualisation	Western Cape (SA)
2007	Camdeboo Estate	Residential	Western Cape (SA)
2007	Destiny Africa	Residential	Western Cape (SA)
2007	Droogfontein Farm 245	Residential	Western Cape (SA)
2007	Floating Liquified Natural Gas Facility	Structure tanker	Western Cape (SA)
2007	George SDF Municipality Densification	GIS Mapping	Western Cape (SA)
2007	Kloofsig Development	Residential	Western Cape (SA)
2007	OCGT Power Plant Extension	Structure Power Plant	Western Cape (SA)
2007	Oudtshoorn Municipality SDF	GIS Mapping	Western Cape (SA)
2007	Oudtshoorn Shopping Complex	Structure	Western Cape (SA)
2007	Pezula Infill (Noetzie)	Residential	Western Cape (SA)
2007	Pierpoint Nature Reserve	Residential	Western Cape (SA)
2007	Pinnacle Point Golf Estate	Golf/Residential	Western Cape (SA)
2007	Rheebok Development Erf 252 Apeal	Residential	Western Cape (SA)
2007	Rossing Uranium Mine Phase 1	Mining	Namibia
2007	Ryst Kuil/Riet Kuil Uranium Mine	Mining	Western Cape (SA)
2007	Sedgefield Water Works	Structure	Western Cape (SA)
2007	Sulpher Handling Station Walvis Bay Port	Industrial	Namibia
2007	Trekkopje Uranium Mine	Mining	Namibia
2007	Weldon Kaya	Residential	Western Cape (SA)
2006	Farm Dwarsweg 260	Residential	Western Cape (SA)
2006	Fynboskruin Extention	Residential	Western Cape (SA)
2006	Hanglip Golf and Residential Estate	Residential	Western Cape (SA)
2006	Hansmoeskraal	Slopes Analysis	Western Cape (SA)
2006	Hartenbos Landgoed Phase 2	Residential	Western Cape (SA)
2006	Hersham Security Village	Residential	Western Cape (SA)
2006	Ladywood Farm 437	Residential	Western Cape (SA)
2006	Le Grand Golf and Residential Estate	Residential	Western Cape (SA)
2006	Paradise Coast	Residential	Western Cape (SA)
2006	Paradyskloof Residential Estate	Residential	Western Cape (SA)
2006	Riverhill Residential Estate	Residential	Western Cape (SA)
2006	Wolwe Eiland Access Route	Road	Western Cape (SA)
2005	Harmony Gold Mine	Mining	Mpumalanga (SA)
2005	Knysna River Reserve	Residential	Western Cape (SA)
2005	Lagoon Bay Lifestyle Estate	Residential	Western Cape (SA)
2005	Outeniquabosch Safari Park	Residential	Western Cape (SA)
2005	Proposed Hotel Farm Gansevallei	Resort	Western Cape (SA)
2005	Uitzicht Development	Residential	Western Cape (SA)
2005	West Dunes	Residential	Western Cape (SA)
2005	Wilderness Erf 2278	Residential	Western Cape (SA)
2005	Wolwe Eiland Eco & Nature Estate	Residential	Western Cape (SA)

2005	Zebra Clay Mine	Mining	Western Cape (SA)
2004	Gansevallei Hotel	Residential	Western Cape (SA)
2004	Lakes Eco and Golf Estate	Residential	Western Cape (SA)
2004	Trekkopje Desalination Plant	Structure Plant	Namibia (SA)
1995	Greater Durban Informal Housing Analysis	Photogrammetry	KwaZulu-Natal (SA)

16 ANNEXURE D: 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 project 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.

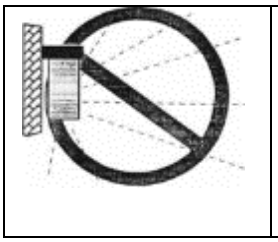
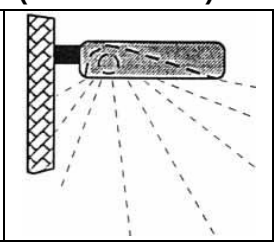
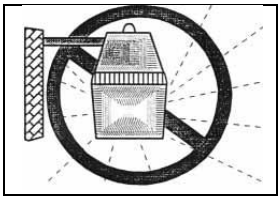
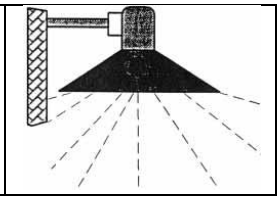
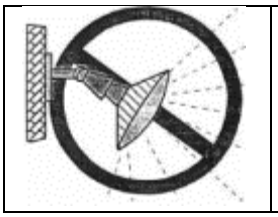
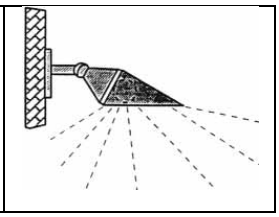
Glare Here’s the basic rule of thumb: If you can see the bright bulb from a distance, it’s a bad light. With a good light, you see lit ground instead of the dazzling bulb. “Glare” is light that beams directly from a bulb into your eye. It hampers the vision of pedestrians, cyclists, and drivers.

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

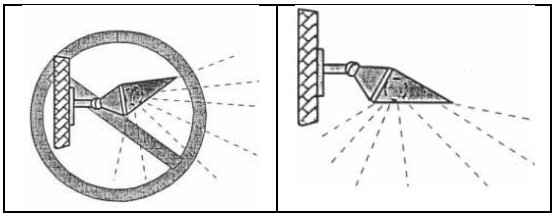
How do I switch to good lighting?

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!

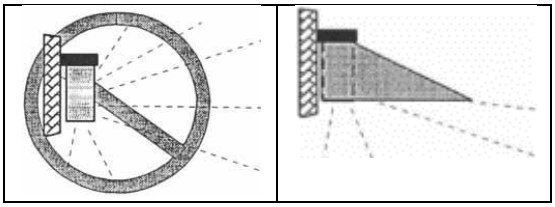
What You Can Do To Modify Existing Fixtures

Change this . . . to this (aim downward)



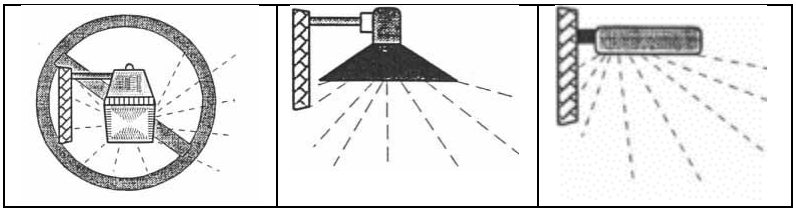
Floodlight:

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.

17 ANNEXURE E: BACKGROUND INFORMATION

Background

In 2016 ecoleges undertook a S&EIA for the development of a 225 MW Solar PV facility between Hanover and De Aar in the Northern Cape. Three alternative footprints (PV01, PV02, PV03) were investigated during the assessment process. The central footprint (PV02) was identified as the preferred option because of its lower environmental impact and proximity to an existing 400kV Eskom powerline when compared with PV01 and PV03. The National Department of Environmental Affairs granted an environmental authorisation (DEA Reference: 14/12/16/3/3/2/998) on 16th April 2018. The activity must commence on the PV02 footprint within a period of five years from the date of issue.

An amendment to increase the capacity (not the footprint) of the facility to 300 MW due to technological advancements in solar photovoltaic efficiency and electrical output was granted on 24th November 2020. A second amendment was granted in 2021 for the inclusion of containerised lithium-ion battery Storage and dual-fuel backup generators with associated fuel storage.

The competent authority was the National Department of Environmental Affairs because the application was part of the REIPPP or RMIPPP BID rounds, which formed part of a Strategic Infrastructure Project (SIP) as described in the National Development Plan, 2011. Soventix SA (Pty) Ltd was an unsuccessful bidder. However, the applicant has since partnered with another company, Solar Africa, with 1.5 GW in private renewable energy offtake agreements, making it economically feasible to develop two more 300 and 400 MW facilities (Phases 2 and 3, respectively).

Soventix will therefore apply for an environmental authorisation to develop an additional 300MW on the PV03 footprint (Phase 2) that was considered during the initial S&EIA. It is proposed to connect this second phase to the substation that forms part of the authorised facility on PV02.

Unlike footprints PV02 and PV03, Phase 3 was not assessed during the S&EIA for Phase 1. Phase 3 involves the development of a third 400 MW Solar Photovoltaic (PV) facility on the Remainder of Farm Goede Hoop 26C and Portion 3 of Farm Goede Hoop 26C.

The two additional Solar PV facilities (Phase 2 and 3) will feed into the authorised sub-station on the PV02 footprint (Phase 1). Consequently, the expansion of the substation footprint will require a third (Part 2) amendment to the existing environmental authorisation (DEA Reference: 14/12/16/3/3/2/998).

Project Description

The size of the proposed development footprint for a 400 MW solar PV facility is approximately 600 ha (1.5 ha per MW). Parts of the solar PV facility may be within 100 m and 500 m of a watercourse and wetland/pan, respectively (**S21(c) and (i)**).

PV System

The PV system is made up of the following components: solar panels or modules are connected to form arrays. The arrays are mounted onto a single-axis tracker and supported by steel or aluminium racks approximately 7.4 m apart. The panels would only incline to a position of 50 degrees when facing East and West. At full tilt the ground clearance will be 0.6 m with a maximum height of 4 m (3.4 m +0.6 m). Several arrays are then connected to an inverter. Approximately 2000 inverters will be cabled to 80 field transformers (twenty-five inverters are

connected to a field transformer). The field transformers then transfer and increase (step up) the voltage of the alternating-current circuit to Eskom's electrical grid. Some of the underground cables from the field transformers to the on-site substation may cross a watercourse (**S21(c) and (i)**).
The current land use is sheep farming, which will continue within the solar PV facility to ensure minimal reduction (if any) on the agricultural potential of the land as well as a management tool to control vegetation growth.

On-site Substation and Distribution Line

The solar PV facility will be connected to Eskom's electrical grid via an onsite substation and a 66 to 132 kV overhead distribution line. The distribution line is approximately 20 m high, and the servitude width is approximately 32 m. The planned 66 kV to 132 kV distribution line will intersect an existing Eskom distribution line; Bletterman/Taaibos 1, 132 kV Overhead Line. A 10 to 15 m lightning mast will be erected within proximity to the on-site substation.

Vegetation Clearance

Vegetation will be cleared from the physical footprint of the construction camp (no more than 4 ha including laydown area), inverters, field transformers, on-site substation, rack foundations, pylon footings (linear), underground cables and water pipes (linear), roads (linear), a fire-break road and fencing posts (linear), operational area (1 ha, but within the construction camp footprint), borrow pit (no more than 2 ha), water storage tanks and deionization plant(s).

Roads

Two-track roads

Two-track access roads will be placed between the parallel arrays during the construction phase, and a fire break, comprising a two-track dirt road with mowed vegetation will be created inside the perimeter fence.

Cleared/Graded Roads

Existing roads will be upgraded (graded 5 to 6 m wide, imported material, shaped for runoff, and compacted), including the servitude road under the Eskom 132 kV powerline and three road crossings (**S21(c) and (i)**) that will link the two areas separated by a watercourse. Precast box culverts or pipes will also be required for the three road crossings. New roads, 5 to 6 m wide, will be built (graded, imported material, shaped for runoff, and compacted) to access the construction camp, which includes the laydown area and remains the site for the operational area, as well as to access components of the PV system, specifically field transformers and the on-site substation.

Passing Lanes

Passing lanes up to 8 m wide (not wider) will be placed at strategic areas on new roads. Considering existing roads are less than 8 m wide, they may be widened by more than 6 m for passing lanes without triggering listed activity 56 of Listing Notice 1. Existing roads within 100 m of a watercourse or wetland may be widened by more than 4 m but trigger Listed Activity 18 in LN3 (part of the application).

Borrow Pit(s)

Any fill material required for road construction will be obtained from existing borrow pits (no mining permit is required as per the exemption afforded in section 106 of the MRPDA) and/or a new borrow pit (not more than 2 ha in surface area) will be mined.

Construction

Heavy delivery vehicles will use the same staging area as for Phase 1 and 2. Materials, machinery and equipment will then be transferred onto lighter vehicles so that they can pass underneath Transnet's railway line unhindered and transported to the laydown area in the construction camp.

No accommodation facilities will be provided at the construction camp. Staff will be required to leave the site at the end of the day.

It is anticipated that the construction equipment will include at least: Water tankers, Graders, Tipper trucks, Drilling rigs, Mobile pile ramming machines, Excavators, TLBs, Concrete mixers, Compaction equipment, Light delivery vehicles, and Heavy delivery vehicles (for the transformers).

Operational Area

The operational area comprises a controlled access (security gate), single-storey building, unpaved parking, and a sewerage treatment plant(s). The building shall be constructed from brick with metal sheet roofing and include space for an office, showers (incl. change rooms), medical room, control room, kitchen, storeroom, workshop, and containerised toilets.

Fencing

The facility will be fenced off with a galvanised diamond razor mesh security fence. The fence is embedded 300 mm into the ground and is 1.8 m high. Access will be controlled using a security gate. A 4 to 5 m-wide fire break road, comprising a two-track dirt road with mowed vegetation will be created inside the perimeter fence. Parts of the perimeter fence (and fire-break road) may cross a watercourse (**S21(c) and (i)**).

Lighting

The facility will not be lit up at night. The fence line will be secured using multiple FLIR PTZ cameras which have a 2 km range in absolute darkness (pers. comm. JP De Villiers, Managing Director Soventix). The obvious areas that would have lights is the control and security office, as well as the on-site substation, as it is a legal requirement.

Access

The main access is off the N10 between De Aar & Hanover, which enters the site from the west. The provincial unsurfaced road (Burgersville District Road) and the existing farm access road will also be utilised. Once on the farm, an Eskom servitude road will be used to access the Main gate to the operational area and on-site substation.

Water

Estimated Demand

Groundwater will be required during construction for dust control (suppression) along principal access roads, mixing concrete and potable usage. Groundwater will be required during operation for potable usage, washing the modules, and livestock watering for the sheep.

Estimated Storage Requirements

The high concentration of ions in the borehole water will be removed by means of a deionization plant. The demineralised water will be stored in aboveground JoJo type storage tanks. The deionization plants and storage tanks will be located outside the 1:100-yr flood line (**S21(c) and(i) for piping water from borehole**). Water shall not be piped to any other area. Instead, it will be pumped into water bowsers and driven to those areas where it will be utilised, including additional storage tanks at the operational area.

The additional storage tanks at the operational area, include those needed for:

(a) storing drinking/potable water for staff,

(b) storage of treated (deionized) wastewater (from on-site disposal facility) for reuse (irrigating the panels), and

(c) rainfall runoff from the roof.

Wastewater
Black water (flush toilet sewerage) and grey water (kitchen, change rooms, medical room, and workshop) shall be treated to general or special limits with a bio-box package plant (**S21(g)**). The treated effluent will need to be treated further if it is to be used for cleaning the modules (or panels) (**S21(e)**).

Electricity
Electricity during construction and operation will be obtained from Eskom via the existing supply to the site.

Waste Management
General waste will be disposed of at the De Aar licensed landfill site. Electrical waste will either be recycled or disposed of at a licensed hazardous waste landfill.

18 ANNEXURE F: I &AP COMMENTS

Richard Vimpany

Owner of Remainder of Farm No. 149 (Farm Goodhope) (neighbour)
Cell: 082 775 6699
Email:richard.vimpany@bravospace.co.za

1) Visual Effect – He is mainly concerned with the fact that the solar plant will impact his view. He explained that they have a ridge behind the big dam we saw when driving along the border fence-line, and that they have quite an extensive view over Willem's farm and that they will then possibly be looking right onto the panels.
2) Increased traffic & number of people – He is concerned that the major increase in people working on the construction of the plant will pose a risk to both their personal safety as well as to their livestock and game (theft & poaching).
3) The effect on the value of their farm – He is concerned that if their farm does have a view over the solar plant or is being affected by things like theft/poaching, that it could potentially affect the resale value of their farm.
4) He had a concern with the access road to the Phase 2 & 3 area, but I have told him that it will not be on the road/close to his access gate and that it will be located on the road running parallel to the railway (in-between Willem's farms), so that issue seems resolved.

He asked to see the following:
1) Proposed area demarcated for the Phase 2 and Phase 3 development (Map) to see the possible areas where it might affect their farm.
2) He hasn't received a BID yet, so I said I would email that to him as well.

Manual (Manny) Orfao

Owner of Portion 2 & 5 Taaibosch Fontein No. 41 (Farm: Skilpadskuil)
Cell: 082 784 1972
Email: kmss@worldonline.co.za

He had the following concerns:

1) Power line – He was concerned with the fact that on the notice board it indicates that the power line will be right on the border, i.e., if you look at the power line structure as an H that one pole will be planted on Willem's side of the fence and the other will be planted on his side of the fence instead of the whole power line structure being put up on Willem's side of the fence.
2) Safety – He is also concerned with the fact that the increase in people in the area (during construction) might lead to stock theft and break-ins.
3) Value of the farm – He is also concerned with the fact that the Solar plant might affect the resale value of his farm in future. This links to the fact that there might be a possible increase in crime due to the increased number of people, as well as the view that might be affected by the solar plant.
4) Visual impact – He is not too concerned with the visual impact on its own but is concerned that it could affect the resale value of his farm.
5) Extent of the solar plant- both phase 2 and phase 3 will be alongside 1/3 of his farm boundary.
6) Effect of a solar plant next-door on possible development on his farm –he wanted to know what possible effect the solar plant might have on him doing a similar type of development in future.

He did receive a BID and said that he would fill in the Registration & Comment Sheet.