THE PROPOSED SUN CENTRAL SOLAR PHOTOVOLTAIC FACILITY - ASSOCIATED INFRASTRUCTURE, NORTHERN CAPE PROVINCE, SOUTH AFRICA

Visual Impact Assessment

Final v_2

DATE: 7 February 2023

Document prepared for SolarAfrica Energy (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
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.'

1 DFFE SPECIALIST REPORTING REQUIREMENTS

1.1 Specialist declaration of independence

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 draft copy of 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

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

Table 2: Specialist report requirements table

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.

A specialist report prepared in terms of the Environmental Impact Regulations of 2014 (as amended in 2017) must contain:	Relevant section in report
	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
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	Baseline Assessment
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	Visual Resource Management Classes
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;	VRM Map
A description of any assumptions made and any uncertainties or gaps in knowledge;	Assumptions and Limitations
The duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment	31 December 2022
A description of the findings and potential implications of such findings on the impact of the proposed activity or activities	Visual Impact Assessment
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	Opportunities and Constraints
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	**It is the recommendation that the proposed development should commence WITH MITIGATION for the key reasons motivated in the Executive Summary.**

A specialist report prepared in terms of the Environmental Impact Regulations of 2014 (as amended in 2017) must contain:	Relevant section in report
A description of any consultation process that was undertaken during the course of carrying out the study	NA
A summary and copies if any comments that were received during any consultation process	NA
Any other information requested by the competent authority.	NA

1.3 DFFE Screening Tool Site Sensitivity Verification

In terms of Part A of the Assessment Protocols published in GN 320 on 20 March 2020, site sensitivity verification is required relevant to the DFFE Screening Tool. ***The DFFE Screening Tool did not list Landscape Issues***. However, *reference was made to the mapping to inform general landscape themes related to plant species, cultural heritage and agricultural sensitivity, as these layers inform the landscape character.*

2 EXECUTIVE SUMMARY

Visual Resource Management Africa CC (VRMA) was appointed by Ecoleges Environmental Consultants cc to undertake a ***Visual Impact Assessment*** for the associated infrastructure for the proposed Sun Central Cluster 1 Solar Photovoltaic (PV) Facilities on behalf of SolarAfrica Energy (Pty) Ltd. A ***site visit that was undertaken on the 31st of December 2022.*** During the survey, photographs and comments were recorded and can be viewed in Annexure A, with the associated map of the survey points.

CONCLUSION

It is the recommendation that the proposed development should commence WITH MITIGATION for the following key reasons:

- Moderate Zone of Visual Influence with no tourism activities or tourist view-corridors.
- Lower levels of Visual Intrusion for the roads, OHPL and Communication Tower.
- The area is remote, and few receptors were identified.

However, it should be noted that if light spillage mitigation is not implemented, light at night impacts from the Overhead Flood Lights has the potential to significantly degrade the existing rural dark sky sense of place within the Foreground/ Mid Ground areas detracting from the local receptor's scenic quality. This also has the potential for setting a negative precedent for substation development deep rural where local farmstead/ residents are sensitive to lights at night intrusion. To the extent feasible or possible, given the Eskom directives and specifications with regards to the MTS construction, **it is recommended that lights at night impacts are adequately mitigated without compromising the required safety standards.**

POLICY FIT **High**

In terms of the *local and regional planning*, the ***expected visual/ landscape policy fit of the landscape change is rated High.*** 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, but does fall within a Strategic Transmission Corridor, where infrastructure development associated with RE projects is encouraged. However, the project is located in close proximity to an Existing Eskom power line corridor that does include 400kV power lines, and the Substation has already been authorised (not built).

In terms of regional and local planning fit for landscape and visual related themes, the ***expected visual/ landscape policy fit of the landscape change is rated Medium to High +VE. The moderation of the landscape Policy Fit pertains to the Lights at Night impacts from the MTS Overhead Flood Lights, that have the potential to significantly degraded the local area nigh-time sense of place/ scenic resources.***

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 (LILO/Communication Tower/Access Roads)**
Regional (Overhead lighting)

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 making use of NASA SRTM 30m Digital Elevation Model data. 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).

LILO and Communication Tower:

Due to the monopoles 32m height in relation to the relatively flat gradient of the surrounding terrain within the 6km distance of the viewshed, theoretical visual incidence covers the full area for all the routing. However, due to the existing presence of pylons in the landscape that increases the Visual Absorption Capacity, as well as the limited visual footprint of these structures, the ZVI is likely to be contained to the Middle Ground and influence landscape resources within 6km from location. ***The Extent is defined as Local Area.***

MTS Overhead Lighting:

Due to the height of the overhead lights in relations to the relatively flat terrain of the surrounds, the views extents over a wide area to the west and east, with the northern low ridgeline reducing views to the north, and higher ground reducing views to the south. As the area does have a Dark Sky sense of place, the landscape change is likely to be clearly noticeable to the surrounding areas. ***The ZVI is likely to extend the full area of the viewshed and is thus defined as Regional as it will extend into the Background Distance areas.***

Access Roads:

Due to the low height of the road landscape change, with vehicles and dust from moving vehicles being a temporary visual element, the viewshed is contained. However, due to the flat terrain of the road upgrade locality, the movement of vehicles will be noticeable in all sectors or the viewshed. The Zone of Visual Influence is likely to be contained to

the Foreground area with the landscape change noticeable within 2km during construction and localised to the immediate surrounds for the lifetime of the operation. **The Visual Extent of the visual impact is thus defined as Local**. However, mitigation is required during construction to reduce the negative influence of dust from moving vehicles.

RECEPTORS AND KEY OBSERVATION POINTS

- **8 Receptors and 4 Key Observations Points (with no tourism activities or tourist 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 four Key Observation Points located within the project ZVI.

KOP Motivation Summary Table

Name	Theme	Exposure	Motivation
N10 National Highway.	All landscape changes	Medium	The N10 is a National Highway and is likely to be used by tourist who are likely to be sensitive to landscape change.
Farmstead 3	Overhead Lights/ OHPL/ communication Tower	Medium to High	Located in a remote and rural setting, it is likely that retaining the existing arid farming sense of place is important to the receptor.
Skilpadskuil. / Good Hope Farm	Overhead Lights	Medium	Located in a remote and rural setting, it is likely that retaining the existing arid farming sense of place is important to the receptor.
Blouboskuil Labour Cottages	Road upgrade	Very High	Very High Visual Exposure to nuisance dust effect generated from moving construction and operation vehicles.

SCENIC QUALITY **Medium to High**

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. 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 land use favourably enhances visual harmony and adds to the Medium to High levels of Scenic Quality

RECEPTOR SENSITIVITY TO LANDSCAPE CHANGE **Medium**

Receptor sensitivity to landscape changes is rated Medium. 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. 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 for the rural karoo area, but High for the River Washes, that would need to be regarded as Special Areas .

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)	• 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 (As per Surface Water Hydrologist Recommendations)	• **Hydrological washes (***The proposed road and OHPL do cross over areas that fall within Hydrological Washes. While this does not preclude development, management of these areas needs to be carefully considered to ensure that the road does not wash away and result in landscape degradation)*
Class III (suitable with mitigation)	• **Nama Karoo Rural** *(These areas are suitable for development with mitigation to ensure that the existing rural karoo sense of place is retained to some degree.)*
Class IV (applicable)	• **D2448 Road Reserve** *(This area is already legally defined as a road where road related*

landscape changes can take place within the proclaimed road reserve.

EXPECTED VISUAL IMPACT SIGNIFICANCE

COMMUNICATION TOWER

Medium (-ve)
(without mitigation)

Without mitigation the visual contrast generated has the potential to be Strong for Colour and Texture. Although seen from over a distance, the lights at night will create a new light source in the landscape, and if the mast is painted a blue colour, the proposed mast landscape change will be clearly visible. With the painting of the mast a mid-grey colour, the distance from the receptor would allow for atmospheric influence, and minimal visual contrast. With mitigation that Class III Visual Objective would be met.

Low
(-ve)
(with mitigation)

As the proposed tower landscape change is located within the context of the substation (authorised but unbuilt), once the substation is built the VAC levels will be higher. The distance from the receptors allows for atmospheric influence, where with mitigation, the landscape change would meet the Class III Visual Objectives.

OHPL

Moderate (-ve)
(without mitigation)

The OHPL are located in Medium to Low Visual Exposure to two receptors. As the routing length is short and is located in close proximity to two existing power lines, the VAC levels are higher, and it is unlikely that the OHPL landscape change would be noticed by causal observers located as the receptor locations. As such, not Visual Impact specific mitigation is proposed, but generic best practice is required to ensure that local landscape resources are not degraded by soil erosion along access tracks.

Minor (-ve)
(with mitigation)

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.

MTS OVERHEAD FLOODLIGHTS

High (-ve)
(without mitigation)

Due to the existing dark sky sense of place in this deep rural setting, the proposed Overhead Flood Lights will dominate the attention of the casual observer. As light spillage night has the potential to travel long distances, it is likely that light spillage and

	pool of light effects would occur that would not meet the Class III Visual Objects. Mitigation is recommended and should include light spillage reduction management where lighting is side shielded and downward facing, the overhead poles are reduced in height to approximately 8m, and that Mesopic lighting is used to reduce the influence of the lights at night. With mitigation, the Class III Visual Objects would be met. As this could a negative precedent for deep rural development, ***potential negative Cumulative Effects are flagged as Medium to High,*** and mitigation is recommended.
Medium (-ve) *(with mitigation)*	As the proposed tower landscape change is located within the context of the substation (authorised but unbuilt), once the substation is built the VAC levels will be higher. The distance from the receptors allows for atmospheric influence, where with mitigation, the landscape change would meet the Class III Visual Objectives during the day. However, night time light spillage will significantly influence the local dark sky sense of place.
ROAD UPGRADE **Medium (+ve)** *(without mitigation)*	As the upgrade of an existing road is proposed, a Class IV was defined for this landscape change. As seen from the Bouboskuil Labour cottages, the landscape change of the road is unlikely to be a significant issue as Form, Line, Texture and Colour will remain the same. The issue of dust generated from vehicle movements during construction and operation phases is highlighted, and without mitigation, the close proximity of the receptor to the road is likely to be a nuisance factor. With mitigation and the use of dust suppressant during construction phase, these effect can be reduced to acceptable levels such that currently take place from the gravel road.
Medium (+ve) *(with mitigation)*	As the existing road is gravel and would result in some dust from vehicle movement, the change in number of vehicles resulting in significant dust risk is low to the receptors located 150m (approx.) from the road. The wider and better maintained road would be a positive change to the community.

RECOMMENDED MITIGATIONS MEASURES

Landscape Element	Mitigation	Motivation
Communication Tower	Control of Lights	• Control of lights at night to allow only local disturbance to the current dark sky night landscape (refer to appendix for general guidelines).
OHPL	Monitor Soil erosion	• 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.
Substation Overhead Flood Lights	Review design for lower light spillage such that current dark night sky sense of place is retained as seen from surrounding farmstead receptors.	• Reduce height to 8m height. • Shielding of light to reduce light spillage and repositioned to allow for downward & inward facing. • Use of Mesopic lighting such that light requirements are provided without creating a pool of light effect (see Annexure).
Road Upgrade	Monitor Soil erosion	• Soil erosion along the maintenance road needs to be adequately monitored on a Bi-Annual basis. • Rehabilitation of impacted areas and routine monitoring during Operational Phase to ensure that the restorion objectives are achieved. •

3 INTRODUCTION

Visual Resource Management Africa CC (VRMA) was appointed by Ecoleges Environmental Consultants cc to complete the proposed Sun Central Solar Photovoltaic (PV) facility and Associated Infrastructure ***Visual Impact Assessment*** on behalf of Solar Africa Energy South Africa (Pty) Ltd. (Proponent). The site visit was undertaken on the 31st December 2022. 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 Sun Central Cluster PV1 and substation authorised but unbuilt, and Soventix PV 2 & 3 undergoing an EIA process. Visual and Landscape impacts for Phase 2 will not be addressed in this report, however due to the adjacent locality of the Phase 2 site, cumulative effects will need to be addressed.

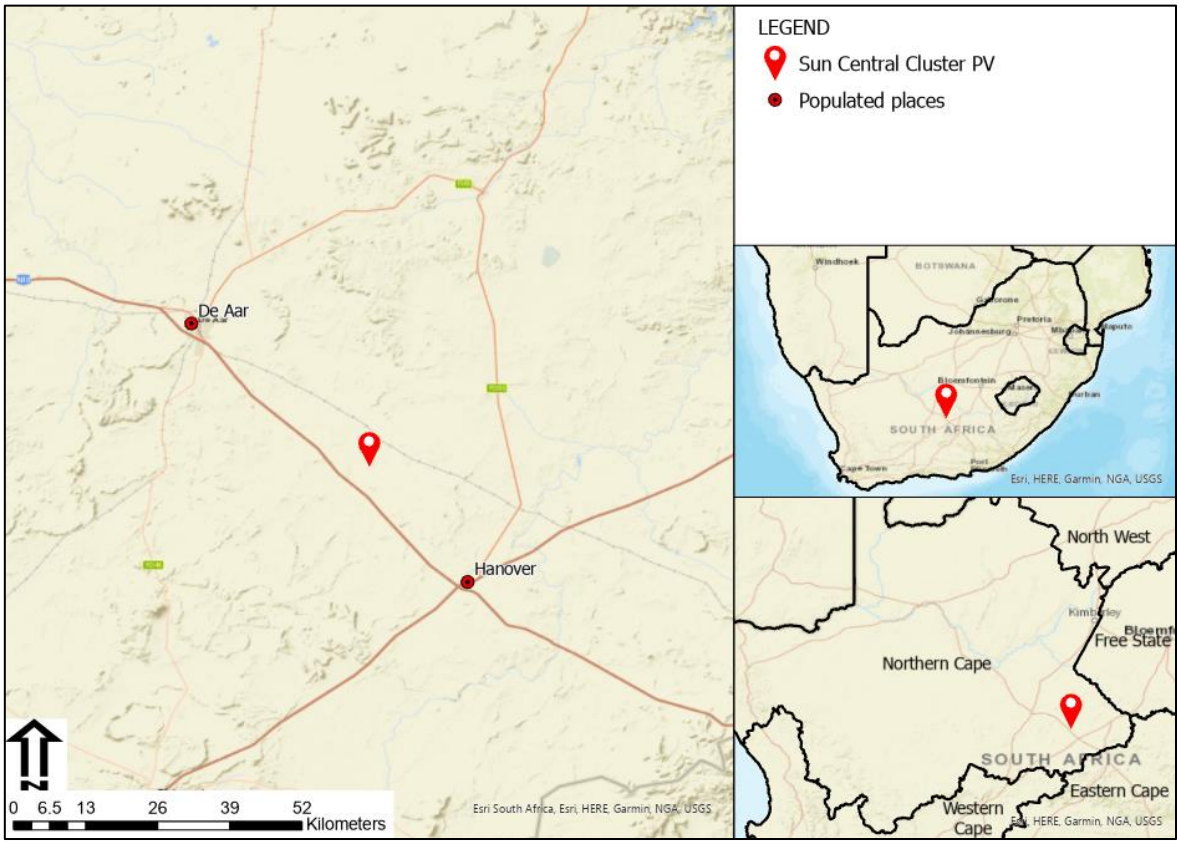


Figure 1: National and regional locality map.

3.1 Terms of Reference

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

- Collate and analyse all available secondary data relevant to the affected proposed project area. This includes a site visit of the full site extent, as well as of areas where potential impacts may occur beyond the site boundaries.
- Specific attention is to be given to the following:

- Quantifying and assessing existing scenic resources/visual characteristics on, and around, the proposed site.
- Evaluation and classification of the landscape in terms of sensitivity to a changing land use.
- Determining viewsheds, view corridors and important viewpoints in order to assess the visual impacts of the proposed project.
- Determining visual issues, including those identified in the public participation process.
- Reviewing the legal framework that may have implications for visual/scenic resources.
- Assessing the significance of potential visual impacts resulting from the proposed project for the construction, operation and decommissioning phases of the proposed project.
- Assessing the potential cumulative impacts associated with the visual impact.
- Generate photomontages of the proposed landscape modification.
- Identifying possible mitigation measures to reduce negative visual impacts for inclusion into the proposed project design, including input into the Environmental Management Programme report (EMPr).

3.2 Study Team

Contributors to this study are summarised in the table below.

Table 3: Authors and Contributors to this Report.

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

3.3 Visual Assessment Approach

The full methodology used in the assessment can be found in Annexure C, 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 4: 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, mitigation recommendations are to be 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.

3.4 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 5: Methodology Summary Table

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

Action	*Description*
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 report (EMPr) and the authorisation conditions.

3.5 Impact Assessment 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 6. 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.

3.6 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 Map, ArcGIS Online and Google Earth Satellite imagery.
- The project deliverables, including electronic copies of reports, maps, data, shape files and photographs are based on the author's professional knowledge, as well as available information.
- VRM Africa reserves the right to modify aspects of the project deliverables if and when new/additional information may become available from research or further work in the applicable field of practice or pertaining to this study.
- As access to farms and private property is often limited due to security reasons, limiting access to private property in order that photographs from specific locations are taken. 3D modelling is used to reflect the expected landscape change area where applicable.
- Mapping makes use of the SANI BGIS webmap (SANBI, 2018)

4 PROJECT DESCRIPTION

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

Table 7: Project Information Table

PROPONENT SPECIFICATIONS	
Applicant Details	**Description**
Applicant Name:	SolarAfrica Energy Pty (Ltd)
Project Name:	Upgrading & Development of an Access Road from the N10/'Burgerville' District Road (2448) Turn-Off into the Farm Riet Fountain No. 39C and to the Switching Station and Main Transmission

	Substation on Sun Central Cluster 1 (300 MW) Solar PV Facility between De Aar & Hanover, Emthanjeni Local Municipality, Pixley Ka Seme District Municipality, Northern Cape Province, South Africa

The project site (route) is located between De Aar & Hanover, Emthanjeni Local Municipality, Pixley Ka Seme District Municipality, Northern Cape Province on the following properties:

- SANRAL servitude (N10/'Burgerville' District Road (2448) turn-off)
- Portion 1 & Remainder of Farm Blaauwbosch Kuilen Outspan No. 37C
- Remainder of Farm Barends Kuilen No. 38C
- Portion 1 of Farm Riet Fountain No. 39C
- Portion 1 of Farm Kwanselaars Hoek No. 40C
- Portion 4 of Taaibosch Fontein No. 41C

The following associated infrastructure projects are assessed:

4.1.1 Main Transmission Substation (MTS) and overhead transmission lines:

- Eskom has agreed to the construction of a Main Transmission Substation (MTS) to deliver electricity to the Eskom system, specifically the existing 400 kV Hydra-Poseidon overhead transmission line (Line 2 initially and possibly even Line 1 in future) via a new Loop-In, Loop-Out 400 kV electricity transmission line. Eskom has dictated that the MTS be designed for up to 2 GW capacity, so that it has the capacity to receive electricity generated by the applicant's (Solar Africa Energy (Pty) Ltd) 300 MW Solar PV facility (Sun Central Cluster 1) and any future electricity generation facilities that would apply to feed into the grid at the same location.
- Equipment will be transported to site using the left, north-bound lane of the N10 from Hanover and then turn right on to the dedicated access road.

4.1.2 Access Roads:

- The access road can be divided into three sections: (See Annexure B for further details)

4.1.3 Communication Tower and Overhead Lighting for the already authorised substation:

- This would include a Switch room and Control Room
- The proposed project will include the following infrastructure:

Table 8: Project Description Table

TECHNOLOGY DETAILS	
Substation Overhead Lighting (Visual Statement)	Six (21 m) lightning mast will be erected within proximity to the on-site substation. See **Error! Reference source not found.**, **Error! Reference source not found.**, **Error! Reference source not found.**, **Error! Reference source not found.** and **Error! Reference source not found.** for further details.
Communication Tower. (Visual Statement)	Eskom Spec for Tower (35 m tall at both Dx and MTS): Tower Specification (IPP output) Design, procure and erect a microwave tower for a Substation based on Technology Standard 240- 59967638 - New towers:

	• General Tower Specification for new installations of Eskom Telecommunications Radio Towers. Tower antenna loading to accommodate 2 x 0.6m microwave dishes and 2 x 1.2m microwave dishes. • Design a tower structure to clear the future 400kV yard structures and achieve the 1+1 Space Diversity configuration with 8m antenna separation. • Working platforms will be required at each ODU level.
Access Roads	**(1)** Upgrade of the existing **public** 'Burgerville' District Road (2448), **(2)** Upgrade of the existing **private** farm tracks, and **(3)** A new road to the DX Switching Station and Main Transmission Substation. The portion of new road is required as Eskom needs unrestricted access to both substations, that is without traversing the fenced Sun Central Cluster 1 development footprint.
Yard Lighting	• The illumination levels for any substation shall be according to the OHS-act. • Minimum average illumination level of 10 lux within the high voltage yard and 20 lux at the transformer bays and reactor bays. • Uniformity ratio of 5 within the high voltage yard. • The illumination level shall be sufficient for personnel to observe obstructions & other hazards while moving within the high voltage yards, and to read high voltage apparatus identification labels, mounted at height not exceeding 2m above the ground level. • To ensure the safety of maintenance personnel, the Floodlighting installations shall be mounted on 21m high masts having a maintenance platform and caged ladder. • Light colour must be 'Neutral White' i.e. 4000 K. • Luminaire efficacy be eaqual to or greater than 120Im/W. • Bat wind shape illumination pattern. • Colour rendering index must be equal to or greater than 80.

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

Figure 2: Monopole photographic examples depicting *similar landscape change*.

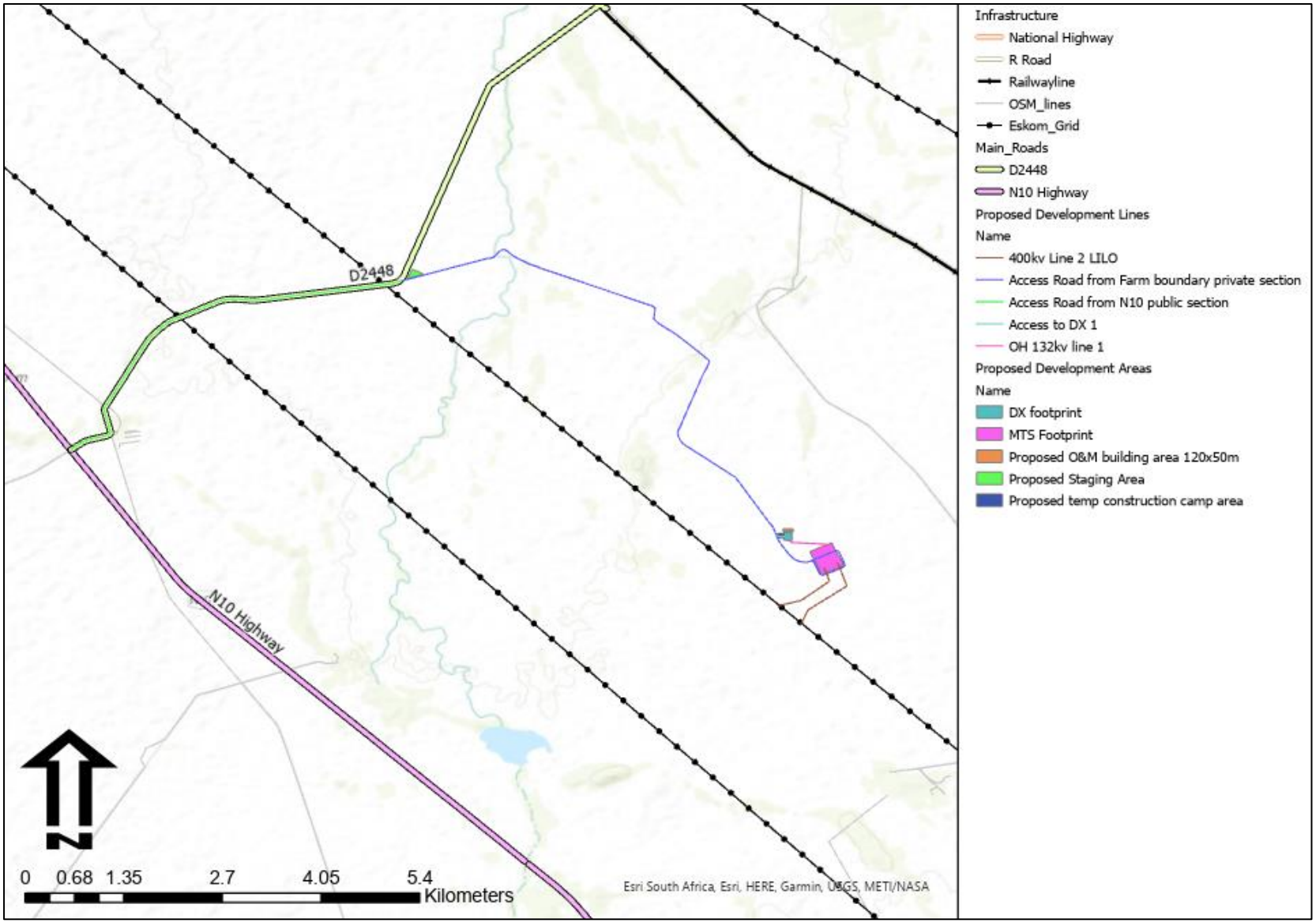


Figure 3: Proposed layout plan map.

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 4 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
REDZ	The study area is not located within a REDZ area but is located in a Strategic Transmission Corridor.

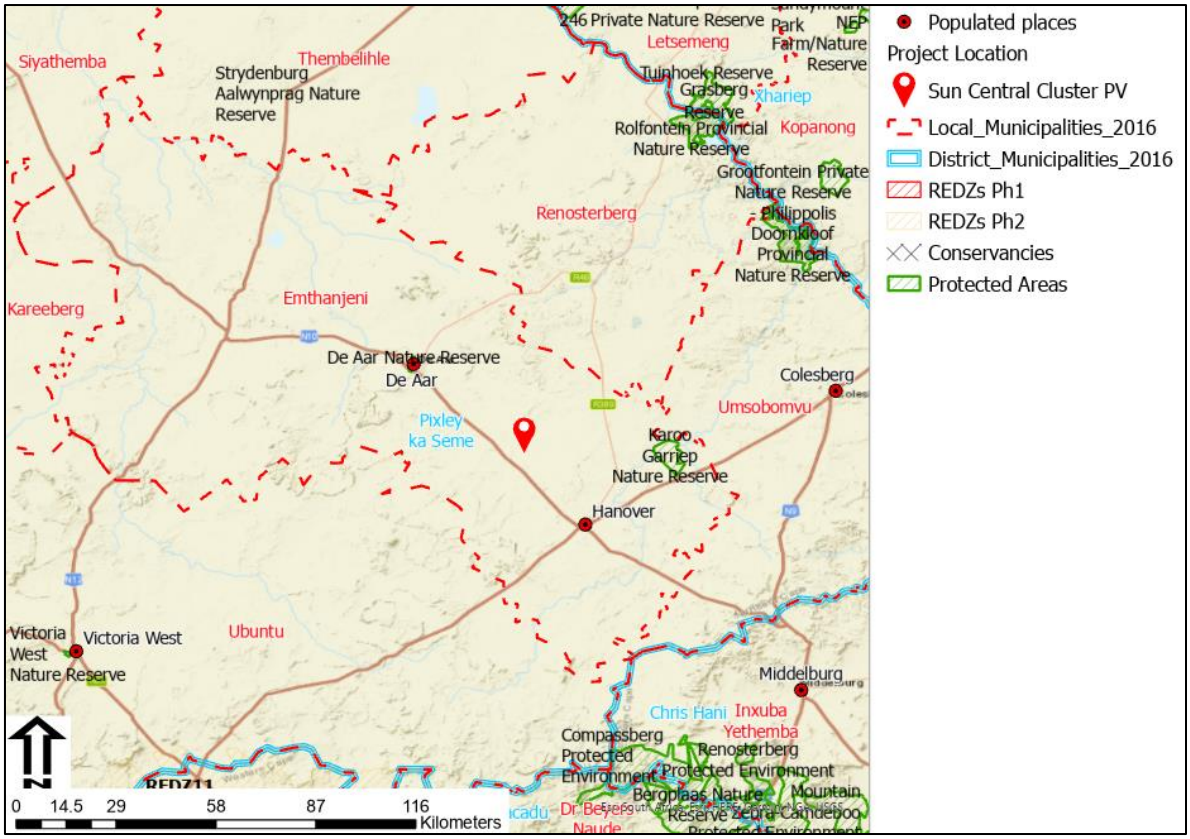


Figure 4: Planning locality map depicting the local, district and national planning zones.

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) (Department of Environment Affairs). 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 Conservation Planning

As can be seen in Figure 4 above, no proclaimed conservation areas are located within the project Zone of Visual Influence. No tourist related activities were found in the immediate area during the site visit.

5.2.4 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: District Planning reference table relevant to the project.

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

(Pixley ka Seme District Municipality, 2022)

Table 11: Local Planning reference table relevant to the project.

Emthanjeni Municipality IDP 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	Pg 34

Theme	Requirements	Page
	grid.	
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
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

(Emthanjeni Municipality, 2007)

Emthanjeni Municipality Spatial Development Framework (SDF) 2007

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 visa versa.	Pg 12

(Emthanjeni Municipality, 2007)

5.3 Landscape Planning 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*, there were no significant cultural/ landscape resources found on the site or immediate surrounds that are flagged by international landscape guidelines.

In terms of the *local and regional planning*, the ***expected visual/ landscape policy fit of the landscape change is rated High.*** 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. However, the project is located in close proximity to an Existing Eskom power line corridor that does include 400kV power lines.

In terms of regional and local planning fit for landscape and visual related themes, the ***expected visual/ landscape policy fit of the landscape change is rated Medium to High +VE. The moderation of the landscape Policy Fit pertains to the Lights at Night***

impacts from the MTS Overhead Flood Lights, that have the potential to significantly degraded the local area nigh-time sense of place/ scenic resources.

6 BASELINE VISUAL INVENTORY

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

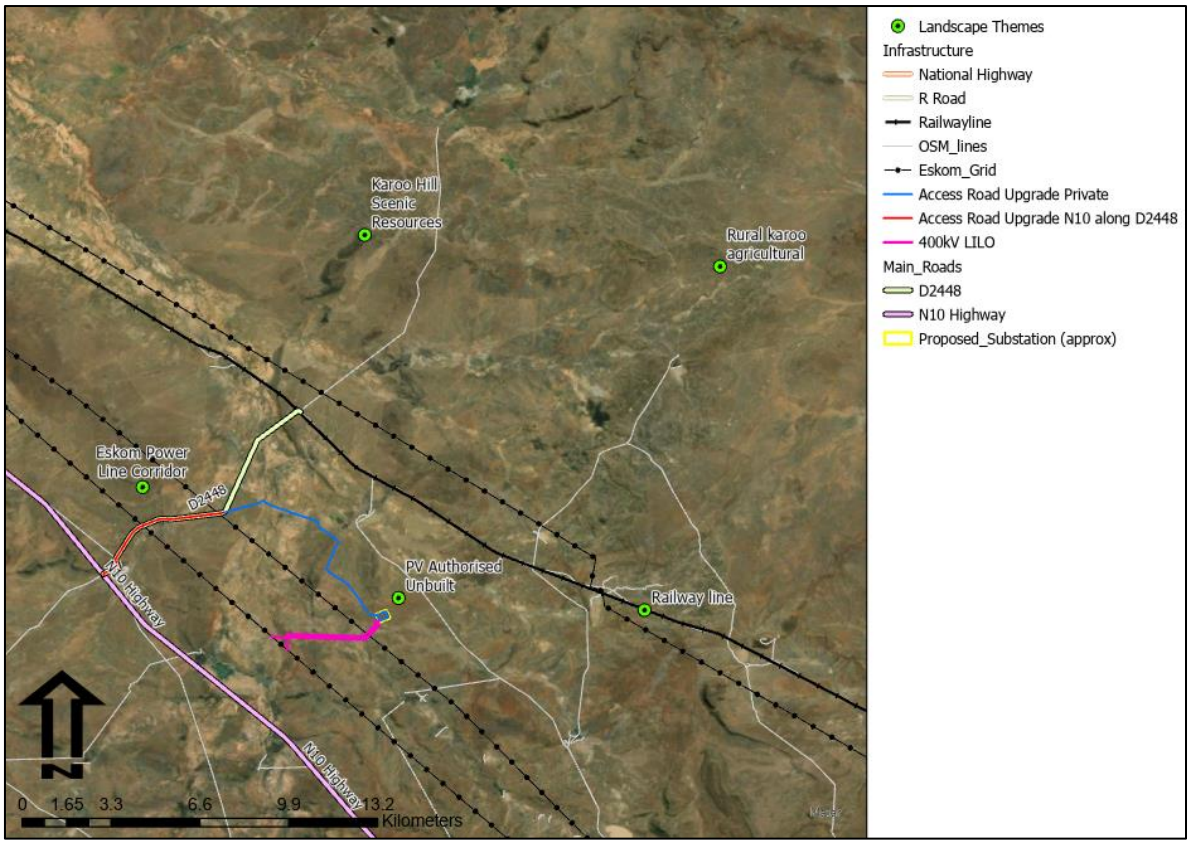


Figure 5. Local landscape themes map.

The region where the project is proposed is in the Northern Cape Province of South Africa. The proposed Sun Central Solar Facility is located 37 km southeast of the town of De Aar, with the nearest town of Hanover located 22km to the southeast of the study area. 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.

Within the regional context, the property is located in a rural karoo landscape, with land uses predominantly related to low intensity sheep farming. This low intensity agriculture, in conjunction to the isolated hills and ridgelines, creates an interesting landscape that is strongly associated with the central Karoo. Also of relevance to the existing landscape are the two Eskom power line, as well as the railway line. While the railway line offers limited visual intrusion, the contrast generated by the powerline pylons, do detract from the local landscape character some degree.

In terms of future landscape changes, three PV projects are proposed in the area, with Central PV1 and substation authorised, and Soventix PV 2 & 3 in EIA process pending authorisation.Once these three PV projects are developed, it is likely that the local sense of place will be strongly associated with renewable energy. As the PV is low height, the combined Zone of Visual Influence will be localised, but within this localised ZVI, the sense of place will be strongly semi-industrial.

6.2 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 map below outlines the vegetation type based on BGIS mapping (South African National Biodiversity Institute, 2018).

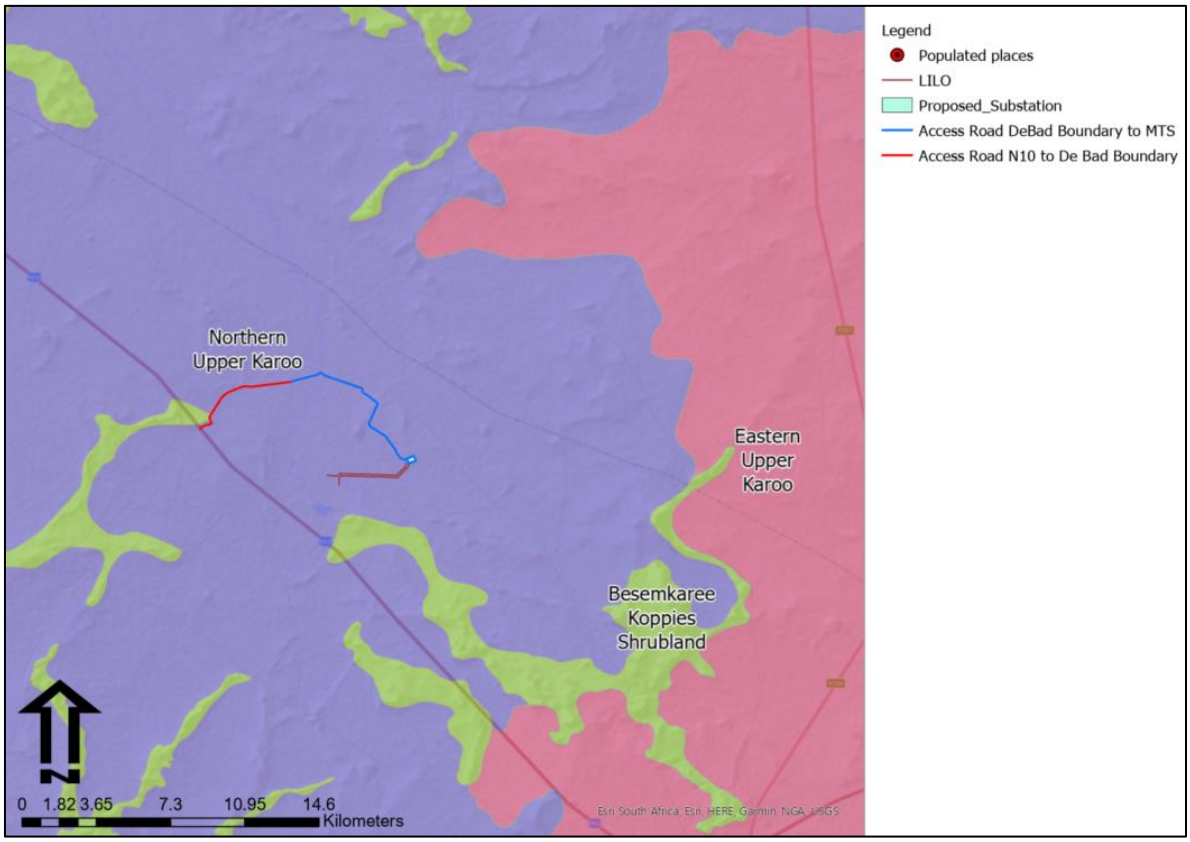


Figure 6. BGIS Biome and Vegetation Type Map (South African National Biodiversity Institute, 2018)

According to the South African National Biodiversity Institute (SANBI) 2012 Vegetation Map of South Africa, Lesotho and Swaziland (South African National Biodiversity Institute, 2012) the project area is located in 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.

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 6. 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.

6.3 Other Renewable Energy Projects

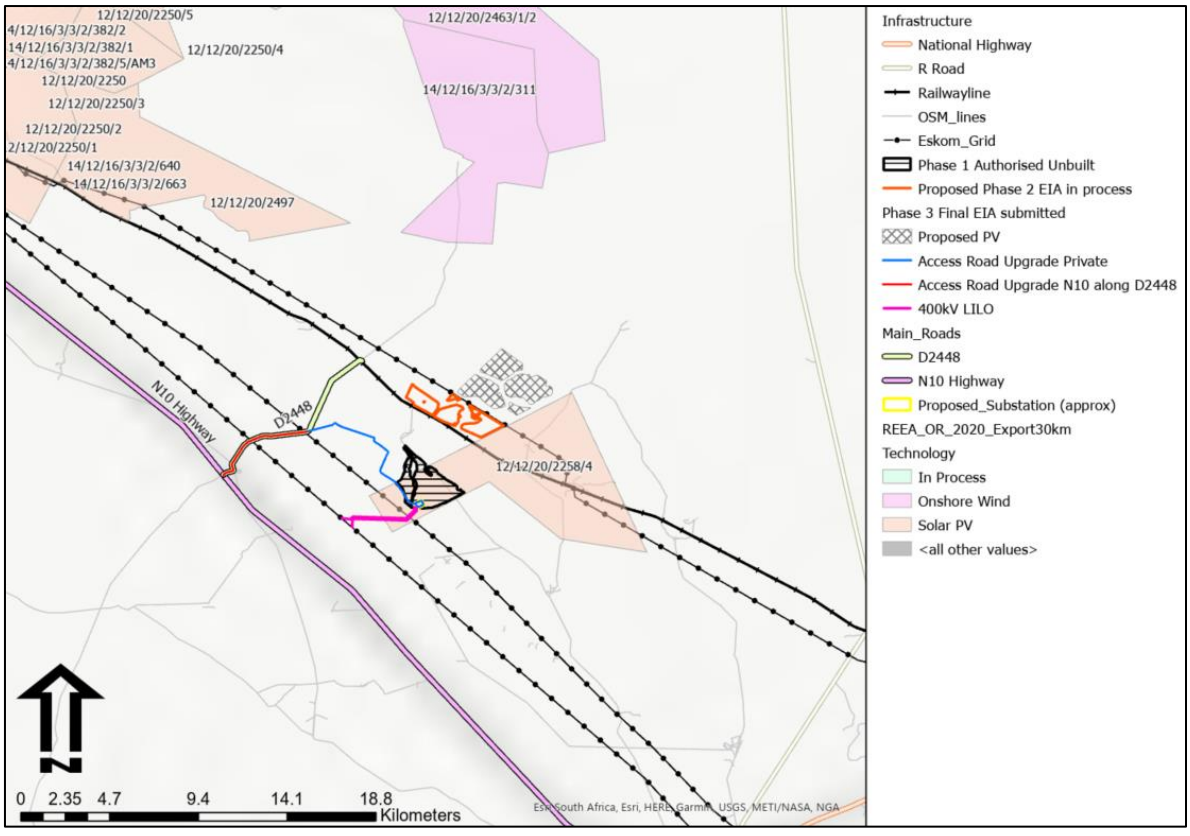


Figure 7: Map depicting DEA Renewable Energy project status.

Numerous other renewable energy projects are located in the region around the town of De Aar as mapped in Figure 7 above.

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. As indicated in the landscape context section, should the Soventix Phase 2 and Phase 3 be authorised, the locality will become strongly associated with a PV development with a semi-industrial sense of place. ***Given the deep rural location where the dark sky at night sense if place is applicable, it is recommended that light at night mitigation is required for the substation.***

6.4 Regional Landscape Topography

Making use of the NASA STRM digital elevation model, profile lines were generated for the area within 24km on either side of the project area predominantly in the North to South and East to West compass reference but orientated to take into account dominant topographic trends that could influence the local landscape and viewscape. The map depicting the regional elevation profile lines can be view on the following page. The viewshed is strongly associated with the regional topography and as such this topic is addressed before the viewshed analysis.

The regional topography is flat to gently undulating rising towards defined ridgelines. Within the immediate regional topographic context, the minimum elevation is 1020 mamsl located to the northwest of the site, with a maximum elevation of around 2467 mamsl, located roughly 24km to the north 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 the Brak River (not mapped) that drains to the northwest.

North to South Profile depicts a gentle accent in elevation from North to South, with the project area likely to be visible along this axis line due to the lack of undulation. The West to East Profile depicts much more gradient variation, with the project located in the central low-lying lands. Due to topographic screening to the east and west, the project visibility is likely to be low on this axis.

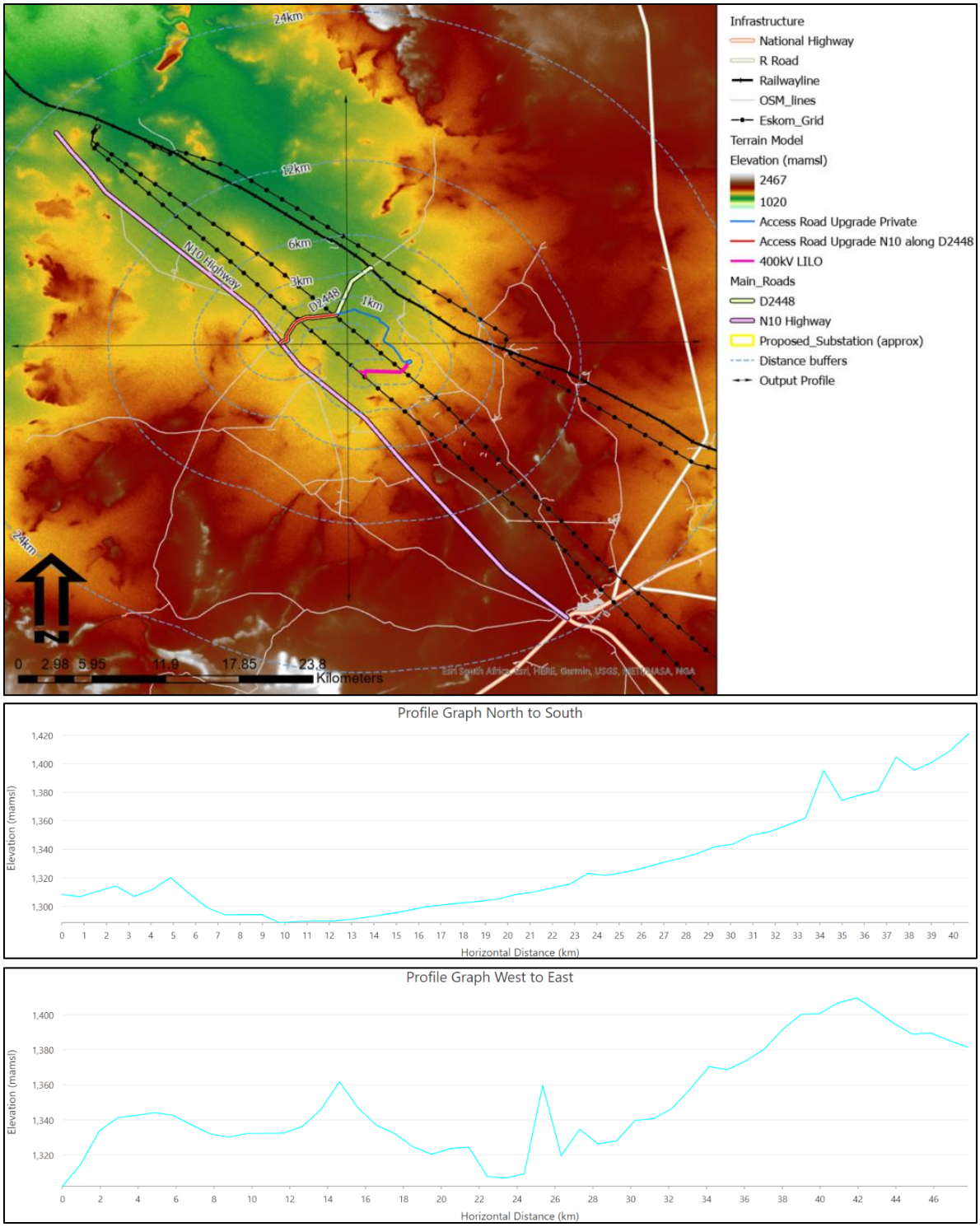


Figure 8: Regional Digital Elevation Mapping and Profiles Graphs.

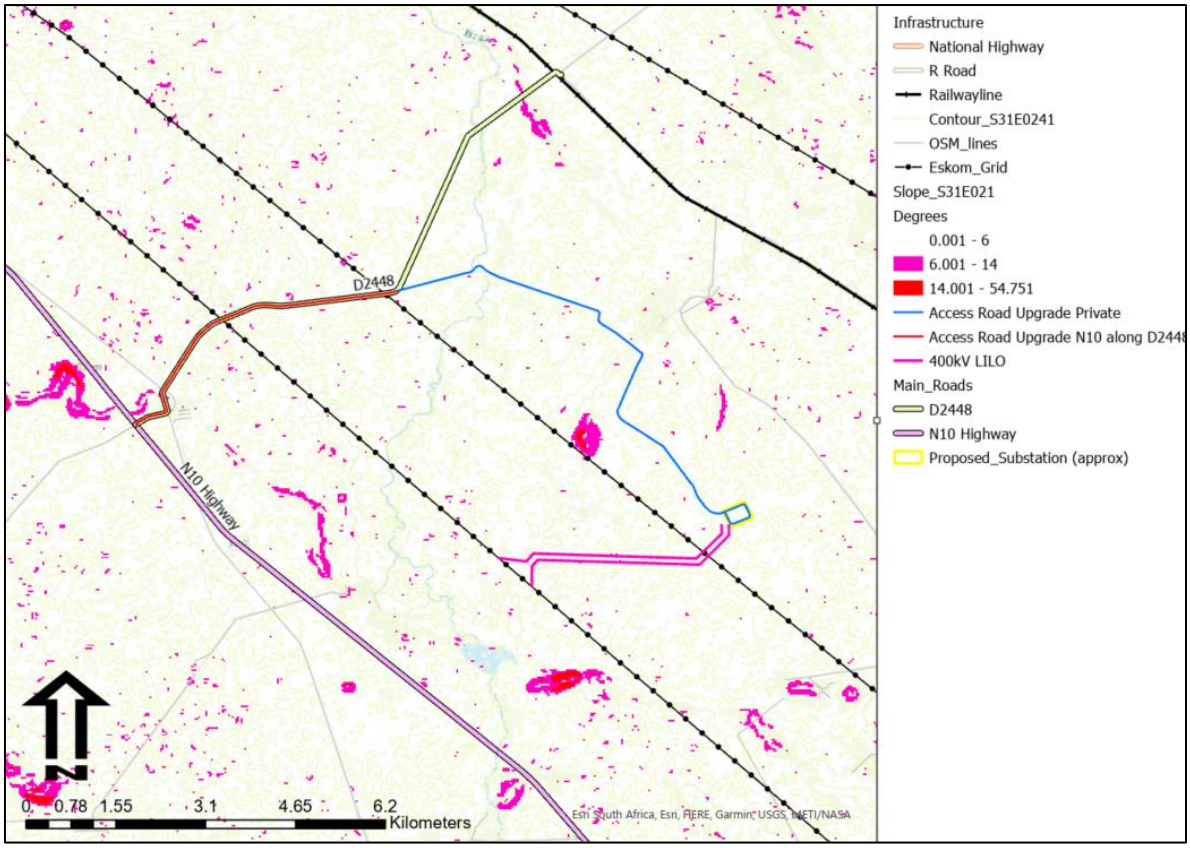


Figure 9: Key topographic features and slope analysis map.

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

- Minor drainage lines.
- Several minor landform features.
- Minor ridgelines.
- Road crossing of the Brak River.

Other than the road crossing over the Brak River, no significant topographic features or steep slopes were identified within the study area. The Brak River will need to be flagged as a risk area as this is a unique landform. Recommendations on the suitability of the crossing will need to be informed by the Surface Water Hydrologist findings.

6.5 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. The viewshed analysis 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).

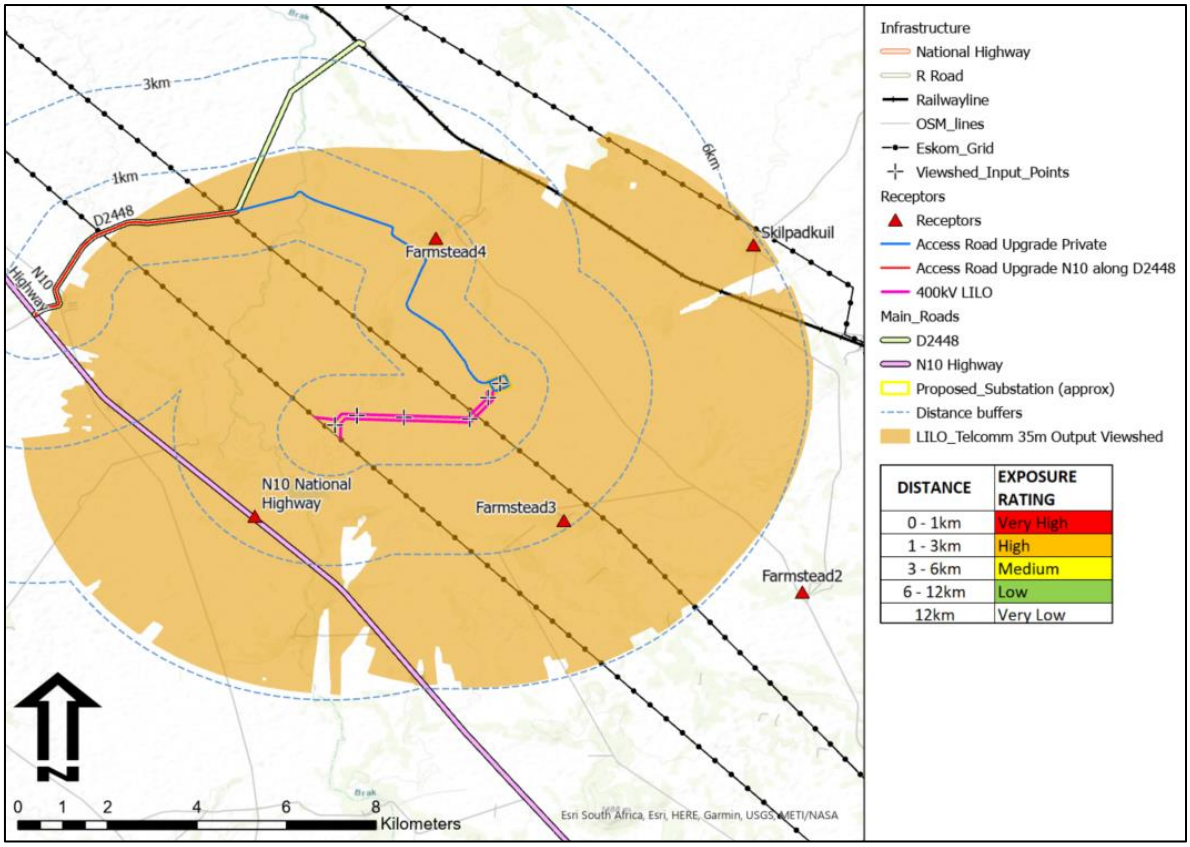
A viewshed analysis was undertaken for the site making use of NASA SRTM 30m Digital Elevation Model data. An Offset value representing the height of the proposed activity was used to represent the approximate height of the proposed development as reflected in the table below. The viewshed was also capped at a defined extent to take atmospheric influences into consideration where the landscape change would not be clearly visible from.

Table 12: Proposed Project Heights Table

Proposed Activity	Height (m)	Model Extent	Motivation
LILO transmission lines	32m	12km	The 32m/ 35m height is likely to extent widely across the local landscape, but the regional undulation and atmospheric influence, in conjunction with the limited visual footprint of the pylons, reduces the visual extent.
Communication Tower	35m	12km	
Overhead Lighting	21m	24km	As light spillage has the potential to cover large distances, the full 24km distance is used to assess the visual extent.
Access Roads	4m	6km	Although the road is located on ground level, the movement of vehicles is the visual element and as such the 4m height is utilised as an Offset. The low height restricts the extent of the view and as such, the Model Extent is capped as 6km.

6.5.1 LILO Viewshed Findings and Communication Tower

Due to the monopoles 32m height in relation to the relatively flat gradient of the surrounding terrain within the 6km distance of the viewshed, theoretical visual incidence covers the full area for all the routing. However, due to the existing presence of pylons in the landscape that increases the Visual Absorption Capacity, as well as the limited visual footprint of these structures, the ZVI is likely to be contained to the Middle Ground and influence landscape resources within 6km from location. ***The Extent is thus defined as Local Area.***



6.5.2 Figure 10: LILO and Communication Tower Viewshed

As receptors are located within the 3km of the proposed landscape change, ***the Visual Exposure is rated Medium.*** Within the ZVI the following receptors were identified.

- N10 National Highway.
- Farmstead 3 (Farmstead 4 is property owner).

6.5.3 Overhead Lighting

Due to the height of the overhead lights in relations to the relatively flat terrain of the surrounds, the views extents over a wide area to the west and east, with the northern low ridgeline reducing views to the north, and higher ground reducing views to the south. As the area does have a Dark Sky sense of place, the landscape change is likely to be clearly noticeable to the surrounding areas. ***The ZVI is likely to extend the full area of the viewshed and is thus defined as Regional as it will extend into the Background Distance areas.***

As receptors are located within the 3km of the proposed landscape change, ***the Visual Exposure is rated Medium.*** Within the ZVI the following receptors were identified.

- N10 National Highway.
- Farmstead 3 (Farmstead 4 is property owner).
- Skilpadskuil.
- Good Hope Farm.

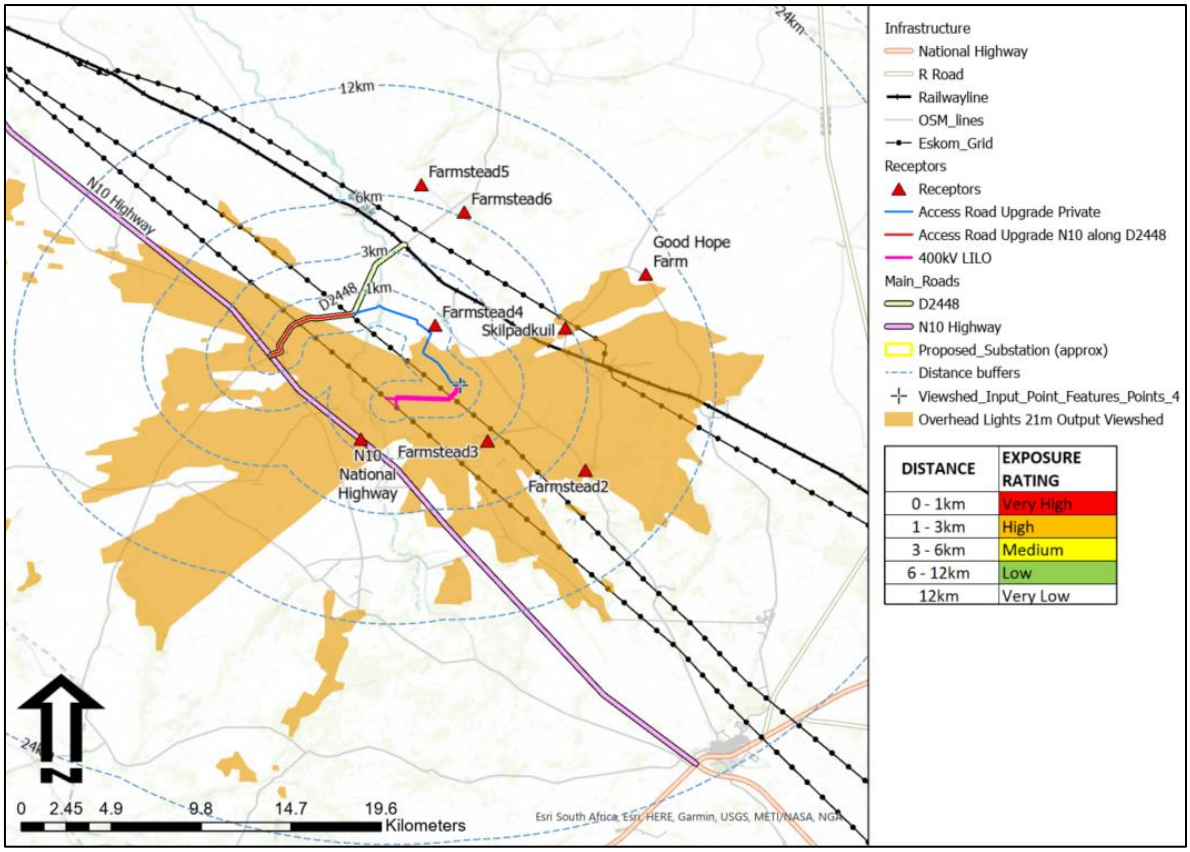


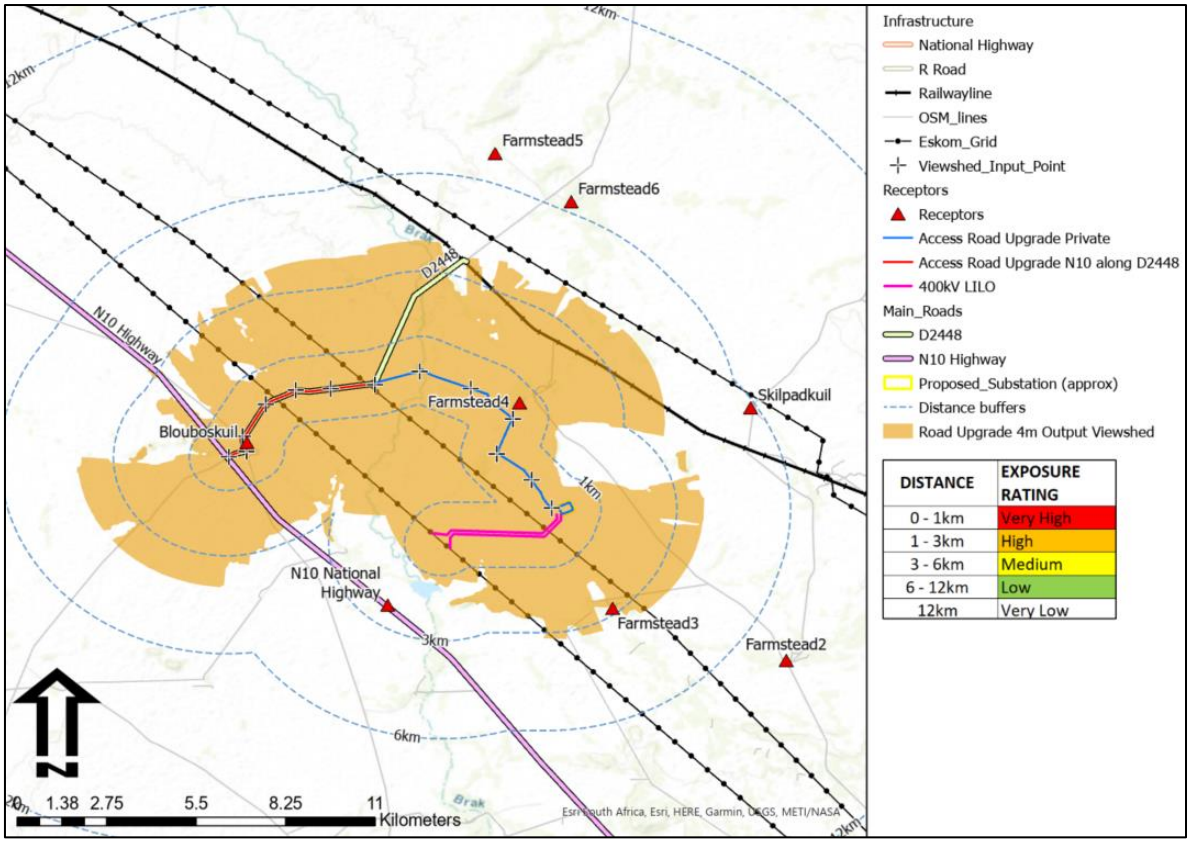
Figure 11: Overhead Lighting Viewshed

6.5.4 Access Roads

Due to the low height of the road landscape change, with vehicles and dust from moving vehicles being a temporary visual element, the viewshed is contained. However, due to the flat terrain of the road upgrade locality, the movement of vehicles will be noticeable in all sectors or the viewshed. The Zone of Visual Influence is likely to be contained to the Foreground area with the landscape change noticeable within 2km during construction, and localised to the immediate surrounds for the lifetime of the operation. The Visual Extent of the visual impact is thus defined as Local. However, mitigation is required during construction to reduce the negative influence of dust from moving vehicles.

As receptors are located within the 1km of the proposed landscape change, ***the Visual Exposure is rated Very High.*** Within the ZVI the following receptors were identified.

- Blouboskuil labour dwelling.



6.6 Figure 12: Access Roads ViewshedReceptors and Key Observation Points

As defined in the methodology, KOPs are defined by the Bureau of Land Management as the people (receptors) located in strategic locations surrounding the property that make consistent use of the views associated with the site where the landscape modifications are proposed. The following table identifies the receptors identified within the ZVI, as well as motivates if they have significance and should be defined as KOP. The receptors located within the ZVI, and KOPs view lines are indicated the map on the following page. As motivated in Table 13 and mapped in Figure 13 below, the following receptors have been identified as Key Observation Points and should be used as locations to assess the suitability of the landscape change.

Table 13: KOP Motivation Table.

Name	Theme	Exposure	Motivation
N10 National Highway.	All landscape changes	Medium	The N10 is a National Highway and is likely to be used by tourist who are likely to be sensitive to landscape change.
Farmstead 3	Overhead Lights/ OHPL/ communication Tower	Medium to High	Located in a remote and rural setting, it is likely that retaining the existing arid farming sense of place is important to the receptor.
Skilpadskuil. / Good Hope Farm	Overhead Lights	Medium	Located in a remote and rural setting, it is likely that retaining the existing arid farming sense of place is important to the receptor.

Blouboskuil Labour Cottages	Road upgrade	Very High	Very High Visual Exposure to nuisance dust effect generated from moving construction and operation vehicles.

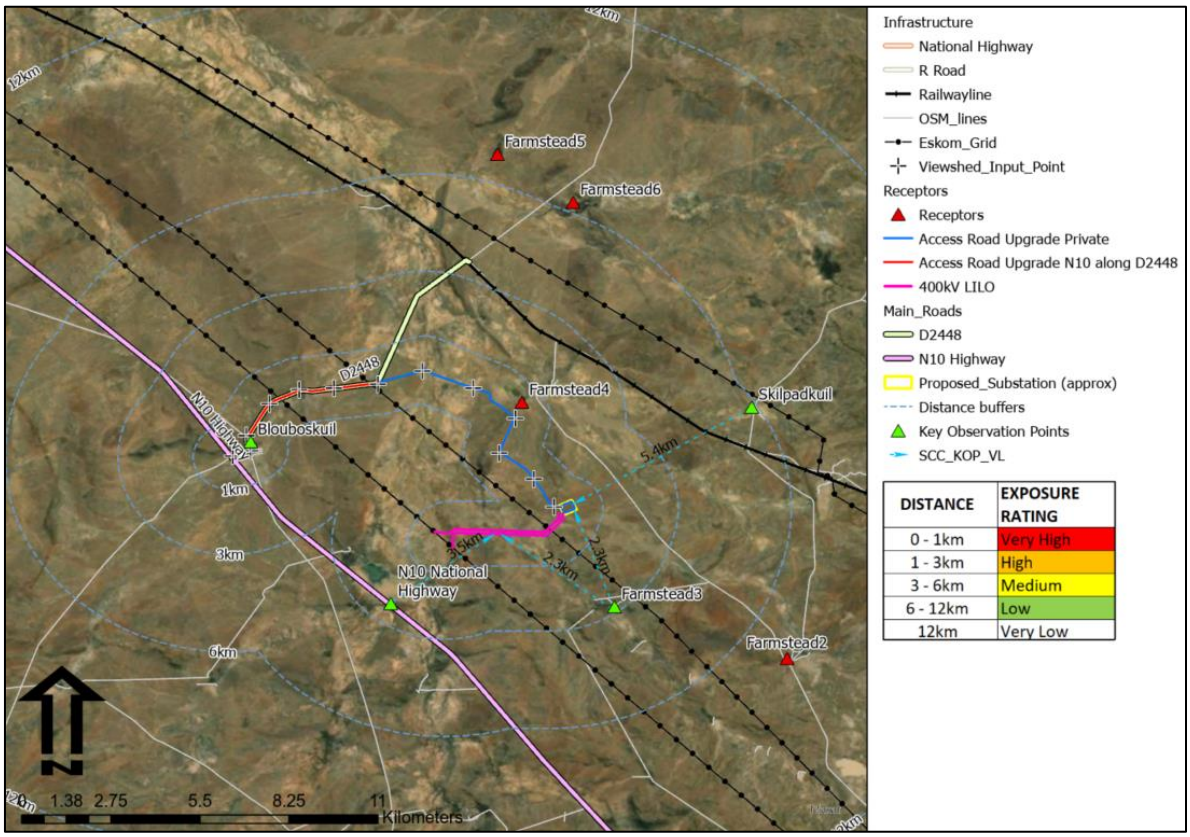


Figure 13: Receptor Map

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 proposed development area that reflect specific physical and graphic elements that define a particular landscape character. These unique landscapes within the project development areas are rated to assess the scenic quality and receptor sensitivity to landscape change, which is then used to define a Visual Resource Management Class for each of the site's unique landscape/s. The exception is Class I, which is determined based on national and international policy / best practice and landscape significance and as such are not rated for scenic quality and receptor sensitivity to landscape change. Based on the SANBI vegetation mapping and the site visit to define key landscape features, the following broad-brush areas were tabled and mapped in Figure 14 below. A 100m buffer was used to define the extent of the PRU study area.

Table 14: Physiographic Landscape Rating Units.

Landscapes	Motivation
Rural Nama Karoo	The majority of the project area is defined as Rural Nama Karoo where the dryland agricultural land uses and shrub vegetation are the main elements that characterise the landscape.
River Wash	There are some larger areas related to the Brak River washes, where low lying areas would need to be carefully managed.
Road Reserve	The existing D2448 is rural road with a proclaimed road reserve.

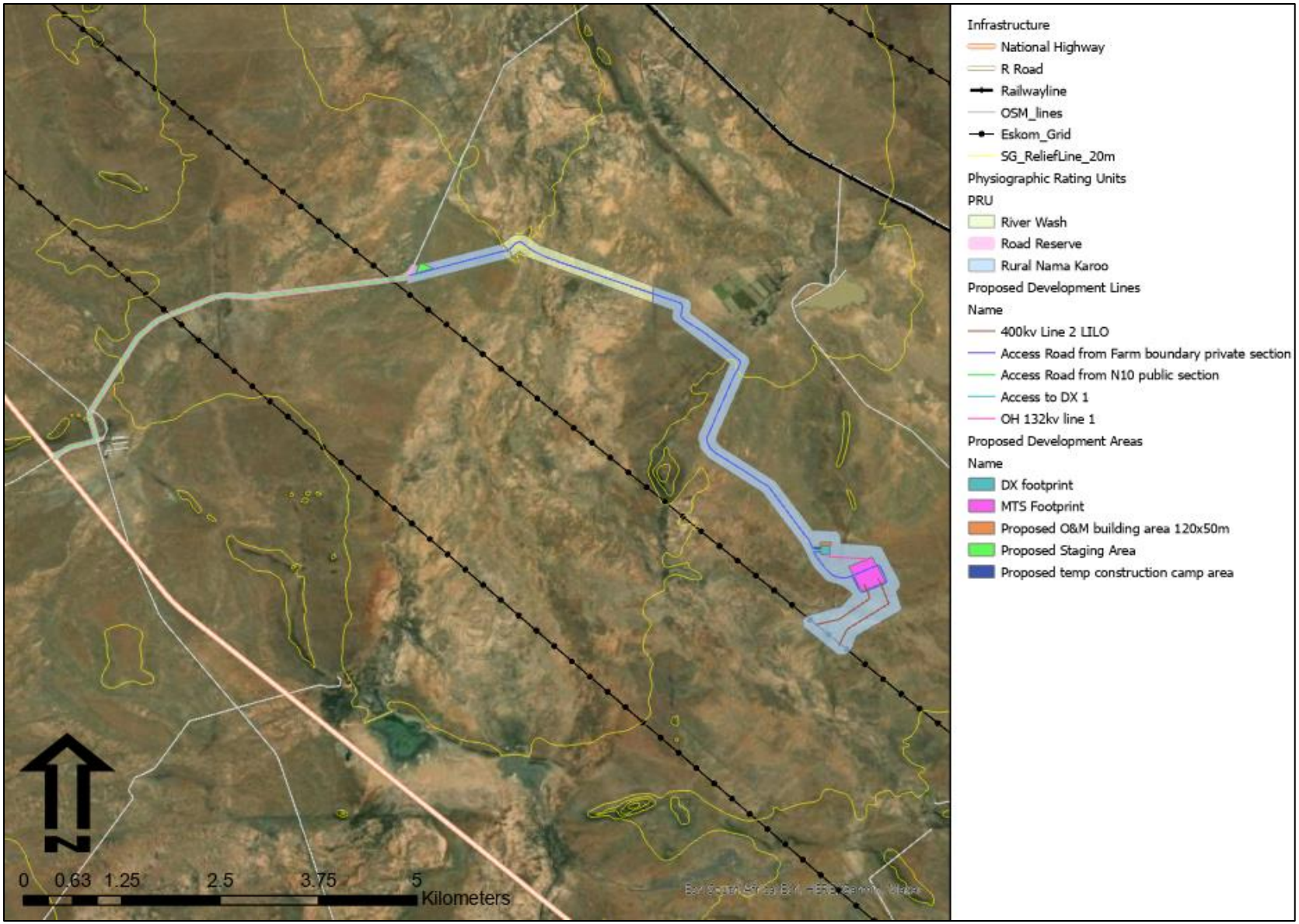

Infrastructure
National Highway
R Road
Railwayline
OSM_lines
Eskom_Grid
SG_ReliefLine_20m
Physiographic Rating Units
PRU
River Wash
Road Reserve
Rural Nama Karoo
Proposed Development Lines
Name
400kv Line 2 LILO
Access Road from Farm boundary private section
Access Road from N10 public section
Access to DX 1
OH 132kv line 1
Proposed Development Areas
Name
DX footprint
MTS Footprint
Proposed O&M building area 120x50m
Proposed Staging Area
Proposed temp construction camp area
N
0 0.63 1.25 2.5 3.75 5
Kilometers

Figure 14: Physiographic Rating Units identified within the defined study area.

Table 15: 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**
Significant Heritage / Ecological / Hydrology.	**(Class I is not rated)**																**I**
Hydrological washes	3	2	0	3	3	4	2	**15**	**B**	M	L	L	M	H	**H**	**II**	**II**
Nama Karoo Rural	1	2	0	3	3	4	2	**15**	**B**	M	L	L	M	L	**M**	**III**	**III**
Existing Road Reserve	1	2	0	3	3	4	2	**15**	**B**	L	L	L	L	L	**L**	**IV**	**IV**

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.

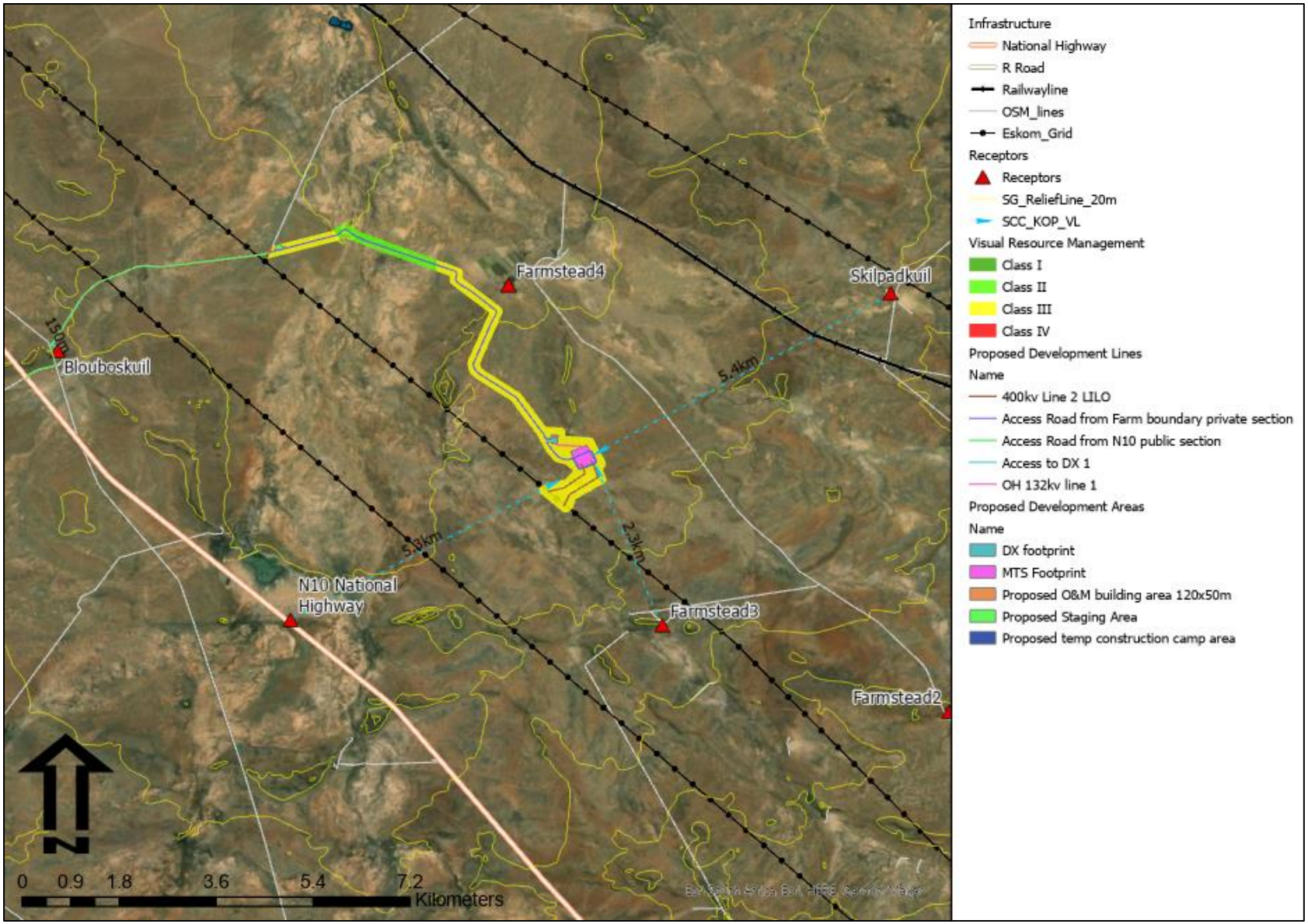

Farmstead4
Skilpadkuil
Blouboskuil
N10 National Highway
Farmstead3
Farmstead2
5.4km
5.9km
2.3km
1.5km
N
0 0.9 1.8 3.6 5.4 7.2
Kilometers
Infrastructure
National Highway
R Road
Railwayline
OSM_lines
Eskom_Grid
Receptors
Receptors
SG_ReliefLine_20m
SCC_KOP_VL
Visual Resource Management
Class I
Class II
Class III
Class IV
Proposed Development Lines
Name
400kv Line 2 LILO
Access Road from Farm boundary private section
Access Road from N10 public section
Access to DX 1
OH 132kv line 1
Proposed Development Areas
Name
DX footprint
MTS Footprint
Proposed O&M building area 120x50m
Proposed Staging Area
Proposed temp construction camp area

Figure 15: Visual Resource Management Classes map.

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. 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 land use 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. 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 for the rural karoo area, but High for the River Washes, that would need to be regarded as Special Areas (subject to Surface Water Hydrologist findings).

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 in terms of the VRM Matrix as follows:

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

7.4.1 VRM 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.

7.4.2 VRM Class II

The Class II objective is to retain the existing character of the landscape and the level of change to the characteristic landscape should be low. The proposed development may be seen but should not attract the attention of the casual observer, and should repeat the basic elements of form, line, colour and texture found in the predominant natural features of the characteristic landscape.

- **Hydrological washes.**

The proposed road and OHPL do cross over areas that fall within Hydrological Washes. While this does not preclude development, management of these areas needs to be carefully considered to ensure that the road does not wash away and result in landscape degradation.

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:

- **Nama Karoo Rural.**

These areas are suitable for development with mitigation to ensure that the existing rural karoo sense of place is retained to some degree.

7.4.4 VRM Class IV

The Class IV objective is to provide for management activities that require major modifications of the existing character of the landscape. Due to the degraded sense of place, the following areas were rated Class IV:

- **D2448 Road Reserve.**

This area is already legally defined as a road where road related landscape changes can take place within the proclaimed road reserve.

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, assuming the view of the defined Key Observation Point (where photomontages are not provided). As this is an assumption, the findings of the Social Impact Assessment would need to be viewed once they are made available. As this is a Basic Assessment, Photomontages were not generated.

8.1 Contrast Rating and Photomontages

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 degree of contrast (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.

Table 16: Contrast Rating Key Observation Points Table

	Exposure			**Landscape Elements**					
Key Observation Point	**Distance**	**Exposure**	**Mitigation**	**Form**	**Line**	**Colour**	**Texture**	**Degree of Contrast**	**Visual Objectives Met?**
Communication Tower		**Mitigation**		*Paint the structure mid-grey.*					
Skilpadskuil	5.4km	Medium to Low	W/Out	W	W	S	S	S	No
			With	W	W	W	W	W	Yes
Farmstead 3	2.3km	Medium	W/Out	W	W	S	S	M	No
			With	W	W	W	W	W	Yes
Overhead Flood Lights		**Mitigation**		*Recommendation to reduce height to 8m/ Shielding of light to reduce light spillage and repositioned to allow for downward & inward facing. Use of Mesopic lighting such that light requirements are provided without creating a pool of light effect.*					
Good Hope Farm/ Skilpadskuil	5.4km	Medium to Low	W/Out	N	N	S	S	S	No
			With	N	N	W	W	W	Yes

Farmstead 3	2.3km	Medium	W/Out	N	N	S	S	S	No
			With	N	N	W	W	W	Yes
OHPL		**Mitigation**		*Generic: Dust suppression measures during construction. Routine checking to soil erosion along access tracks.*					
Good Hope Farm/ Skilpadskuil	5.4km	Medium to Low	W/Out	N	W	W	W	W	Yes
			With	*No applicable*					
Farmstead 3	2.3km	Medium	W/Out	N	W	W	W	W	Yes
			With	*No applicable*					
Road Upgrade		**Mitigation**		*Dust suppression measures when dry conditions prevail.*					
Bouboskuil Labour Cottage	150m	Very High	W/Out	W	W	S	W	S	No
			With	W	W	M	W	M	Yes

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

8.1.1 Communication Tower Findings

Without mitigation the visual contrast generated has the potential to be Strong for Colour and Texture. Although seen from over a distance, the lights at night will create a new light source in the landscape, and if the mast is painted a blue colour, the proposed mast landscape change will be clearly visible. With the painting of the mast a mid-grey colour, the distance from the receptor would allow for atmospheric influence, and minimal visual contrast. With mitigation that Class III Visual Objective would be met.

8.1.2 Overhead Flood Lights

Due to the existing dark sky sense of place in this deep rural setting, the proposed Overhead Flood Lights will dominate the attention of the casual observer. As light spillage night has the potential to travel long distances, it is likely that light spillage and pool of light effects would occur that would not meet the Class III Visual Objects. Mitigation is recommended and should include the review of the lighting such that the lighting is lowered, is inward and downward facing and that Mesopic lighting is used to reduce the influence of the lights at night. With mitigation, the Class III Visual Objects would be met.

8.1.3 OHPL

The OHPL are located in Medium to Low Visual Exposure to two receptors. As the routing length is short and is located in close proximity to two existing power lines, the VAC levels are higher, and it is unlikely that the OHPL landscape change would be noticed by causal observers located as the receptor locations. As such, not Visual Impact specific mitigation is proposed, but generic best practice is required to ensure that local landscape resources are not degraded by soil erosion along access tracks.

8.1.4 Road Upgrade

As the upgrade of an existing road is proposed, a Class IV was defined for this landscape change. As seen from the Bouboskuil Labour cottages, the landscape change of the road is unlikely to be a significant issue as Form, Line, Texture and Colour will remain the same. The issue of dust generated from vehicle movements during construction and operation phases is highlighted, and without mitigation, the close proximity of the receptor to the road is likely to be a nuisance factor. With mitigation and the use of dust suppressant during construction phase,

this effect can be reduced to acceptable levels such that currently take place from the gravel road.

8.2 Communication Tower Impact Ratings and Motivation

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

Construction:

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

Operation:

- Localised change to the landscape character from lighting and the mast structure.

Decommissioning:

- Not applicable.

Cumulative:

- Not applicable

Table 17: Construction & Operation Phase Impacts Table

Project phase	**Construction and Operation Phases**			
Impact	**Landscape change from the current rural agricultural sense of place**			
Description of impact	• Wind-blown litter from the laydown and construction sites. • Security lights at night. • Long term change to the rural landscape character.			
Mitigability	High	Mitigations are available and can be implemented		
Potential mitigation	• Structures need to be painted mid-grey colour. • Security lights at night mitigation (see Annexure).			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Long term	Impact will be permanent.	Long term	Impact will be permanent.
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.	Low	Natural and/ or social functions and/ or processes are slightly 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 landscape change is easily reversible.	High	The landscape change is easily reversible.
Landscape Significance	**Medium (-ve)**		**Low (-ve)**	
Motivation	As the proposed tower landscape change is located within the context of the substation (authorised but unbuilt), once the substation is built the VAC levels will be higher. The distance from the receptors allows for atmospheric influence, where with mitigation, the landscape change would meet the Class III Visual Objectives.			
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.			

8.3 Power Line Impact Ratings and Motivation

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

Operation:

- Occasional maintenance vehicles travelling down the access track to check on possible soil erosion and the power lines.

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 18: Power Line Construction Phase Visual Impacts

Project phase	**Construction**	
Impact	**Loss of landscape character due to the construction of monopoles and cabling.**	
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.**	
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 as much as possible. • Effective rehabilitation of access tracks 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 19: Power Line 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.**			
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.			

8.4 Overhead Flood Lights Impact Ratings and Motivation

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

Construction:

- Not Application - Due to the small time taken for construction, only the Operational Impacts area assessed.

Operation:

- Localised change to the landscape character from lighting and the mast structure.

Decommissioning:

- Not applicable.

Cumulative:

- Cumulative Overhead lights from surrounding substation creating glowing ‘pool’ of light that significantly alters the current dark sky sense of place.

Table 20: Overhead Flood Lights Operation Phase Impacts Table

Project phase	**Operation Phases**
Impact	**Landscape change from the current rural agricultural sense of place**
Description of impact	• Light spillage from overhead Security lights at night.

Mitigability	High	Mitigations are available and can be implemented		
Potential mitigation	• Shielding of light to allow for downward focus such that light spillage is minimalised. • The overhead poles are reduced in height to approximately 8m. • Use of Mesopic lighting such that light requirements are provided without creating a pool of light effect (see Annexure).			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Long term	Impact will be permanent.	Long term	Impact will be permanent.
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 strongly altered.	Medium	Natural and/ or social functions and/ or processes are slightly 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 landscape change is easily reversible.	High	The landscape change is easily reversible.
Landscape Significance	**High (-ve)**		**Medium (-ve)**	
Motivation	As the proposed tower landscape change is located within the context of the substation (authorised but unbuilt), once the substation is built the VAC levels will be higher. The distance from the receptors allows for atmospheric influence, where with mitigation, the landscape change would meet the Class III Visual Objectives during the day. However, night time light spillage will significantly influence the local dark sky sense of place.			
Cumulative impacts	Intervisibility of multiple overhead lights from surrounding substation creating glowing 'pool' of light that significantly alters the current dark sky sense of place is rated as **High Negative**. This can also set a negative precedent for substation development in rural areas.			

8.5 Upgrade of D2448 Existing Road Impact Ratings and Motivation

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

Construction:

- Loss of site landscape character due to the removal of vegetation adjacent to the road for the widening.
- Wind-blown dust from movement of construction vehicles.
- Wind-blown litter from the laydown and construction sites.

Operation:

- Movement of vehicles.
- On-going windblown dust.

Decommissioning:

- Not applicable.

Cumulative:

- Not applicable.

Table 21: D2448 Upgrade Construction Phase Impacts Table

Project phase	**Construction Phase**			
Impact	**Short-term landscape change from the upgrade of the current rural agricultural gravel road.**			
Description of impact	• Loss of site landscape character due to the removal of vegetation adjacent to the road for the widening. • Wind-blown dust from movement of construction vehicles. • Wind-blown litter from the laydown and construction sites.			
Mitigation Viability	High	The mitigation will reduce the significance of the visual and landscape impacts.		
Potential mitigation	• Wind blown dust mitigation. • Dust from moving vehicles.			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Short term	Impact will last less than 12 months.	Short term	Impact will last less than 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	Medium	Natural and/ or social functions and/ or processes are moderately altered.	Low	Natural and/ or social functions and/ or processes are slightly 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	Low	The landscape change is not reversible.	Low	The landscape change is not reversible.
Significance	**Medium (-ve)**		**Negligible (-ve)**	
Comment on significance	The existing road is well established and proclaimed a road reserve. With dust mitigation during construction, the Visual Impact risk would be Negligible and would not impact adjacent receptors.			
Cumulatives	**Null**		**Null**	
Neutral	Not applicable.			

Table 22: Operation Phase Impacts Table

Project phase	**Operation Phase**			
Impact	**Long-term landscape change from the upgrade of the current rural agricultural gravel road.**			
Description of impact	• Increased movement of vehicles.			
Mitigation Viability	Low	Mitigation does not exist.		
Potential mitigation	• NA			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Positive		Positive	
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	Medium	Natural and/ or social functions and/ or processes are improved.	Medium	Natural and/ or social functions and/ or processes are improved.
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	Low	The landscape change is not reversible.	Low	The landscape change is not reversible.
Significance	**Medium (+ve)**		**Medium (+ve)**	
Comment	As the existing road is gravel and would result in some dust from vehicle movement, the change in number of vehicles resulting in significant dust risk is low to the receptors located 150m (approx.) from the road. The wider and better maintained road would be a positive change to the community.			
Cumulatives	**Null**		**Null**	
Neutral	Not applicable.			

8.6 Upgrade of existing farm roads of private property Impact Ratings and Motivation

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

Construction:

- Loss of site landscape character due to the removal of vegetation adjacent to the road for the widening and the construction of the short section of new road.
- Wind-blown dust from movement of construction vehicles.
- Wind-blown litter from the laydown and construction sites.

Operation:

- Movement of vehicles.
- On-going windblown dust.

Decommissioning:

- Not applicable.

Cumulative:

- Not applicable.

Table 23: Farm Road Upgrade Construction Phase Impacts Table

Project phase	**Construction Phase**			
Impact	**Short-term landscape change from the upgrade of the current farm gravel road.**			
Description of impact	• Loss of site landscape character due to the removal of vegetation adjacent to the road for the widening and re-alignment. • Wind-blown dust from movement of construction vehicles. • Wind-blown litter from the laydown and construction sites.			
Mitigation Viability	High	The mitigation will reduce the significance of the visual and landscape impacts.		
Potential mitigation	• Wind blown dust mitigation. • Dust from moving vehicles.			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Short term	Impact will last less than 12 months.	Short term	Impact will last less than 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	Medium	Natural and/ or social functions and/ or processes are moderately altered.	Low	Natural and/ or social functions and/ or processes are slightly 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	Low	The landscape change is not reversible.	Low	The landscape change is not reversible.
Significance	**Medium (-ve)**		**Negligible (-ve)**	
Comment on significance	The farm road is established but would need to be upgraded. With dust mitigation during construction, the Visual Impact risk would be Negligible and would not impact adjacent receptors. There are no close proximity receptors and surrounding farms will not be exposed to views of the road landscape change.			
Cumulatives	**Null**		**Null**	
Neutral	Not applicable.			

Table 24: Farm Road Upgrade Operation Phase Impacts Table

Project phase	**Operation Phase**			
Impact	**Long-term landscape change from the upgrade of the current rural agricultural gravel road.**			
Description of impact	• Increased movement of vehicles.			
Mitigation Viability	Low	Mitigation does not exist.		
Potential mitigation	• NA			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Positive		Positive	
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	Medium	Natural and/ or social functions and/ or processes are improved.	Medium	Natural and/ or social functions and/ or processes are improved.
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	Low	The landscape change is not reversible.	Low	The landscape change is not reversible.
Significance	**Low (+ve)**		**Low (+ve)**	
Comment	As the existing road is gravel and would result in some dust from vehicle movement, the change in number of vehicles resulting in significant dust risk is low to the receptors located 150m (approx.) from the road. The wider and better maintained road would be a positive change to the local farm community.			
Cumulatives	**Null**		**Null**	
Neutral	Not applicable.			

9 ENVIRONMENTAL MANAGEMENT PLAN

9.1 Communication Tower

9.1.1 Design Phase

- Not applicable.

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 structure should be simple, diamond shaped (to catch wind-blown litter) and appear transparent from a distance. The fences should be checked on a monthly basis for the collection of litter caught on the fence.
- No signage should be located on the structure.
- 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.

9.1.3 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).

9.1.4 Decommissioning Phase (if applicable).

- 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 Overhead 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.
- 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.

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

- Not applicable.

9.3 Substation Overhead Flood Lights

9.3.1 Design Phase

- Review design for lower light spillage such that current dark night sky sense of place is retained as seen from surrounding farmstead receptors.
    - *Shielding of light to allow for downward facing illumination to reduce light spillage.*
    - The overhead poles are reduced in height to approximately 8m.
    - *Use of Mesopic lighting such that light requirements are provided without creating a pool of light effect (see Annexure).*

9.3.2 Construction Phase

- Not applicable.

9.3.3 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).

9.4 D2448 Road Upgrade

9.4.1 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.
- 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.

9.4.2 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.

9.4.3 Closure Phase

- Not applicable.

9.5 Farm Road Upgrade

9.5.1 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.
- 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.

9.5.2 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.

9.5.3 Closure Phase

- Not applicable.

10 PRELIMINARY OPPORTUNITIES AND CONSTRAINTS

10.1 Communication Tower

10.1.1 Opportunities

- No tourist activities or tourist view-corridors were located within the project ZVI.
- Existing multiple powerlines create vertical elements in the local landscape increasing the local VAC levels.

10.1.2 Constraints

- Wide area ZVI that will be visible to surrounding receptors.
- Increased massing effects from multiple masts and towers.
- Increased lights at night light spillage altering local dark sky sense of place.

10.2 Communication Tower No-Go Option

10.2.1 Opportunities

- Retain existing semi-degraded 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 Powerline

10.3.1 Opportunities

- National energy objectives for renewable energy and job creation will be met.
- Existing powerline increase VAC level where the local landscape is partially degraded, and the proposed change will not result in significant Visual Impacts.
- Limited receptors with Medium Visual Exposure.

10.3.2 Constraints

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

10.4 Powerline No-Go Option

10.4.1 Opportunities

- National energy objectives for renewable energy and job creation will not be met.
- Retain existing semi-degraded landscape character.

10.4.2 Constraints

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

10.5 Overhead Flood Lights

10.5.1 Opportunities

- No tourist activities or tourist view-corridors were located within the project ZVI.
- Existing multiple powerlines create vertical elements in the local landscape increasing the local VAC levels.

10.5.2 Constraints

- Wide area ZVI that will be visible to surrounding receptors.
- Increased massing effects from multiple masts and towers.
- Increased lights at night light spillage altering local dark sky sense of place (High Significance without mitigation).

10.6 Overhead Flood Lights No-Go Option

10.6.1 Opportunities

- Retain existing semi-degraded landscape character.
- Agricultural productivity from sheep farming creates some employment opportunities.

10.6.2 Constraints

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

10.7 D2448 Road Upgrade

10.7.1 Opportunities

- Existing road already established within the proclaimed road reserve.
- Limited receptors with a single High Visual Exposure receptor.
- Reduce ZVI.
- Upgrade of existing rural road adds value to local farming community.

10.7.2 Constraints

- Some vegetation would be lost to the road development footprint.

10.8 D2448 Road No-Go Option

10.8.1 Opportunities

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

10.8.2 Constraints

- Road remains in poor state of maintenance.

10.9 Farm Road Upgrade

10.9.1 Opportunities

- Existing road already partially established.
- Limited receptors
- Reduced ZVI.
- Upgrade of existing rural road adds value to local farm community.

10.9.2 Constraints

- Some vegetation would be lost to the road development footprint.

10.10 Farm Road No-Go Option

10.10.1 Opportunities

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

10.10.2 Constraints

- Existing farm road remains in poor state of maintenance.

11 CONCLUSION

It is the recommendation that the proposed development should commence WITH MITIGATION for the following key reasons:

- Moderate Zone of Visual Influence with no tourism activities or tourist view-corridors.
- Lower levels of Visual Intrusion for the roads, OHPL and Communication Tower.
- The area is remote, and few receptors were identified.

However, it should be noted that if light spillage mitigation is not implemented, light at night impacts from the Overhead Flood Lights has the potential to significantly degrade the existing rural dark sky sense of place within the Foreground/ Mid Ground areas detracting from the local receptor's scenic quality. This also has the potential for setting a negative precedent for substation development deep rural where local farmstead/ residents are sensitive to lights at night intrusion. To the extent feasible or possible, given the Eskom directives and specifications with regards to the MTS construction, it is recommended that these impacts are adequately mitigated without compromising the required safety standards.

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13 ANNEXURE A: SITE VISIT PHOTOGRAPHS AND COMMENTS

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

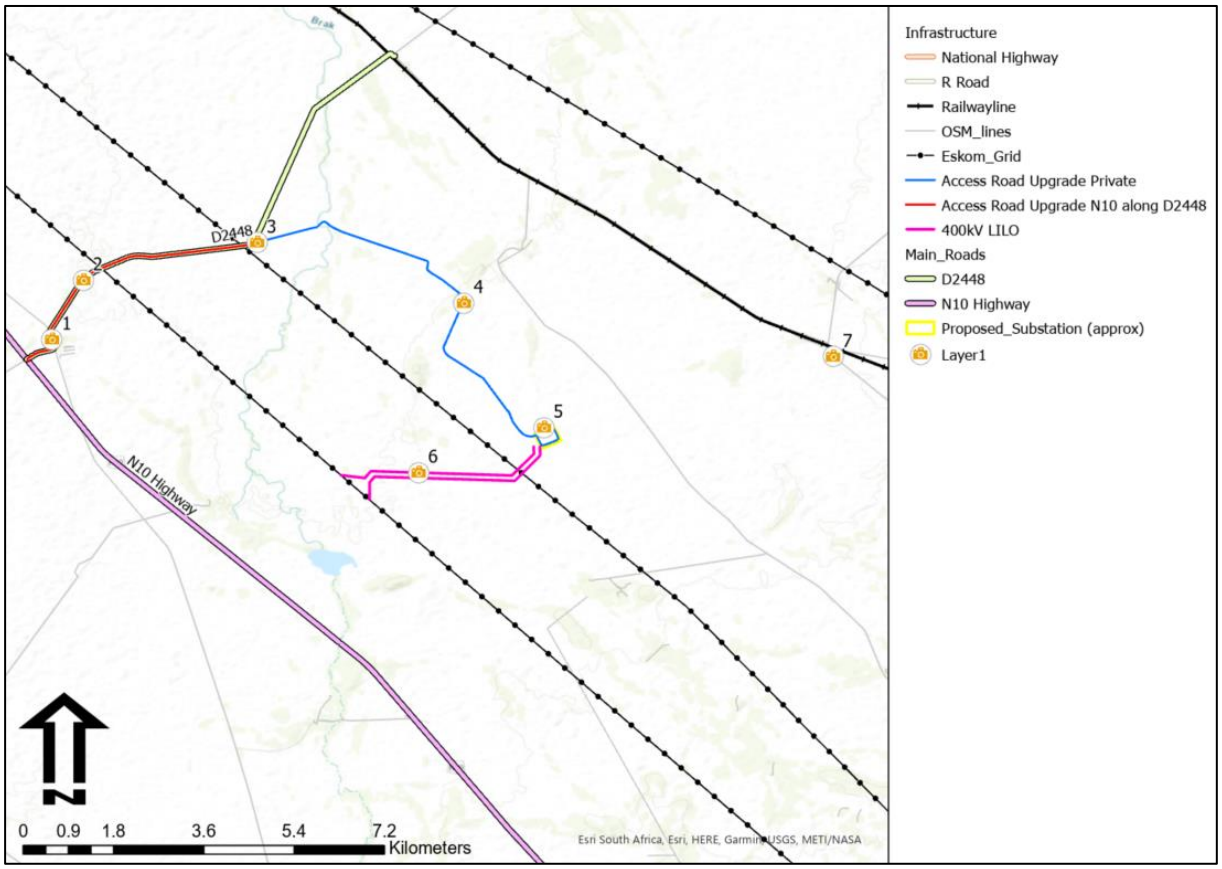


Figure 16: Site Survey Point Map

ID	1
SUITABILITY	Suitable with mitigation
DESCRIPTION	Road access with high exposure to possible residential receptors. Dust mitigation required for life of project. Recognition that there is an existing gravel road.

ID	2
SUITABILITY	Suitable
DESCRIPTION	Well established rural gravel road to be upgraded. Keep alignment to retain rural winding sense of place.

ID	3
SUITABILITY	Suitable
DESCRIPTION	Existing farm road to be upgraded.

ID	4
SUITABILITY	Suitable
DESCRIPTION	Existing farm track that will be upgraded.

ID	5
SUITABILITY	Suitable
DESCRIPTION	Substation location suitable. No proximate receptors but lights at night mitigation would be necessary.

ID	6
SUITABILITY	Suitable
DESCRIPTION	Existing powerlines in the middle ground and the foreground depicting the proposed LILO OHPL connection.

ID	7
SUITABILITY	Suitable
DESCRIPTION	View from eastern farms access road towards substation that is authorised (unbuilt).

14 ANNEXURE B: ACCESS ROAD PROJECT DESCRIPTION

The following provided by the client information informs the nature of the landscape change:

The bellmouth design at the N10/ 'Burgerville' District Road (2448) turn-off must be widened to accommodate an abnormal load to safely turn off the N10 on to the gravel road. The N10 will not be widened. The reshaping or re-design applies to the 'Burgerville' District Road (2448) only. The intersection adjoining the N10 will be widened from an existing width of approximately 25,7 m (**Figure 1**) to approximately 60 m (measured along the top of the road) (**Figure 1**) to accommodate the required turning circle from both directions and then gradually taper along a length of 20 m to the specified 7 m shoulder width.

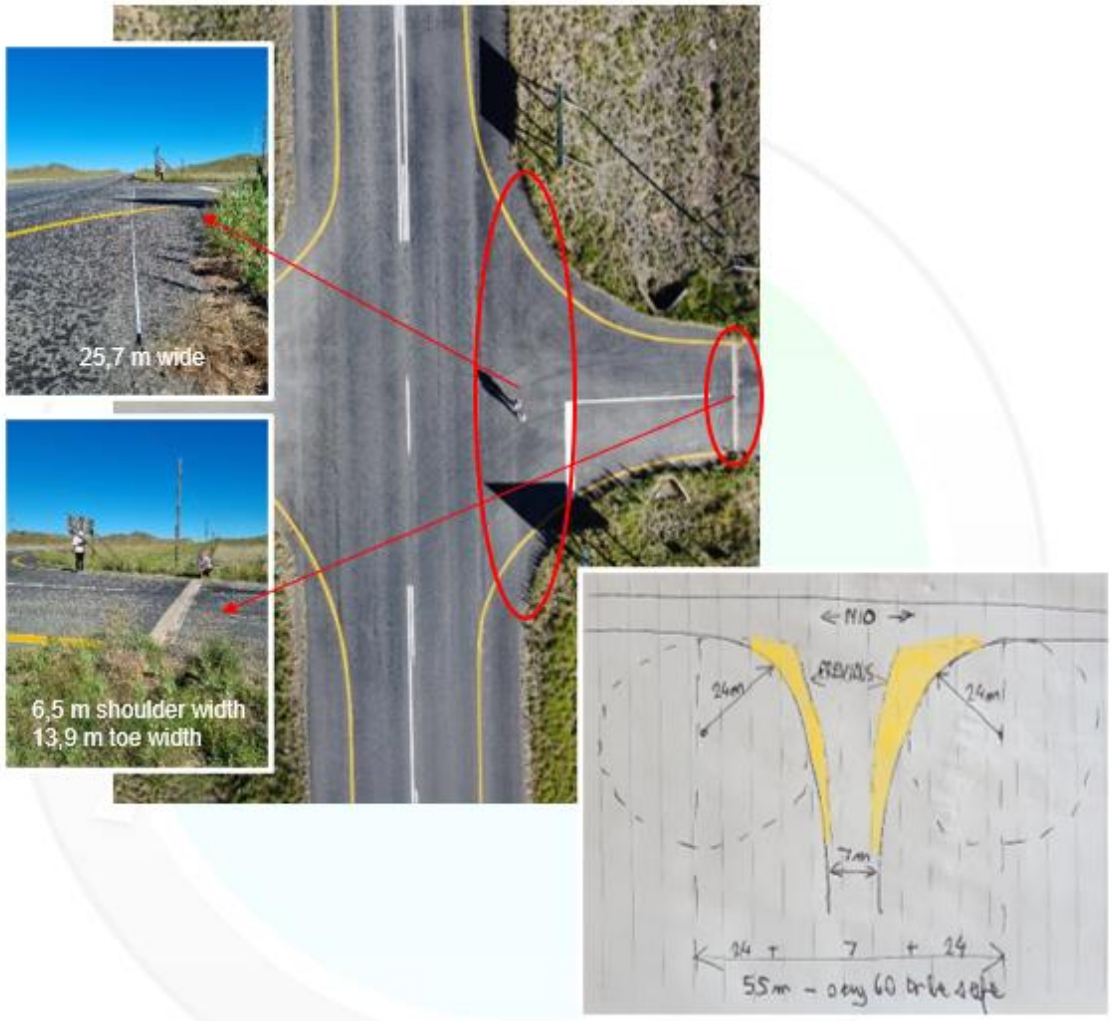


Figure 1. The Bellmouth Design of the N10/'Burgerville' District Road (2448), including a sketch of its planned widening (indicated by the yellow shading). The current turning circle is approximately 17 m, so will require widening to a minimum of 24 m (see sketch).

Figure 17: Extract from Background Information Document on the N10/ District Road 2448 junction.

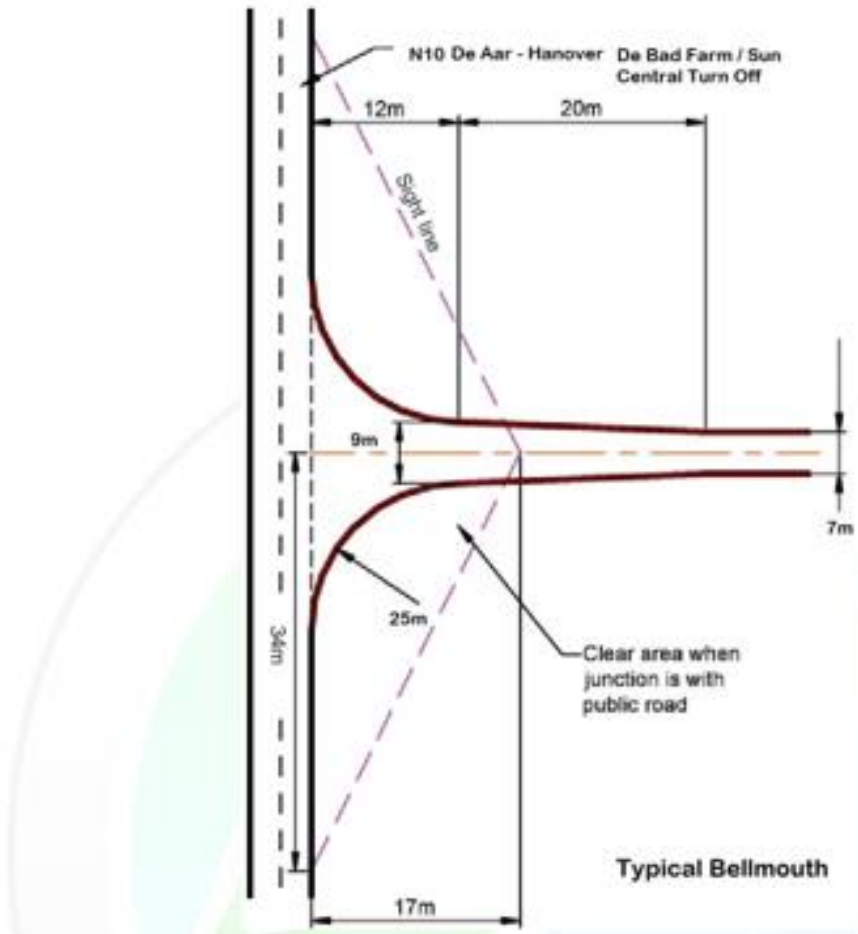


Figure 1. Specified widths (m) of the required Bellmouth Design of the N10/'Burgerville' District Road (2448).

Figure 18: Extract from Background Information Document of the proposed engineering documents of the N10/ District Road 2448 junction.

(i) Type 6 District Road Standard

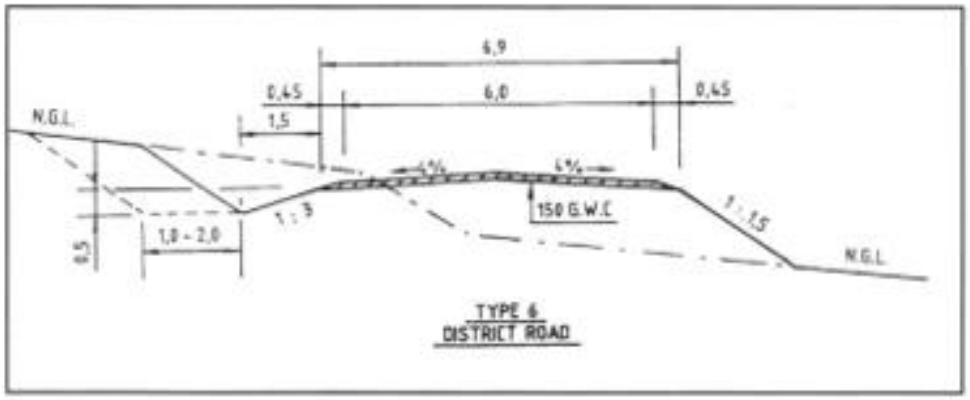


Figure 1: Typical Standard Design for an R4 rural collector road.

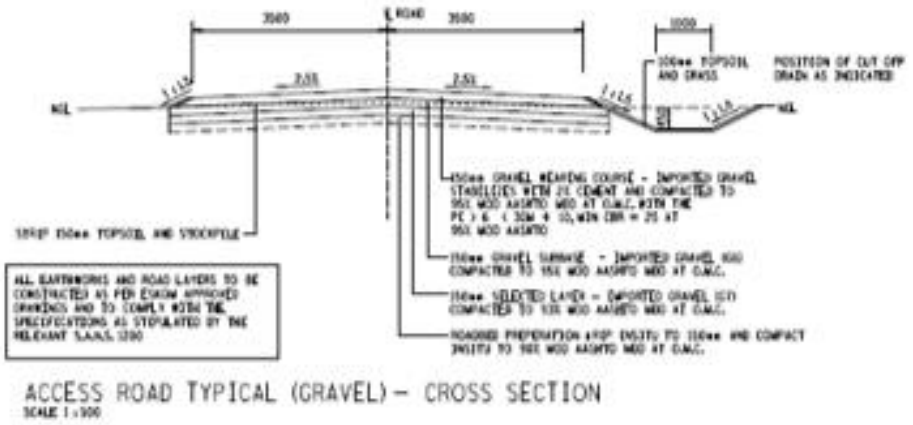


Figure 1: The minimum ESKOM Standard for access roads for extra heavy loads into ESKOM facilities (taken from ESKOM Typical Access Road Cross Section Drawing).

The maximum "box-cut" will be 300 mm with an additional 150 mm rip *in situ* and recompact (**Figure 1**). Dependent on whether a cut or fill area.

The average toe-to-toe width of the district road is 12,6 m (the average fence line width is 18,9 m) (**Table 2**). The affected district road is approximately 5.2 km long and will be rebuilt to a width of 11 m (allowing 8 m for the roadbed preparation, and up to 3 m for for the side/cut-off drain).

Table 2. Approximate width(s) (m) of the Burgerville' District Road (2448).

Statistic	Shoulder width	Toe width	Fence line width
Average	7,71 m	12,59 m	18,87
Range	6,2 m to 10 m	11,2 to 13,6 m	16,6 m to 40 m

Figure 1. Section of existing public 'Burgerville' District Road (2448) from its intersection with the N10 (1) to its intersection with the existing private road (farm track) at the boundary of Farm Riet Fountain 39C (2). Red lines indicate flood plain soils (possible watercourses).

Figure 19: Extract from Background Information Document of the upgrade section of the District Road 2448.

Figure 1. Section of existing private road from its intersection with the 'Burgerville' District Road (2448) at the farm boundary (1) to its intersection with the new road (2). Red lines indicate flood plain soils, including the Brak River.

Figure 20: Extract from Background Information Document of the upgrade section of the private road.

The length and width of the new road build will be ± 3 km and 11 m, respectively (or ± 3,3 ha).

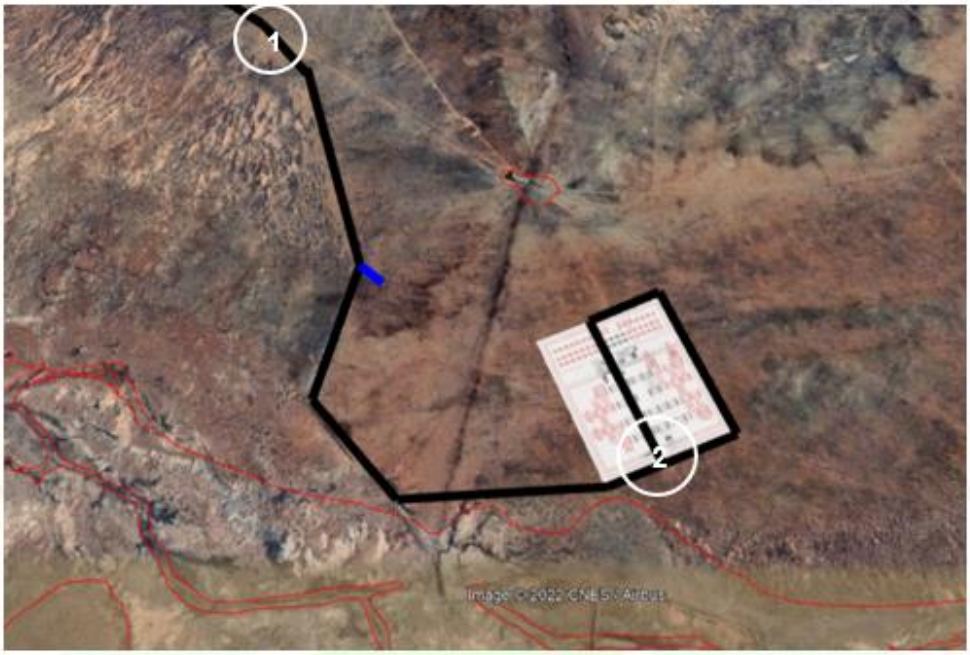


Figure 1. Section of new road from its intersection with the existing private road/farm track (1) to the Main Transmission Substation MTS (2). A short access road to the Switching Station (Dx) will also be developed (blue line). Red lines indicate flood plain soils (possible watercourse).

Figure 21: Extract from Background Information Document of the new section of road on the private property.

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 25: 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 Appeal	Residential	Western Cape (SA)
2007	Rossing Uranium Mine Phase 1	Mining	Namibia
2007	Ryst Kuil/Riet Kuil Uranium Mine	Mining	Western Cape (SA)
2007	Sedgefield Water Works	Structure	Western Cape (SA)
2007	Sulpher Handling Station Walvis Bay Port	Industrial	Namibia
2007	Trekkopje Uranium Mine	Mining	Namibia
2007	Weldon Kaya	Residential	Western Cape (SA)
2006	Farm Dwarsweg 260	Residential	Western Cape (SA)
2006	Fynboskruin Extension	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	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.
- Without jeopardising safety, overhead lighting is not recommended, with preference for lower level lighting, closer to the source using 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.

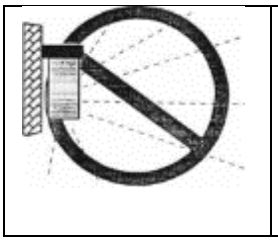
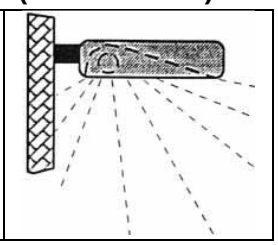
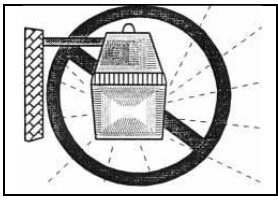
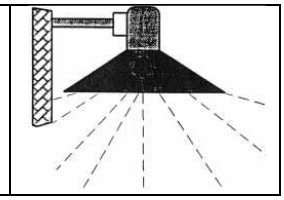
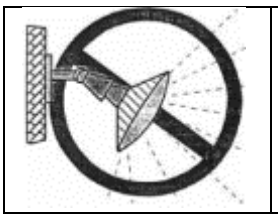
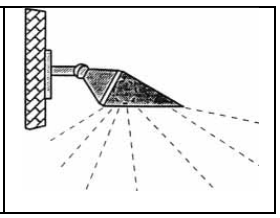
Glare Here's the basic rule of thumb: If you can see the bright bulb from a distance, it's a bad light. With a good light, you see lit ground instead of the dazzling bulb. "Glare" is light that beams directly from a bulb into your eye. It hampers the vision of pedestrians, cyclists, and drivers.

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

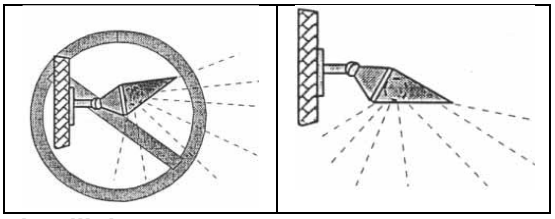
How do I switch to good lighting?

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!

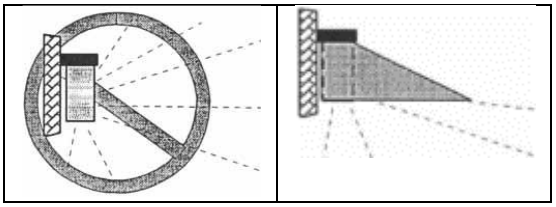
What You Can Do To Modify Existing Fixtures

Change this . . . to this (aim downward)



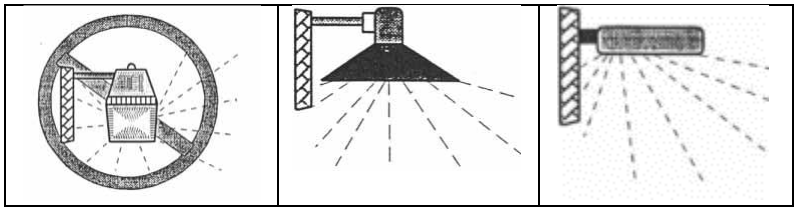
Floodlight:

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: METHODOLOGY DETAIL

17.1 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.

17.1.1 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.

17.1.2 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.

17.1.3 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.

17.1.4 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.

17.2 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.

17.2.1 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.

17.2.2 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).