THE PROPOSED ROAN 2 PV FACILITY AND ASSOCIATED INFRASTRUCTURE, NORTH WEST PROVINCE, SOUTH AFRICA

Visual Impact Assessment Report

Draft v_2 (Pending I&AP Comment)

DATE: February 2022

Document prepared for Cape EAPrac (Pty) Ltd
On behalf of AMDA November (Pty) Ltd

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LIST OF ACRONYMS

APHP	Association of Professional Heritage Practitioners
BLM	Bureau of Land Management (United States)
BPEO	Best Practicable Environmental Option
CALP	Collaborative for Advanced Landscape Planning
DEM	Digital Elevation Model
DoC	Degree of Contrast
EIA	Environmental Impact Assessment
EMPr	Environmental Management Plan

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

GLOSSARY OF TECHNICAL TERMS

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

Technical Term	**Definition** (USDI., 2004)
Key Observation Point	Receptors refer to the people located in the most critical locations, or key observation points, surrounding the landscape modification, who make consistent use of the views associated with the site where the landscape modifications are proposed. KOPs can

	either be a single point of view that an observer/evaluator uses to rate an area or panorama, or a linear view along a roadway, trail, or river corridor.
Visual Resource Management	A map-based landscape and visual impact assessment method development by the Bureau of Land Management (USA).
Zone of Visual Influence	The ZVI is defined as 'the area within which a proposed development may have an influence or effect on visual amenity.'

Table 1. Specialist declaration of independence.

This document was completed by Silver Solutions 887 cc trading as VRM Africa, a Visual Impact Study and Mapping organisation located in George, South Africa. VRM Africa cc was appointed as an independent professional visual impact practitioner to facilitate this VIA. I, Stephen Stead, hereby declare that VRM Africa, an independent consulting firm, has no interest or personal gains in this project whatsoever, except receiving fair payment for rendering an independent professional service.

Stephen Stead
APHP accredited VIA Specialist

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

A specialist report prepared in terms of the Environmental Impact Regulations of 2014 (as amended in 2017) must contain:	**Relevant section in report**
Details of the specialist who prepared the report	Stephen Stead, owner / director of Visual Resource Management Africa. steve@vrma.co.za Cell: 0835609911
The expertise of that person to compile a specialist report including a curriculum vitae	Registration with Association of Professional Heritage Practitioners

A specialist report prepared in terms of the Environmental Impact Regulations of 2014 (as amended in 2017) must contain:	**Relevant section in report**
A declaration that the person is independent in a form as may be specified by the competent authority	Table 1. Specialist declaration of independence.
An indication of the scope of, and the purpose for which, the report was prepared	Terms of Reference
A description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change	Visual Resource Management (VRM) Classes
The duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment	NA
A description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;	Methodology
Details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternative;	Baseline Visual Inventory
An identification of any areas to be avoided, including buffers	NA
A map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	Figure 22
A description of any assumptions made and any uncertainties or gaps in knowledge;	Assumptions and Limitations
A description of the findings and potential implications of such findings on the impact of the proposed activity or activities	Visual Resource Management Classes
Any mitigation measures for inclusion in the EMPr	Environmental Management Plan
Any conditions for inclusion in the environmental authorisation	NA
Any monitoring requirements for inclusion in the EMPr or environmental authorisation	NA
A reasoned opinion as to whether the proposed activity or portions thereof should be authorised	Conclusion
Regarding the acceptability of the proposed activity or activities; and	Conclusion
If the opinion is that the proposed activity or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan	***The proposed project should be authorised WITH MITIGIATON, retaining a buffer along the R503 to assist in retaining the rural agricultural sense of place.***

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	A Draft Basic Assessment Report containing this VIA will be subjected to a consultative process as required in terms of regulation 56 of the NEMA 2014 EIA Regulations.
A summary and copies if any comments that were received during any consultation process	Pending I&AP comments
Any other information requested by the competent authority.	Pending I&AP comments

1 INTRODUCTION

Visual Resource Management Africa CC (VRMA) was appointed by Cape EAPrac (Pty) Ltd (hereafter referred to as EAP) to undertake a ***Visual Impact Assessment*** on the proposed Roan 2 PV Facility and Associated Infrastructure), on behalf of AMDA November (Pty) Ltd. (Proponent). The site visit was undertaken on the22 January 2021. The proposed development site is located in the North West Province, Dr Kenneth Kaunda District Municipality and within the City of Matlosana Local Municipality. The Proponent proposes to construct a Photovoltaic (PV) solar energy facility and associated infrastructure on portions 4,5,9 and 16 of the farm 299 located 3 km south of Haartbeesfontein.

As this Visual and Landscape assessment forms part a Basic Assessment EIA due to the location of the project within the Klerksdorp REDZ, impacts are grouped at a project level. The different project components are unpacked in the Opportunities and Constraints section, with recommendation on alternative preference.

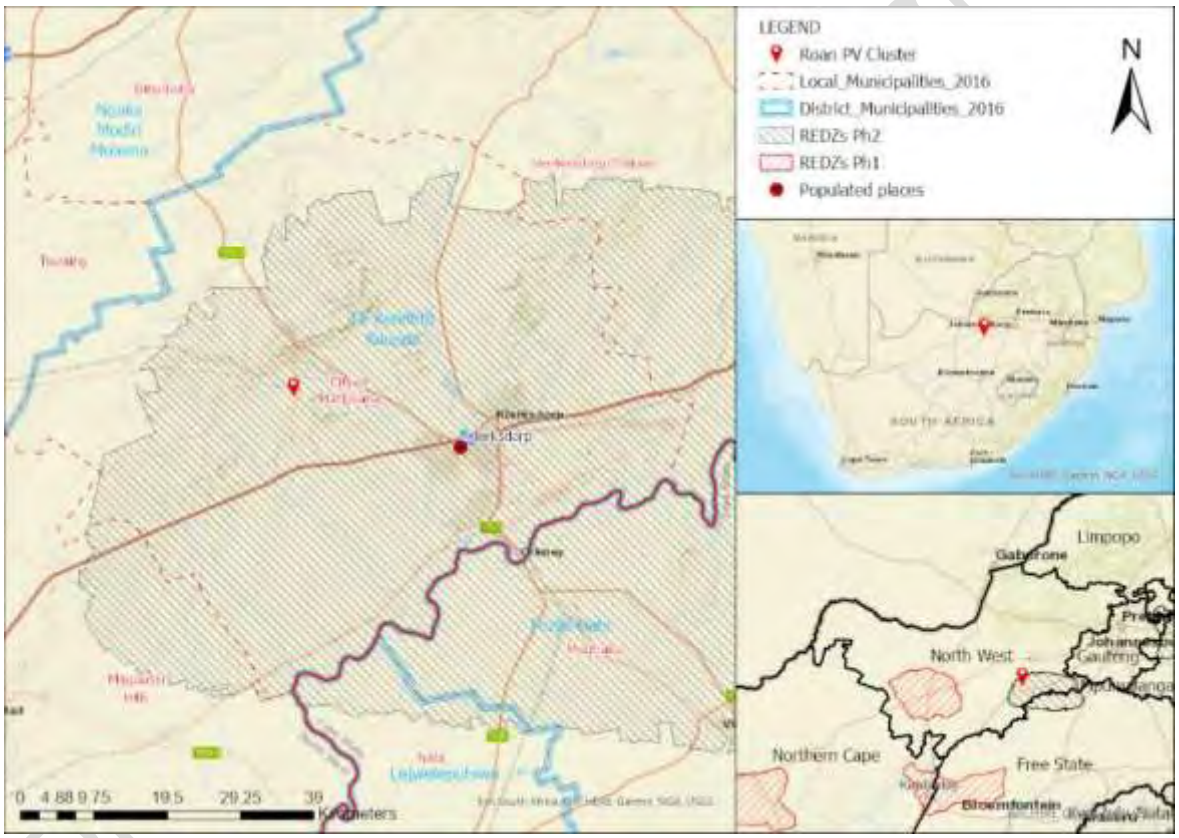


Figure 1. National locality map with the project location identified.

1.1 Terms of Reference

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

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

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

1.2 Study Team

Contributors to this study are summarised in the table below.

Table 3: Authors and Contributors to this Report.

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

1.3 Visual Assessment Approach

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

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

Table 4: Methodology Summary Table

Action	*Description*
Site Survey	The identification of existing scenic resources and sensitive receptors in and around the study area to understand the context of the proposed

	development within its surroundings to ensure that the intactness of the landscape and the prevailing sense of place are taken into consideration.
Project Description	Provide a description of the expected project, and the components that will make up the landscape modification.
Reviewing the Legal Framework	The legal, policy and planning framework may have implications for visual aspects of the proposed development. The heritage legislation tends to be pertinent in relation to natural and cultural landscapes, while Strategic Environmental Assessments (SEAs) for renewable energy provide a guideline at the regional scale.
Determining the Zone of Visual Influence	This includes mapping of viewsheds and view corridors in relation to the proposed project elements, in order to assess the zone of visual influence of the proposed project. Based on the topography of the landscape as represented by a Digital Elevation Model, an approximate area is defined which provides an expected area where the landscape modification has the potential to influence landscapes (or landscape processes) or receptor viewpoints.
Identifying Visual Issues and Visual Resources	Visual issues are identified during the public participation process, which is being carried out by others. The visual, social or heritage specialists may also identify visual issues. The significance and proposed mitigation of the visual issues are addressed as part of the visual assessment.
Assessing Potential Visual Impacts	An assessment is made of the significance of potential visual impacts resulting from the proposed project for the construction, operational and decommissioning phases of the project. The rating of visual significance is based on the methodology provided by the Environmental Assessment Practitioner (EAP).
Formulating Mitigation Measures	Possible mitigation measures are identified to avoid or minimise negative visual impacts of the proposed project. The intention is that these would be included in the project design, the Environmental Management programme (EMPr) and the authorisation conditions.

1.4 Assumptions and Uncertainties

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

2 PROJECT DESCRIPTION

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

No alternatives are provided for the PV, two routing alternatives for the Grid Connect. For the PV, a comparison of the No-go is included as a comparative analysis in Section 9.

Table 5: Project Information Table

PROPONENT SPECIFICATIONS	
Applicant Details	**Description**
Applicant Name:	AMDA November (Pty) Ltd
Project Name:	Proposed Roan 2 PV Solar Facility VIA

PROPERTY SPECIFICATIONS		
Name	**Description**	**Size (Ha)**
Farm 299	Portions 5,5,9 and 16	250ha

PROJECT SPECIFICATIONS	
COMPONENT	**SPECIFICATION**
PV modules and mounting structures	100 MW PV facility
Inverters and transformers	Both string and centralized inverters are under consideration
Site and internal access roads (up to 8 m wide)	Main access road up 10m wide and internal and perimeter roads up to 6m wide.
Auxiliary buildings	33 kV switch room, gate-house and security, control centre, office, warehouse, canteen & visitors centre, staff lockers etc.
Perimeter fencing and security infrastructure	Electrified perimeter fencing up to 2.4m high
Rainwater tanks	Up to 60kl
Temporary and permanent laydown areas	Construction laydown not exceeding 6ha, Permanent laydown not exceeding 1ha.
Facility substation	Up to 1.2ha (inclusive of IPP and Eskom side)
Grid connection solution	A grid connection corridor of approximately 300 m wide including: • On Site facility substation • On Site Eskom Switching Station

	• An up to 132kV overhead powerline from the on site switching station to the Existing Eskom Roan Substation. • The gridline servitude, once registered, will be 31m in width.
Additional associated infrastructure	Including access roads, feeder bays (inclusive of line bays, busbars, bus section and protection equipment), a fibre and optical ground wire (OPGW) layout, insulation and assembly structures including BESS.

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

Figure 3: Photographic example of monopoles structure
(Source VRM Africa Lunskip VIA)

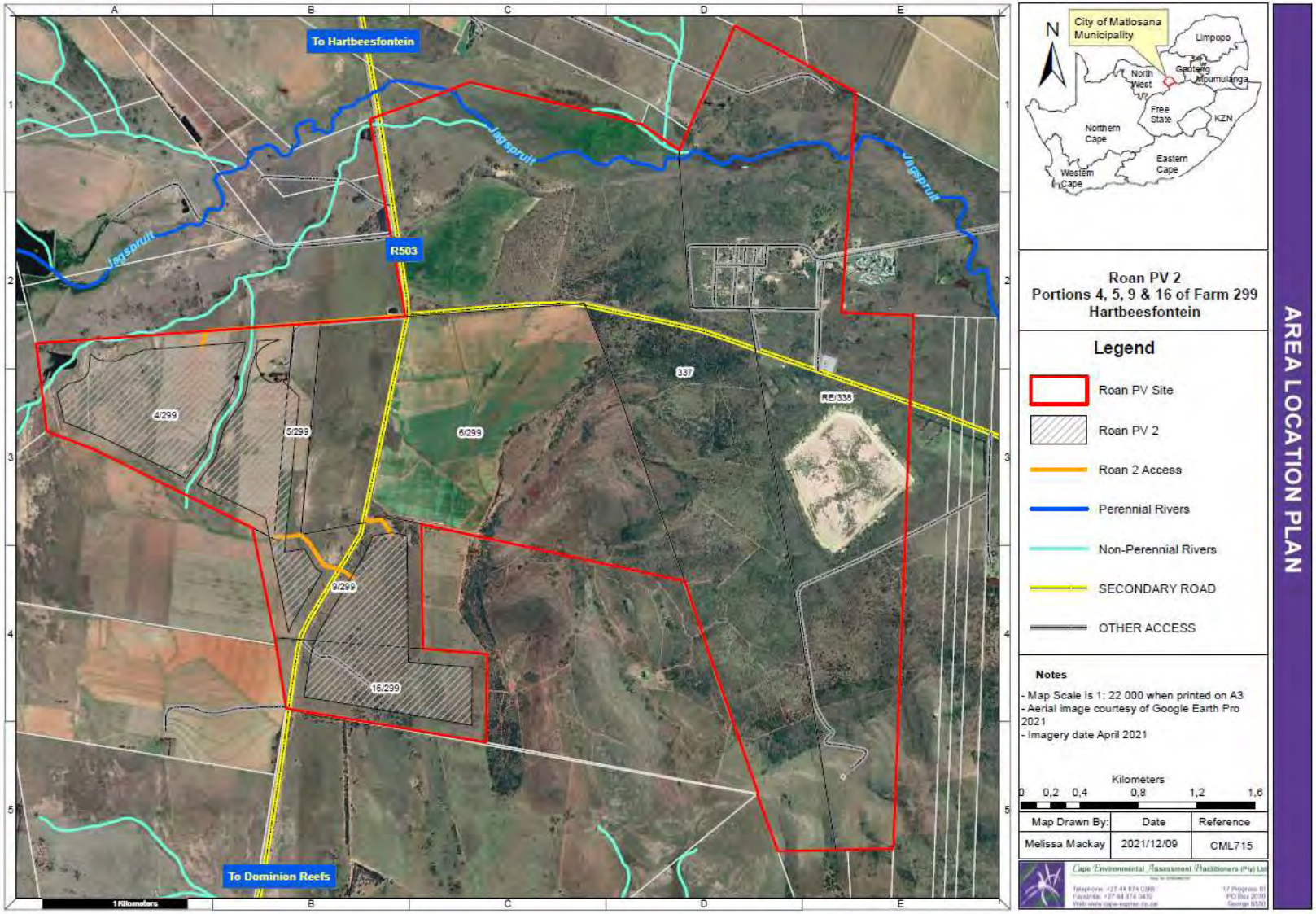


Figure 4: Proposed layout map depicting the north and south portions of the PV2 project care of Cape EAPrac.

2.1.1 Viewshed Analysis

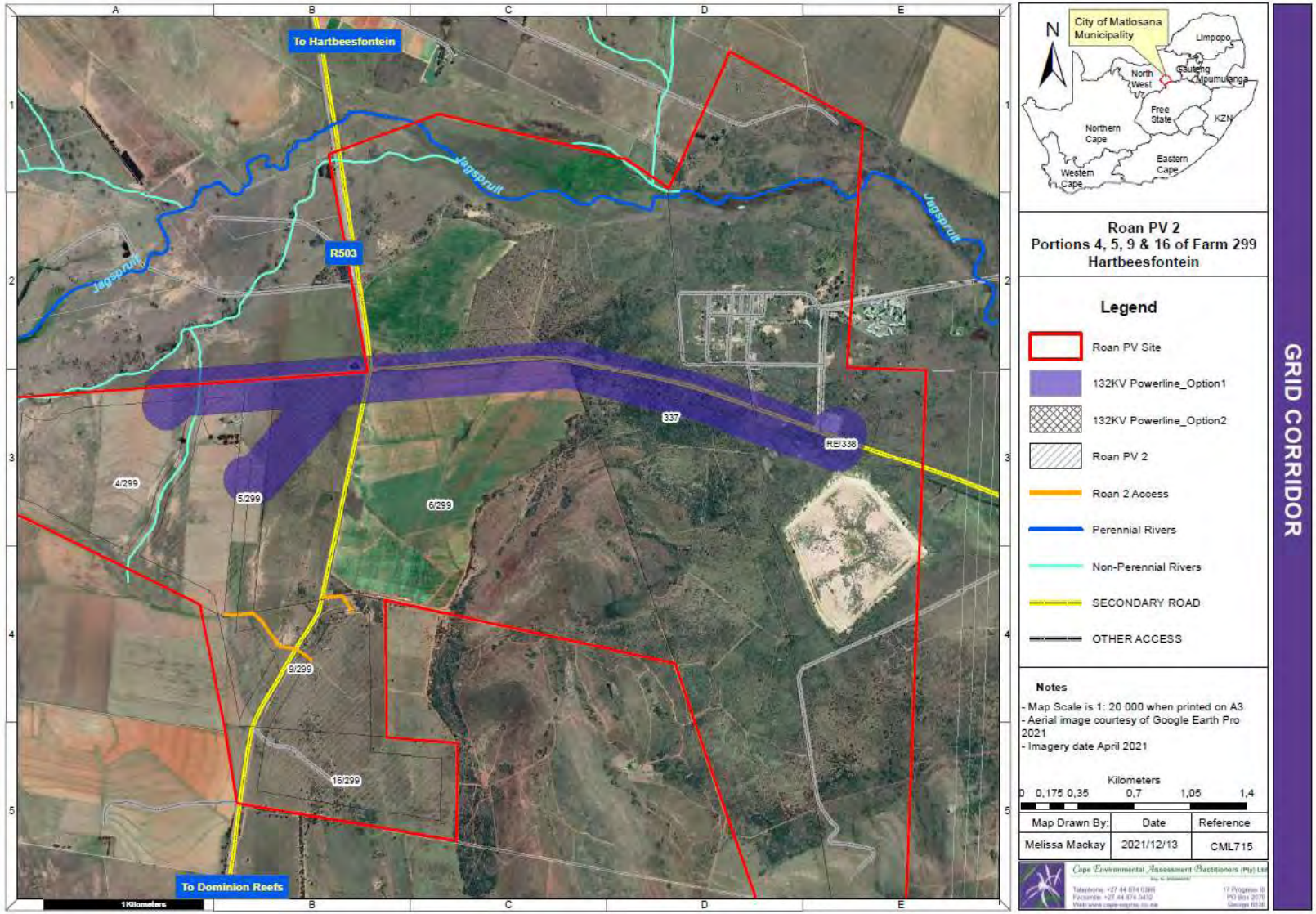


Figure 5: Proposed layout map depicting the grid connect corridors for the PV2 project care of Cape EAPrac.

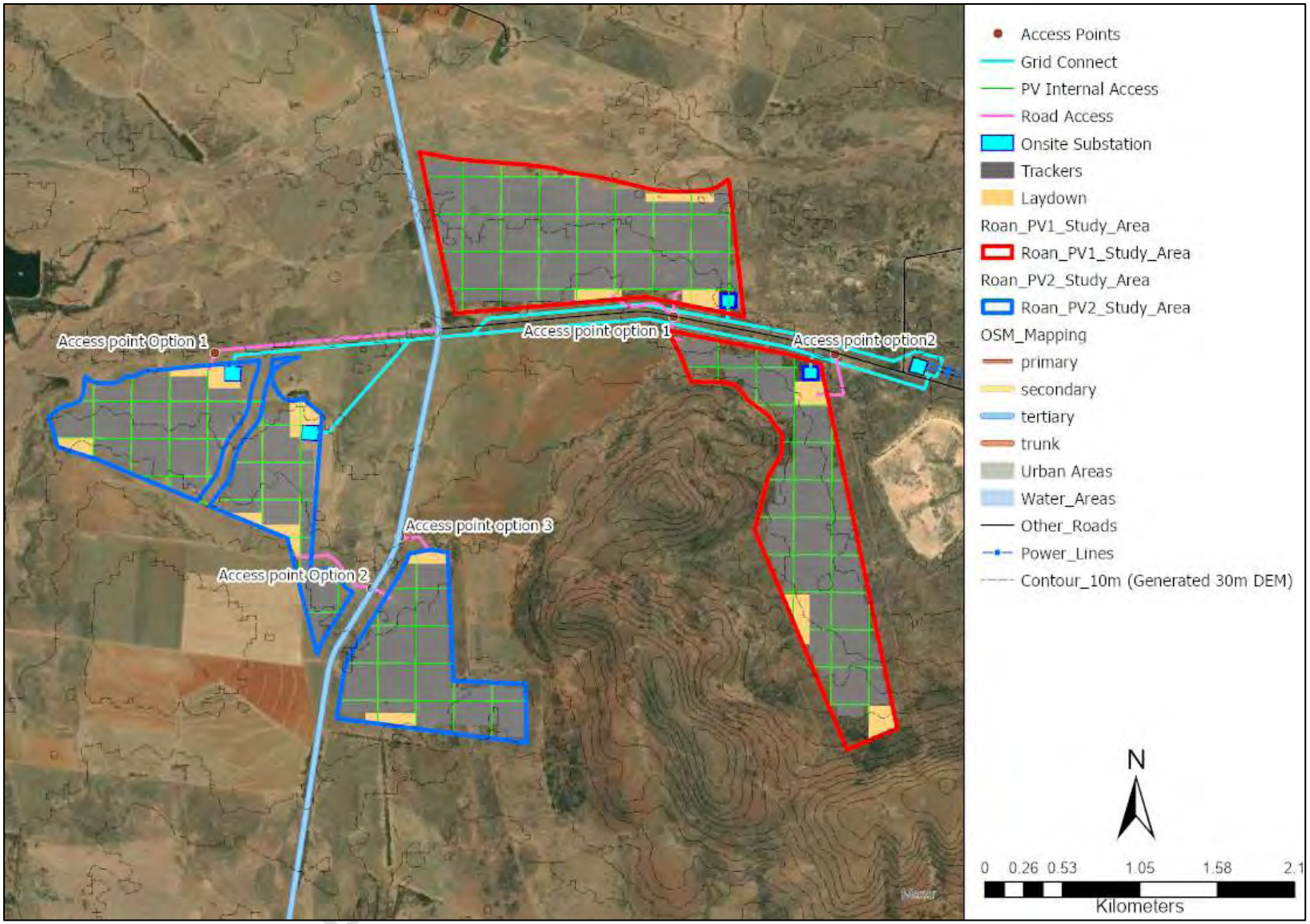


Figure 6: Combined layout map depicting the two proposed Roan PV projects in the area with this study focussing on PV2.

3 LEGAL FRAMEWORK

In order to comply with the Visual Resource Management requirements, it is necessary to relate the proposed landscape modification in terms of international best practice in understanding landscapes and landscape processes. The proposed project also needs to be evaluated in terms of 'policy fit'. This requires a review of 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.

3.1 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).

3.1.1 Guidelines for Landscape and Visual Impact Assessment, Second Edition

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

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

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

3.1.2 International Finance Corporation (IFC)

The IFC Performance Standards (IFC, 2012) do not explicitly cover visual impacts or assessment thereof. Under IFC PS 6, ecosystem services are organized into four categories, with the third category related to cultural services which are defined as "the non-

material benefits people obtain from ecosystems" and "may include natural areas that are sacred sites and areas of importance for recreation and aesthetic enjoyment" (IFC, 2012).

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

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

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

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

3.1.3 Millennium Ecosystem Assessment

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

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

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

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

3.2 National and Regional Legislation and Policies

In order to comply with the Visual Resource Management requirements, it is necessary to clarify which National and Regional planning policies govern the proposed development area to ensure that the scale, density and nature of activities or developments are harmonious and in keeping with the sense of place and character of the area as mapped in Figure 10 below.

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

Table 6: List of key planning informants to the project.

Theme	Requirements
Province	North West Province
District Municipality	Dr Kenneth Kaunda District Municipality
Local Municipality	City of Matlosana Municipality
REDZ	National Energy Planning Klerksdorp REDZ 10

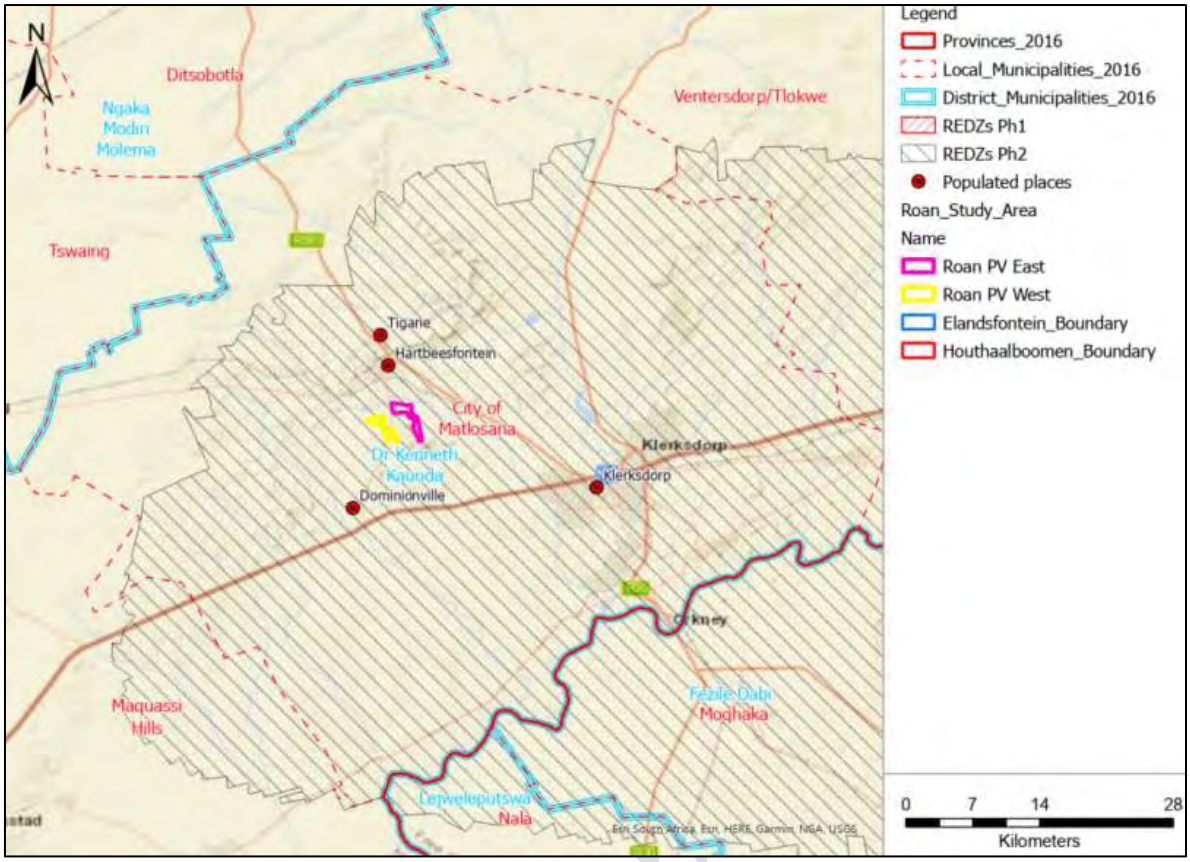


Figure 7: Planning locality map depicting the location of the project within the Klerksdorp REDZ (Roan PV2 indicated by the yellow polygon).

3.2.1 DEA&DP Visual and Aesthetic Guidelines

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

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

3.2.2 REDZ Planning

A Strategic Environmental Assessment commissioned by the Department of Environmental Affairs, undertaken by the CSIR, identified Renewable Energy Development Zones (REDZs). These are gazetted geographical areas in which several wind and solar PV development projects will have the lowest negative impact on the environment while yielding the highest possible social and economic benefit to the country. The project is situated within a Renewable Energy Development Zone (REDZ) known as the Klerksdorp REDZ (REDZ10). (Department of Environment Affairs).

3.2.3 Local and Regional Planning

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

Table 7: North West Provincial Development Plan (North West Provincial Government, 2013).

Theme	Requirements	Page
Renewable Energy	Renewable energies, especially solar and waste/biomass to energy initiatives will play an increasingly important role in the following two decades and will contribute a much greater share of provincial energy consumption.	110
	Promote more sustainable and energy efficient building techniques to reduce the demand on electricity over the long-term. Encourage more independent power producers and promote the use of solar power	79
	The provincial potential as a destination for solar power is often overlooked. The North West province shares a similar solar energy potential than the Northern Cape… The Renewable Energy Strategy for the North West Province (DEDECT, 20129F x) identified two solar power options for the province, Solar Water Heaters and Solar Photovoltaic Technologies.	112
	The North West province has substantial land area available that could potentially be utilised for solar photovoltaic plant applications	113
Tourism	It is critical to develop linkages with the mining and agricultural sectors in manufacturing (agro-processing, input products and beneficiation) and services and to develop the tourism industry	125

Table 8: City of Motlosana Local Municipality Spatial Development Plan Framework (City of Matlosana Municipality , 2009)

Theme	Requirements	Page
Environment	A number of prominent environmental features and resources exist in the municipal area that must be protected against negative impacts of human related activities in order to ensure environmental sustainability. These features and resources include: • Existing protected areas • Dolomite aquifers and dolomite eyes • Hills and ridges • Wetland areas (dam, river, streams and wetlands) • High potential agricultural land • Cultural heritage sites	39
Agriculture	Agricultural land is the most important natural resource within the municipal area. Most of the cultivated land within the municipal area is classified as 'prime agricultural land'.	41
Tourism	Stimulation of tourism nodes along the Vaal River, Vredefort Dome, Highveld National Park and Boskop Dam Nature Reserve Sensitive environmental areas and features form a significant structuring element in the form and structure of future development in the region. On	48

Theme	Requirements	Page
	the one hand, it must be protected in order to ensure long term sustainability and on the other and the functional, educational, recreational and tourism value of these assets must be enhanced.	

3.3 Policy Fit

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

In terms of international best practice, the proposed landscape modification would not trigger any best practice guidelines as there are no significant cultural/ landscape resources on the site or immediate surrounds.

In terms of the local planning, there is a clear emphasis in support of renewable energy that aligns with the project planning. This is further emphasised by the Klerksdorp REDZ. There is also a strong focus on tourism and protection of tourist related resources with the following triggers potentially relating to the proposed landscape change.

- Hills and ridges: The Renosterberg is located adjacent to the proposed site and the general visual resources are being used for tourism by the Renosterberg Safari & Farming, but would not significantly impact the views from the accommodation areas (with mitigation).
- Wetland areas (dam, river, streams and wetlands) are located to the north of the PV1 project, and a suitable buffer would need to be set in place to ensure that encroachment into these visual and ecological resources does not take place.
- High potential agricultural land: The areas proposed for PV development are currently used for agricultural practice and do add to the existing rural agricultural sense of place. Inputs from soil specialist would need to ensure that loss of high potential agricultural land does not take place.

In terms of regional and local planning, the ***expected visual/ landscape policy fit of the landscape change is rated Medium to High.*** While the proposed landscape change is to be seen against the backdrop of the Klerksdorp REDZ planning where renewable energy projects are likely to become more common, the existing tourism activities do make use of landscape resources that could influence the activity sense of place. Mitigation would need to ensure that significant eco-tourism activities are not undermined by the change in landscape character.

4 METHODOLOGY

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

- *"Different levels of scenic values require different levels of management. For example, management of an area with high scenic value might be focused on preserving the existing character of the landscape, and management of an area with little scenic value*

might allow for major modifications to the landscape. Determining how an area should be managed first requires an assessment of the area's scenic values".

- *"Assessing scenic values and determining visual impacts can be a subjective process. Objectivity and consistency can be greatly increased by using the basic design elements of form, line, colour, and texture, which have often been used to describe and evaluate landscapes, to also describe proposed projects. Projects that repeat these design elements are usually in harmony with their surroundings; those that don't create contrast. By adjusting project designs so the elements are repeated, visual impacts can be minimized"* (USDI., 2004).

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

4.1 Baseline Analysis Stage

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

4.1.1 Scenic Quality

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

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

The seven scenic quality criteria are defined below:

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

4.1.2 Receptor Sensitivity

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

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

4.1.3 Exposure

The area where a landscape modification starts to influence the landscape character is termed the Zone of Visual Influence (ZVI) and is defined by the U.K. Institute of Environmental Management and Assessment's (IEMA) *'Guidelines for Landscape and Visual Impact Assessment'* as 'the area within which a proposed development may have an influence or effect on visual amenity (of the surrounding areas).'

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

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

i. ***Foreground / Middle ground***, up to approximately 6km, which is where there is potential for the sense of place to change.

ii. ***Background areas***, from 6km to 24km, where there is some potential for change in the sense of place, but where change would only occur in the case of very large landscape modifications; and

iii. ***Seldom seen areas***, which fall within the Foreground / Middle ground area but, as a result of no receptors, are not viewed or are seldom viewed.

4.1.4 Visual Resource Management Classes

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

Table 9: VRM Class Matrix Table

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

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

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

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

4.1.5 Key Observation Points

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

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

4.2 Assessment and Impact Stage

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

4.2.1 Contrast Rating

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

The following criteria are utilised in defining the DoC:

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

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

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

4.2.2 Photomontages

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

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

The Code of Ethical Conduct states that the presenter should:

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

4.3 Impact Methodology

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

Table 10. DEA&DP Visual and Aesthetic Guideline Impact Assessment Criteria Table.

Criteria	Definition
Extent	The spatial or geographic area of influence of the visual impact, i.e.: • *site-related:* extending only as far as the activity. • *local:* limited to the immediate surroundings. • *regional:* affecting a larger metropolitan or regional area. • *national:* affecting large parts of the country. • *international:* affecting areas across international boundaries.
Duration	The predicted life-span of the visual impact: • *short term,* (e.g., duration of the construction phase). • *medium term,* (e.g., duration for screening vegetation to mature). • *long term,* (e.g., lifespan of the project). • *permanent,* where time will not mitigate the visual impact.
Intensity	The magnitude of the impact on views, scenic or cultural resources. • *low,* where visual and scenic resources are not affected. • *medium,* where visual and scenic resources are affected to a limited extent. • *high,* where scenic and cultural resources are significantly affected.
Probability	The degree of possibility of the visual impact occurring: • *improbable,* where the possibility of the impact occurring is very low. • *probable,* where there is a distinct possibility that the impact will occur. • *highly probable,* where it is most likely that the impact will occur. • *definite,* where the impact will occur regardless of any prevention measures.
Significance	The significance of impacts can be determined through a synthesis of the aspects produced in terms of their nature, duration, intensity, extent and probability, and be described as: • *low,* where it will not have an influence on the decision. • *medium,* where it should have an influence on the decision unless it is mitigated. • *high,* where it would influence the decision regardless of any possible mitigation.

5 BASELINE VISUAL INVENTORY ASSESSMENT

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

define the landscape character, as well as the key receptors that make use of the visual resources created by the landscape.

5.1 Site Investigation

A field survey was undertaken to inform the landscape and visual impact assessment. During the site visit, photographs were taken from each viewpoint, and the view direction and GPS location captured. The main land-use was documented as well as the nature of the dominant landscape in the vista. In order to represent views of the proposed landscape modification by means of photomontages for assessment purposes, panoramic photographs were also taken from key viewpoints. The site survey locations mapped on the following page **in** Figure 8. The site survey photographs are located in Annexure A.

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

- High Exposure to the Renosterberg Safari and Farming eco-tourism activities to the east to the study area.

Table 11: List of Sampling Sites where Landscape and Aesthetic Survey was Conducted

ID	NAME	REMARKS	REC_TIME	LAT	LONG	ELEV
1	Hartbeesfontein	View from Hartbeesfontein towards the Rietkuil Uranium Mine Tailings Dam that does influence the sense of place.	01/22/2022 07:51:04.000 SAST	-26.7707	26.44128	1462
2	Hartbeesfontein	View from Hartbeesfontein of the large grain silo defining the area as an agricultural town.	01/22/2022 07:51:04.000 SAST	-26.7707	26.44128	1462
2	Dominionville Road	KOP view north towards Roan PV1 northern site with the Rietkuil Tailings Dam in the background	01/22/2022 08:06:21.000 SAST	-26.7906	26.42388	1451.1
3	Dominionville Road	KOP view north towards Roan PV2 northern site as seen from the Dominionville Road southbound.	01/22/2022 08:06:21.000 SAST	-26.7906	26.42388	1451.1
3	Roan PV1	Site sense of place (SoP) of western portion depicting grasslands and small scattered trees.	01/22/2022 08:10:17.838 SAST	-26.803	26.42877	1451.1
4	Roan PV2 Power Line	View from the farm road along the proposed Roan PV2 power line corridor.	01/22/2022 08:37:09.000 SAST	-26.8114	26.42591	1444.3
5	Roan PV2 PV	View from the western portion of PV2 to the northwest with Jagspruit River in the midground.	01/22/2022 08:49:20.541 SAST	-26.8186	26.40826	0
5	Roan PV2 PV	Zoomed view across the valley to the town of Hartbeesfontein to the north.	01/22/2022 08:49:20.541 SAST	-26.8186	26.40826	
6	Roan PV2 Central	View east from the Roan PV2 central site with the grasslands in the foreground and the Renosterberg hill in the background.	01/22/2022 09:02:56.689 SAST	-26.8166	26.42005	0
7	Roan PV2 Central	View east from the Roan PV2 central site of typical limited agricultural infrastructure and the Renosterberg hill in the background.	01/22/2022 09:20:28.000 SAST	-26.8272	26.42225	1469.5
7	Roan PV2 Central	View east towards the telephone poles located along the R305 located 100m from the road.	01/22/2022 09:20:28.000 SAST	-26.8272	26.42225	1469.5
8	Roan PV1 South	View east from site of the Rietkuil Mine Tailings Dam located adjacent to the site that degrades the local sense of place.	01/22/2022 10:02:42.065 SAST	-26.8228	26.45243	0
8	Roan PV1 South	Zoomed view of the Rietkuil Mine Tailings Dam and partial rehabilitation on the top and erosion of the sides walls.	01/22/2022 10:02:42.065 SAST	-26.8228	26.45243	

9	Roan PV1 South	View west from the site of the Renosterberg hill in the background owned by Renosterberg Safari and Farming.	01/22/2022 10:06:55.000 SAST	-26.8319	26.45622	1457.4
10	Roan PV1 South	Zoomed view of the Renosterberg Safari accommodation and Lion enclosures overlooking the southern portion of the site, located 550m from the proposed development area.	01/22/2022 10:14:51.000 SAST	-26.8326	26.45306	1467.7
11	Roan PV1 South	View southwest from site along the existing fence line important for management of existing cattle farming.	01/22/2022 10:27:01.040 SAST	-26.8255	26.44766	0
12	Roan PV1 South	Elevated view of the slimes dam located adjacent to the site.	01/22/2022 10:38:12.000 SAST	-26.8198	26.44751	1458.1
12	Roan PV1 South	View west of the higher ground and steeper slopes adjacent to the site.	01/22/2022 10:38:12.000 SAST	-26.8198	26.44751	1458.1
13	Roan PV1 North	Reservoir infrastructure located on the Roan PV1 northern site.	01/22/2022 10:51:19.000 SAST	-26.8086	26.43819	1439.1
14	Roan PV1 North	Lower lying areas that could be associated with water holding soils.	01/22/2022 10:55:05.000 SAST	-26.8028	26.43955	1420
15	Roan PV Power Corridor	View of substation build to power the now defunct Rietkuil Uranium Mine.	01/22/2022 11:15:05.000 SAST	-26.8129	26.45345	1429.9
16	Roan PV1 North	Previously cultivated areas on the western portion of the Roan PV1 North site.	01/22/2022 11:21:36.724 SAST	-26.8092	26.43273	0
17	Roan PV2 Eastern Site	Game fence around the Renosterberg Game Farm that is located 100m to the east of the site.	01/22/2022 12:32:32.000 SAST	-26.8262	26.42957	1476.3
18	Roan PV2 Eastern Site	Photograph southeast of the previously cultivated lands on the site as well as a continuation of the game fence.	01/22/2022 12:41:40.207 SAST	-26.8335	26.43075	0
19	Roan PV2 Eastern Site	View south of the site of the slightly elevated knoll to the south of the site the restricts views from southern receptors to some degree.	01/22/2022 12:42:38.064 SAST	-26.8333	26.42605	0
20	Roan PV2 Eastern Site	Zoomed view to the south of the local farm receptor 2km distance.	01/22/2022 12:45:25.233 SAST	-26.8564	26.43213	0
21	Roan PV2 Eastern Site	View north from the moderately elevated site depicting open views to Hartbeesfontein located in the background	01/22/2022 12:52:48.524 SAST	-26.8285	26.42726	0

22	Roan PV2 Central Site	View northwest towards the Roan PV2 Central Site as seen from the R305 KOP	01/22/2022 13:10:33.000 SAST	-26.8231	26.42577	1462.5
23	Roan PV2 Eastern Site	View southeast towards the elevated Roan PV2 Eastern Site that creates a skyline as seen from the local road KOP.	01/22/2022 13:10:33.000 SAST	-26.8231	26.42577	1462.5
24	Roan PV2 Central Site	View northwest towards the Roan PV2 Central Site as seen from the Dominionville Road KOP	01/22/2022 13:18:20.000 SAST	-26.8312	26.42158	1469.4
25	Roan PV2 Eastern Site	View northeast from the Dominionville Road of the Roan PV2 Eastern Site.	01/22/2022 13:20:59.000 SAST	-26.8355	26.42076	1472.7
25	Roan PV2 Eastern Site	Photograph south of the Dominionville Road with gum trees along the route limited views of the proposed PV landscape change.	01/22/2022 13:20:59.000 SAST	-26.8355	26.42076	1472.7
26	Roan PV2 Grid Connect	Photograph west along the R305 road of the existing telephone and power line infrastructure that increases the visual absorption capacity.	01/22/2022 13:40:27.000 SAST	-26.8109	26.42955	1443.9
27	Roan PV1 North	Key Observation Point for the Dominionville Road northbound towards the Roan PV1 Northern Site.	01/22/2022 13:42:50.000 SAST	-26.8095	26.42781	1443
28	Roan PV1 North	Zoomed photograph of the well vegetation screened farmstead KOP located 800m to the north of the proposed development.	01/22/2022 13:47:04.256 SAST	-26.7936	26.43232	0
29	Roan PV1 South	Main accommodation of the Renosterberg Safari & Farm	01/22/2022 13:47:04.256 SAST	-26.833	26.44526	
29	Roan PV1 South	View as seen from the main accommodation area to the east overlooking the proposed PV site.	01/22/2022 13:47:04.256 SAST	-26.833	26.44526	
29	Roan PV1 South	Photograph of the lower tented camp located on the game farm also view east over the proposed PV site.	01/22/2022 13:47:04.256 SAST	-26.833	26.44526	
30	Roan PV1 South	Elevated view from the top of Renosterberg Safari & Farm depicting the extent of the PV landscape change.	01/22/2022 13:47:04.256 SAST	-26.83	26.44125	
31	Roan PV2 Western Site	Zoomed view to the adjacent farm located 3km to the northwest.	01/22/2022 13:47:04.256 SAST	-26.8029	26.37848	

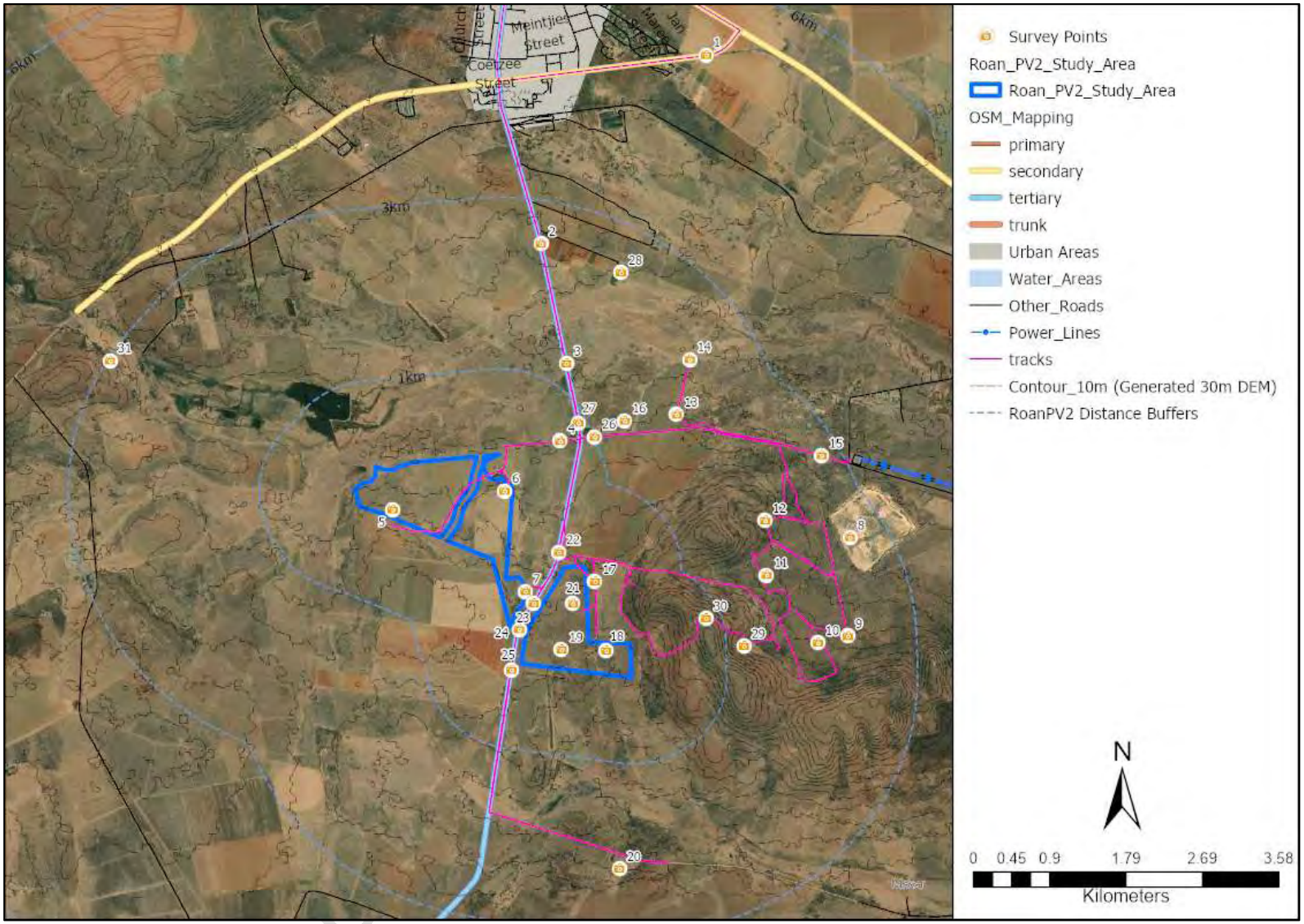


Figure 8: Survey Point Locality Map

5.2 Landscape Context

5.2.1 Regional Locality

The proposed Roan 2 PV Solar Facility is located 3 km south of the town of Hartbeesfontein in the North West Province of South Africa. Like many small rural towns, infrastructure is degraded. The large silo located to the south of the town is the main landscape feature. Within the regional context, the property is located in a rural agrarian landscape predominantly related to maize production, but also including cattle farming. To the east towards Klerksdorp, there is a strongly landscape context of mining, with the now non-operational Rietkuil Uranium Mine located adjacent to the Roan PV1 site. Also clearly visible is the Tailing Storage Facility located to the east of the site. Some rehabilitation has taken place but only on the crest, but this is marginal and with the sides of the tailings eroding, creates a clear mining landscape feature.

5.2.2 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 following paragraph and mapping outline the broad vegetation biome and type.

The Klerksdorp area falls within the grassland biome comprising a wide range of grasses typical of arid areas. The grassland biome, which is second highest to the fynbos biome in species diversity, is regarded as one of the most critically threatened southern African ecosystems (RUTHERFORD & WESTFALL, 1994; SIEGFRIED, 1989). Most of this grassland has been cleared and cultivated with predominantly wheat and maize or is used for cattle and game farming and is disrupted by unnatural fire cycles (RUTHERFORD & WESTFALL, 1994). As can be seen in the map below generated by Cape EAPrac, the southern portion of the PV1 area is associated with Klerksdorp Thornveld, and the northern portion of the site, Vaal-Vet Sandy Grassland.

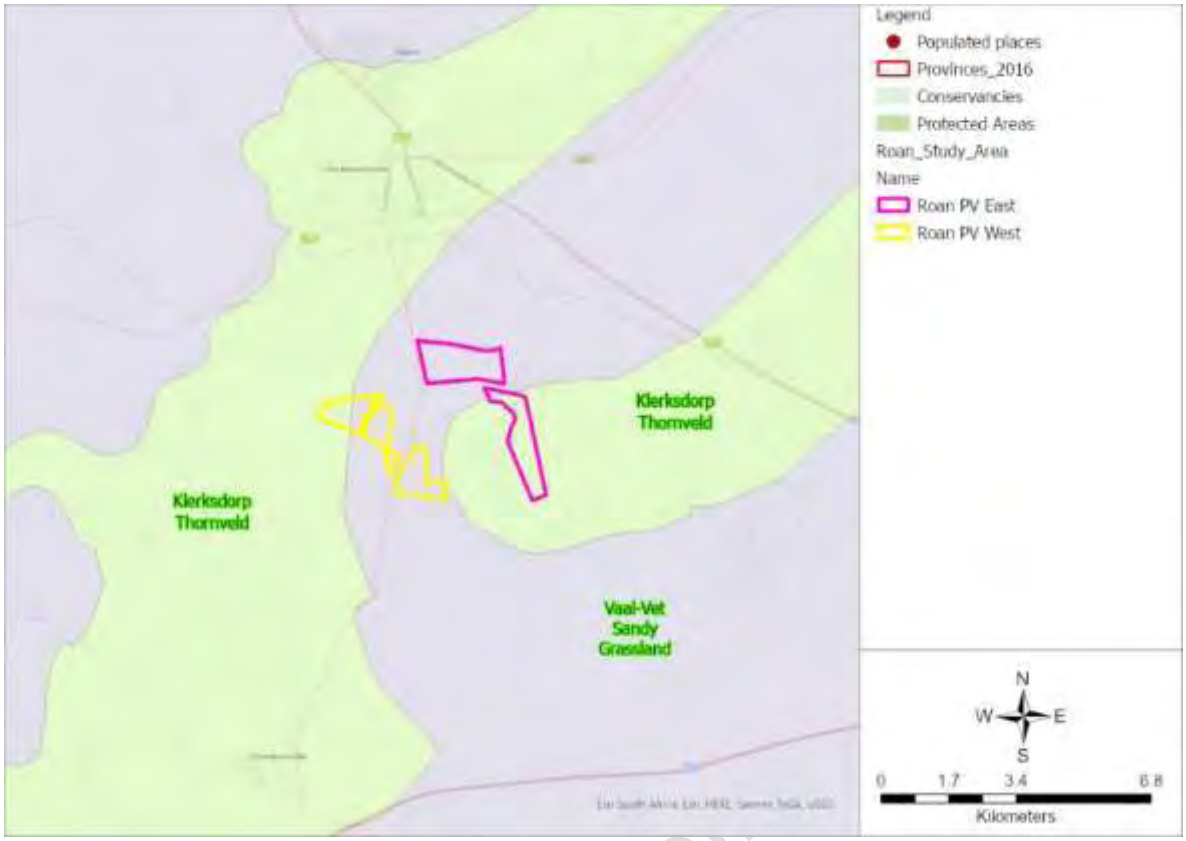


Figure 9. BGIS Vegetation Type Map (South African National Biodiversity Institute, 2018)

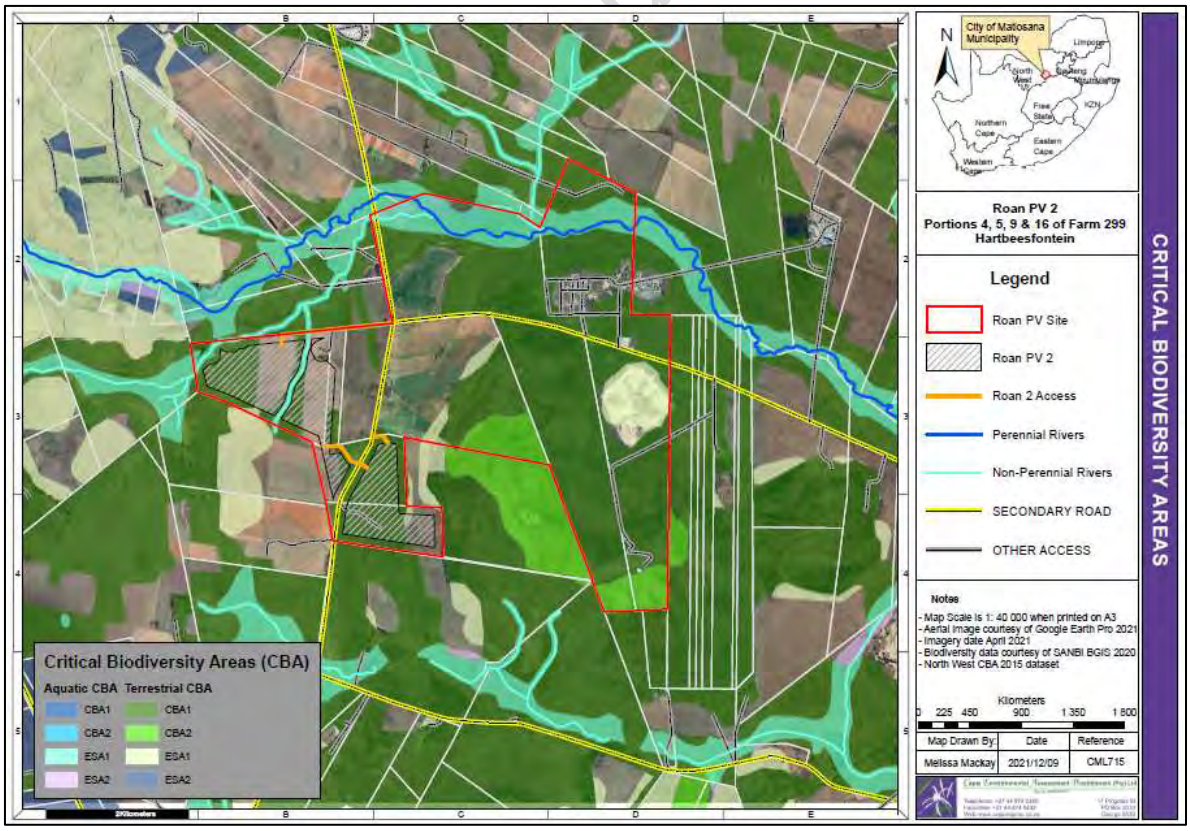


Figure 10. Critical Biodiversity Mapping.

As depicted in the Critical Biodiversity Map provided by Cape EAPrac, the southern and the north-western portion of the sites are classified as CBA1. These areas could have significant vegetation and biodiversity, and these areas would need to be incorporated into the Visual Resource Management mapping as No-go areas should the relevant specialist define this area as not suitable for development.

5.2.3 Mountain and Hill Features

The Matlosana municipal area has a slightly irregular undulating topography dictated by the Vredefort event, which brought about the Vredefort Dome near Parys. The height above sea level ranges between 1 300m and 1 600m, increasing in a general north-westerly direction. The interaction between climate and topography has led to the evolution of a rich biodiversity. The ridges and hills of Klerksdorp have a characteristic range of different aspects, slopes, altitudes, soils and hydrological conditions conducive to heterogeneous abiotic conditions that provide a greater diversity of potential niches for plants and animals than homogeneous landscapes. As a result, many Red Data or threatened species of plants and animals inhabit ridges. In the North West Province, 65% of Red Data plant species have been recorded on ridges (PFAB, 2001). Besides representing habitats, the hills and ridges also serve as important wildlife corridors and provide for movement between defragmented surroundings (ROSENBERG et al., 1997). It is for these reasons that a ridges policy like that which exists for Gauteng, has been recommended in the Provincial Strategic Development Framework (PSDF) for the North West Province (Pg36). (City of Matlosana Municipality , 2009)

As depicted in the photograph below, the Renosterberg Hill is located adjacent to the project area on the western border of the southern portion of the site. The elevated views from this landscape feature have been use

Figure 11. Photograph of the Renosterberg Hills located to the east of the site.

5.2.4 Infrastructure, Mining and Road Access

There are not significant roads or major infrastructure located within the project Zone of Visual Influence (ZVI). The main road past the site is the Hartbeesfontein / Dominionville tarred road that connects the main roads of R503 (north) to the N12 (south). There are no

significant tourist destinations in the regional vicinity that would result in tourist related traffic making use of the minor roads located with the project ZVI. These is a substation located to the northeast of the site that provided electricity to the closed Rietkuil Uranium Mine. There is a large power line corridor linking to the substation but this routes to the east away from the proposed site.

Figure 12: Photograph of Rietkuil Substation.

Figure 13: Zoomed photograph of partially rehabilitated Rietkuil Tailings Storage Facility as seen from the Hartbeesfontein.

5.2.5 Other Renewable Energy Projects

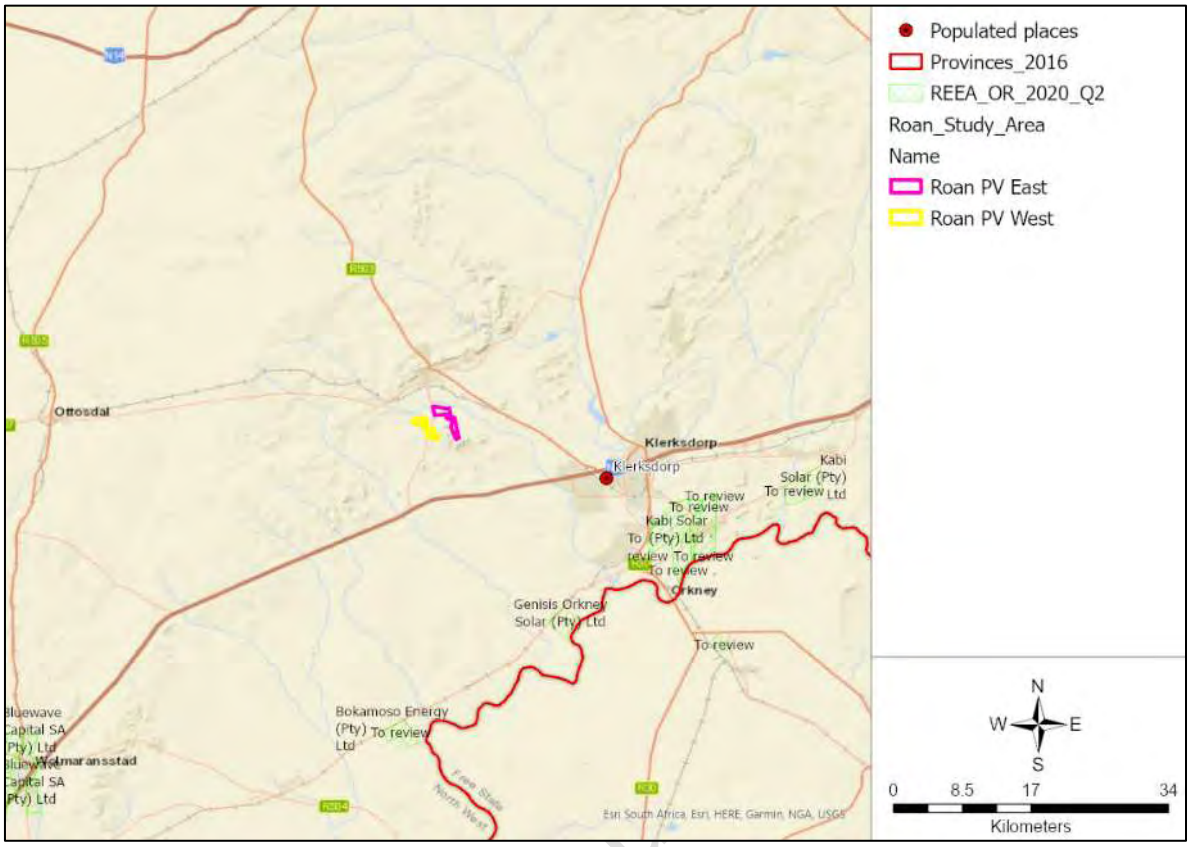


Figure 14: Map depicting DEA Renewable Energy project status.

Even though the area does fall within a REDZ area, there are no other renewable energy projects located within the ZVI that would result is cumulative visual issues associated with landscape cluttering.

5.2.6 Nature and Tourism Activities

As depicted in Figure 15 below, the nearest significant nature conservation areas are the Bosworth and Faan Mentjies Private Nature Reserve. These facilities are not located in the project ZVI.

The nearest tourist related activity is the Renosterberg Safari located adjacent to the site. The area is well established with game and includes two accommodation areas. The following photographs depict the accommodation units. The views from the accommodation look due east and as such would not overlook the proposed PV areas. Tourist making use of the site would have clear views of the PV landscape change as seen from the Renosterberg Hill.

As eco-tourism is emphasised in the local and regional planning, from a cumulative landscape impact perspective, care would need to be taken to ensure that the proposed landscape change does not degrade the views of the main accommodation areas of the Renosterberg Safari areas.

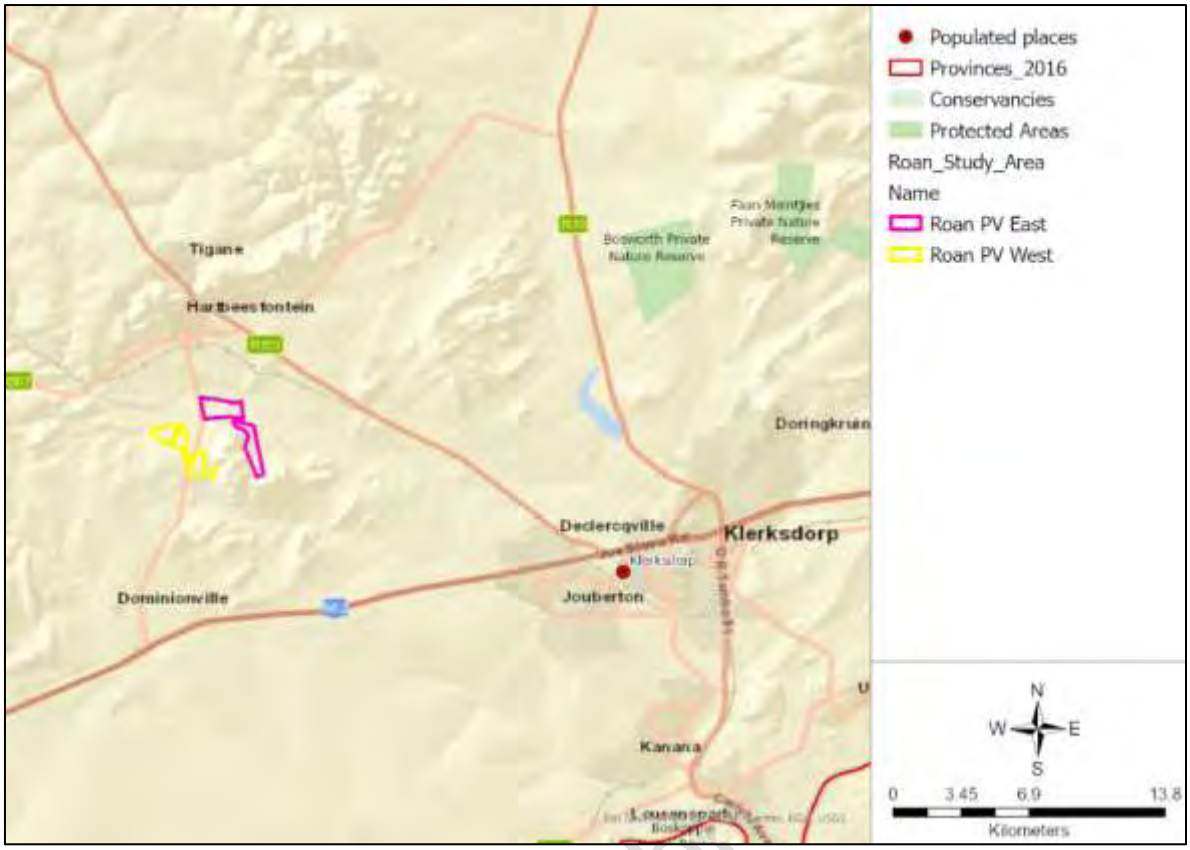


Figure 15: Map depicting the mapped formally protect areas are located outside of the project viewshed.

Figure 16: Photographs depicting the main accommodation at Renosterberg Safari Game Farm that will **not have views to the PV2 project** (but do include PV1 views)

5.3 Project Zone of Visual Influence

The visible extent, or viewshed, is “the outer boundary defining a view catchment area, usually along crests and ridgelines” (Oberholzer, 2005). In order to define the extent of the possible influence of the proposed project, a viewshed analysis was undertaken from the proposed site at a specified height above ground level as indicated in the table below, which

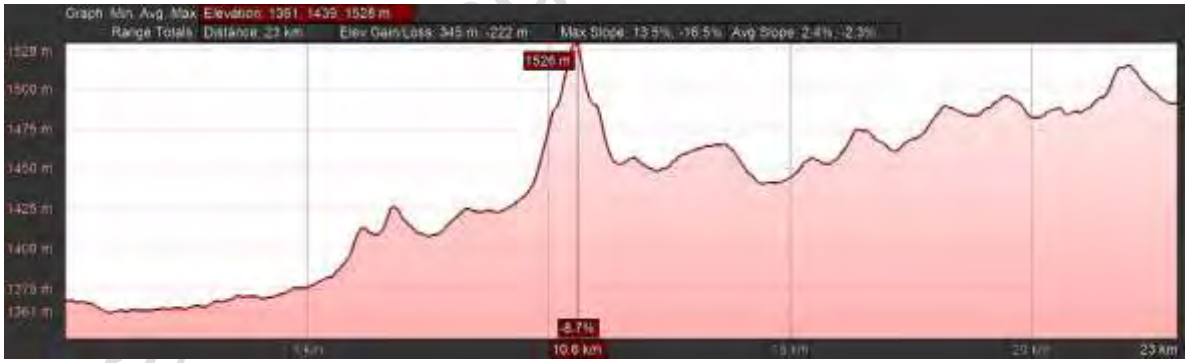
makes use of open-source NASA ASTER Digital Elevation Model data (NASA, 2009). The extent of the viewshed analysis was restricted to a defined distance that represents the approximate zone of visual influence (ZVI) of the proposed activities, which takes the scale, and size of the proposed projects into consideration in relation to the natural visual absorption capacity of the receiving environment. The maps are informative only as visibility tends to diminish exponentially with distance, which is well recognised in visual analysis literature (Hull & Bishop, 1988). The viewshed is strongly associated with the regional topography and as such this topic is address before the viewshed analysis.

5.3.1 Regional Landscape Topography

Making use of the NASA STRM digital elevation model, profile lines were generated for the area within 3km on either side of the project area. The map depicting the regional elevation profile lines can be view in Figure 17 below, with the regional terrain model and profile line locality map in Figure 18 on the following page.

Within the immediate regional topographic context, the minimum elevation is 1361mamsl, the Maximum 1566mamsl and the average 1440mamsl. High ground is to the northwest with drainage to the southeast. To the north of the development site is a low ridgeline lying in an east-west configuration. The town of Hartbeesfontein is located just south of the ridgeline with the upper northern areas creating a shallow plateau. The regional terrain is fairly undulating, with the only main hill feature in close proximity to the proposed site being the Renosterberg Hill located adjacent to the site with an elevation of 1526mamsl, approximately 100m above the average elevation of the adjacent farming areas. With the close proximity of the Renosterberg to the two Roan PV sites, visibility would be strongly divided depending on which site of the hill the development is located.

The East to West Profile



North to South Profile

Figure 17: Elevation Profiles East to West and North to South profiles.

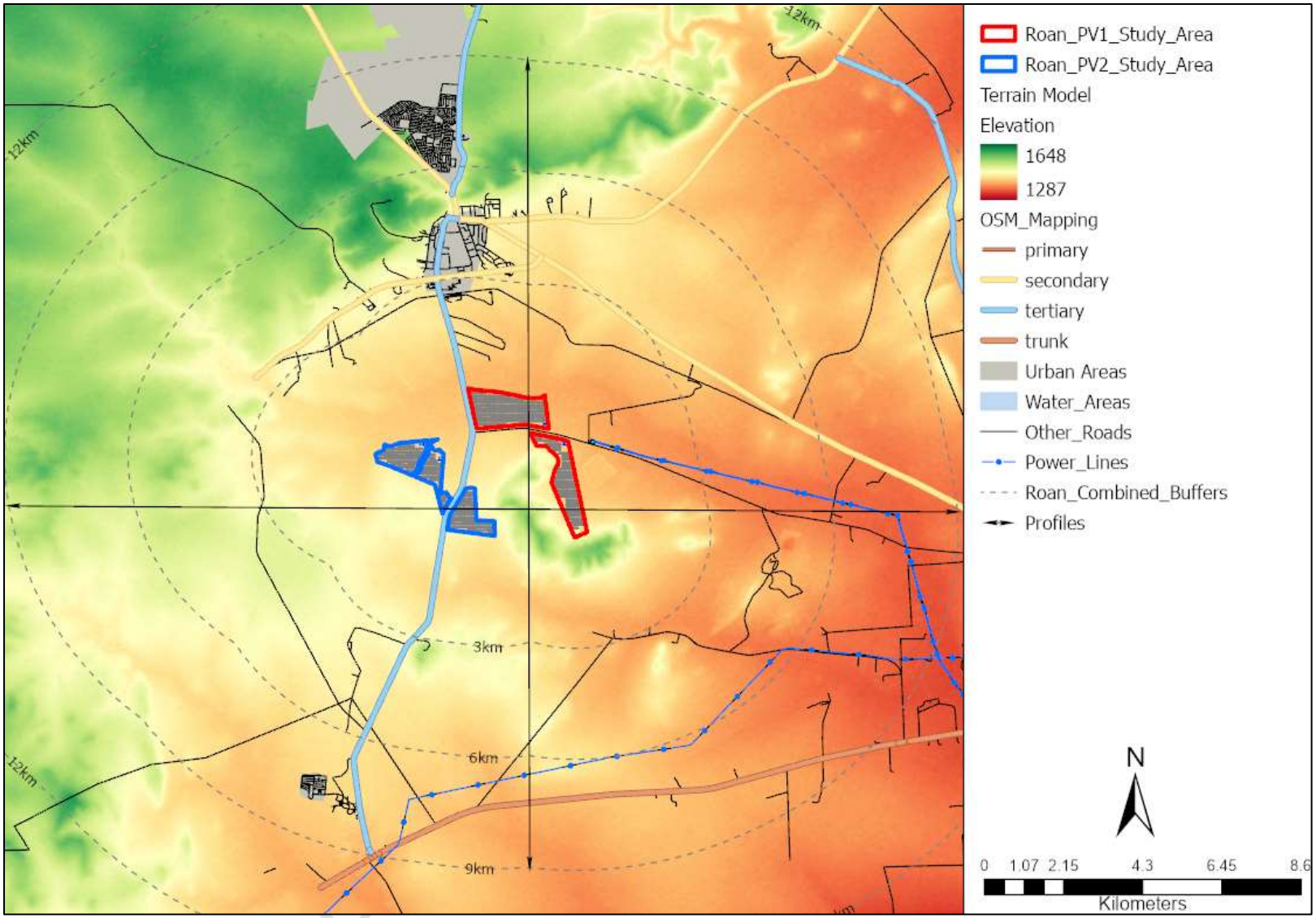


Figure 18: Regional Terrain Model and profile line locality map.

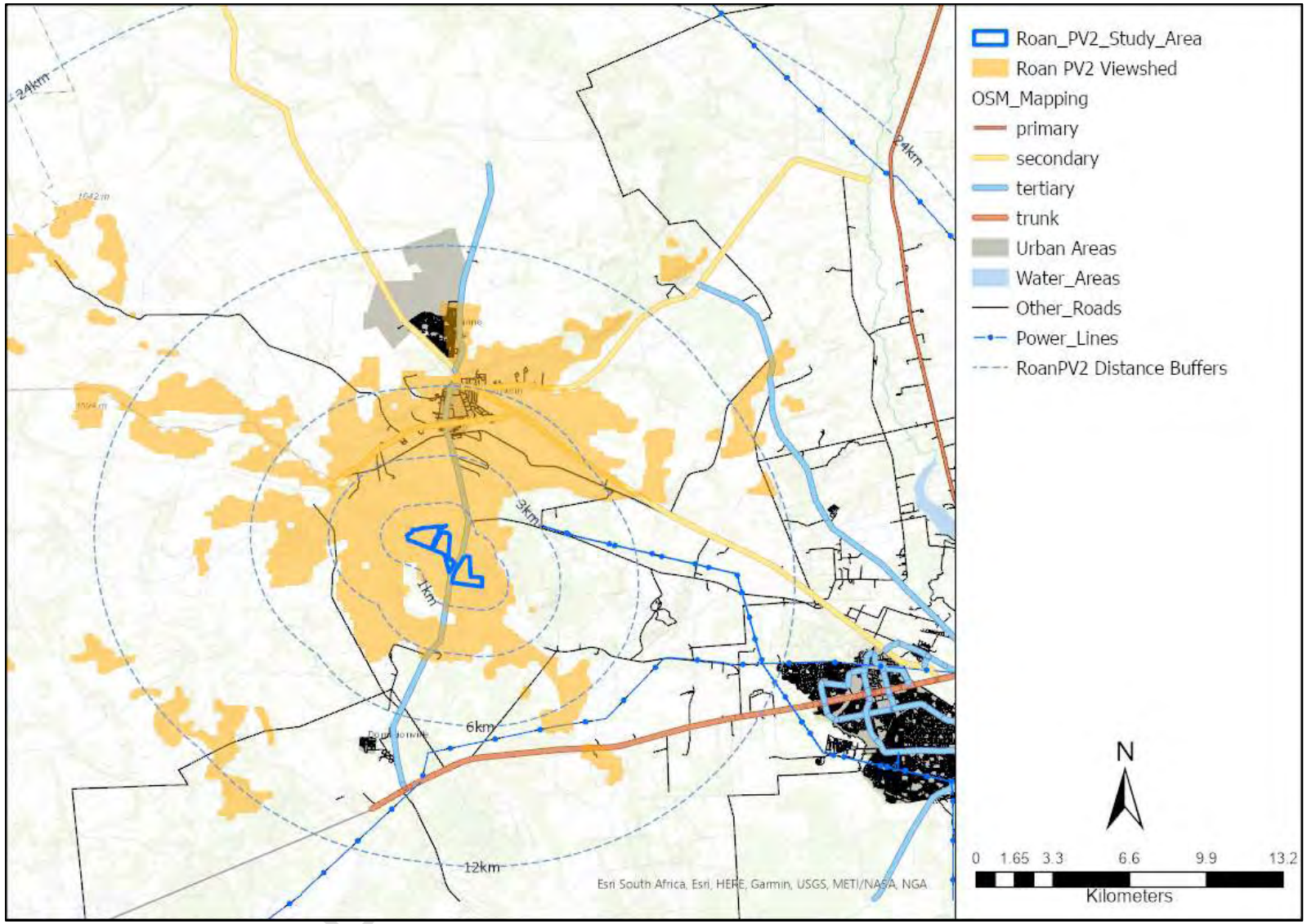


Figure 19: Viewshed analysis map.

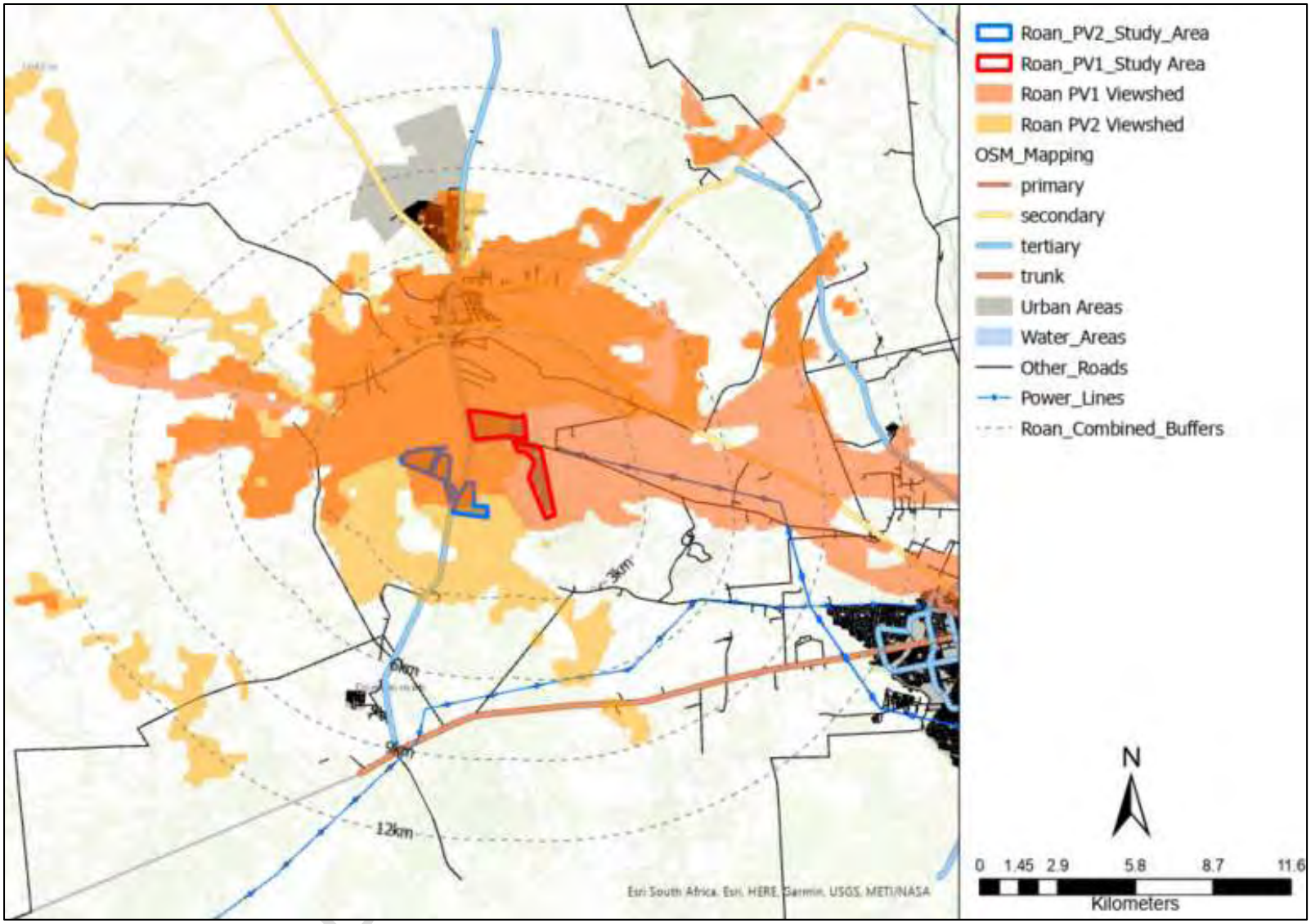


Figure 20: Combined viewshed map depicting the cumulative extent of the two proposed Roan projects.

5.3.2 Viewshed Analysis

A viewshed analysis was undertaken for the site making use of NASA SRTM 30m Digital Elevation Model data. The Offset value for the Roan 2 PV Solar Facility was set above ground to represent the approximate height of the proposed development as reflected in the table below.

Table 12: Proposed Project Heights Table

Proposed Activity	Approx. Height (m)	Terrain Model Extent
Roan 2 PV Solar Facility	3.5m	24km

As can be viewed in Figure 19 on the previous page, the viewshed is mainly east-west oriented in shape and contained by the north and east by raised terrain after the 6km distance. Some expansion to the east is depicted but unlikely to take place due to the wooded vegetation coverage in this area. Views to the south area predominately restricted at the 1km distance due to raised ground. ***Due to the relatively contained viewshed of the project which is mainly contained to the Foreground/ Mid Ground areas (6km), the Zone of Visual Influence is rated Medium.***

From a cumulative perspective, the combined viewsheds of the two proposed Roan PV projects is likely to dominate the local landscape character within the 3km to 6km distance buffer from the project areas. This has relevance from the Renosterberg Safari & Farm eco-tourism venture as both sides of the mountain will be subject to PV landscape changes. For the lower lying farm related receptors, the combined views of the two projects will be limited in that the Renosterberg effectively separates the viewsheds, resulting in less dominating perception of landscape change away from the rural agriculture.

To reduce the 'wrap-around' effect experience for the Renosterberg Safari receptors, it is recommended that the eastern accommodation view is retained as rural farmlands so as to enable the current rural farming/ thornveld landscape character as seen from this locality. This is a visual mitigation requirement for the Roan 1 PV.

5.4 Receptors and Key Observation Points

As defined in the methodology, KOPs are defined by the Bureau of Land Management as the people (receptors) located in strategic locations surrounding the property that make consistent use of the views associated with the site where the landscape modifications are proposed. The following table identifies the receptors identified within the ZVI, as well as motivates if they have significance and should be defined as KOP for further evaluation in the impact assessment phase. The receptors located within the ZVI, and KOPs view lines are indicated the map on the following page. As motivated and mapped in Figure 21 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.

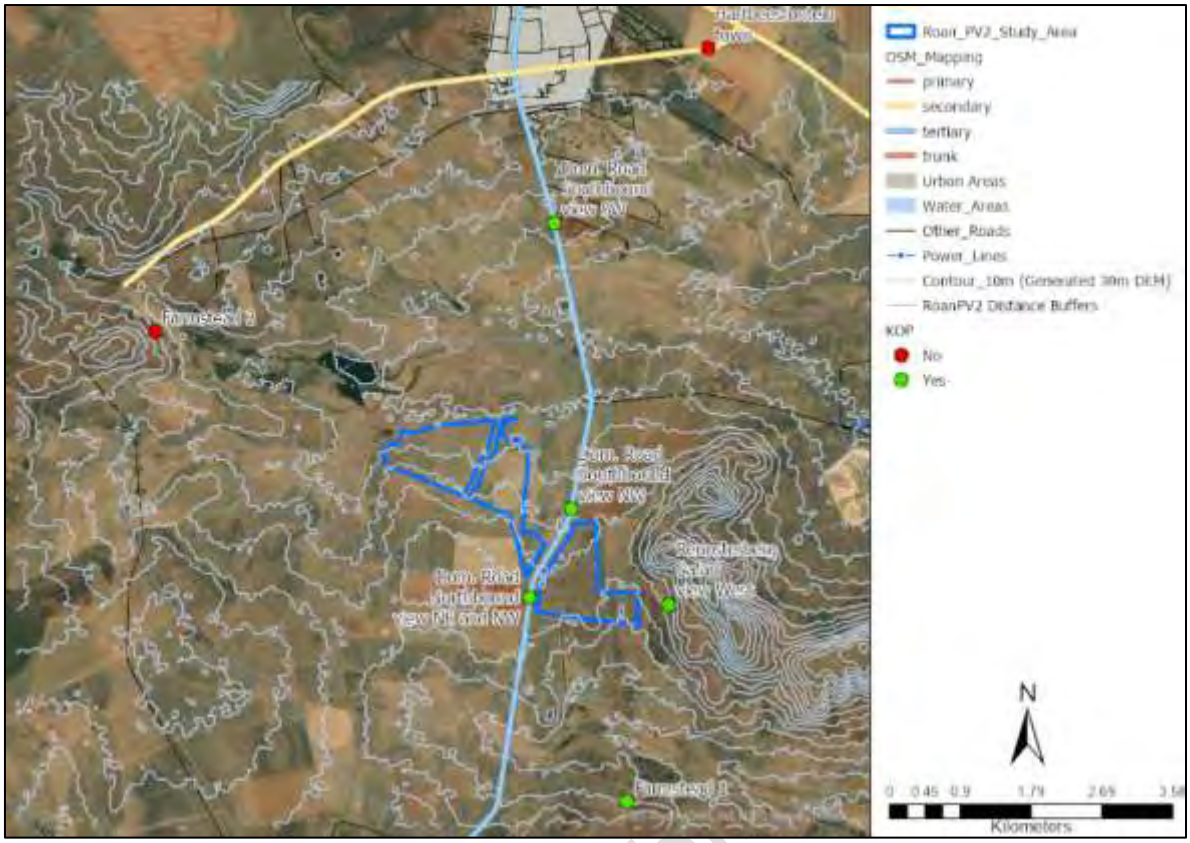


Figure 21: Receptor and Key Observation Point locality map.

Table 13: Receptor and KOP Motivation Table.

ID	Receptor	Exposure	KOP	Motivation
1	Hartbeesfontein town	Low	No	Located approx. 6km to the north of the proposed site, the residential dwellings are urban in character with many shade trees. Views to the south are restricted by the built nature of the landscape.
20	Farmstead 1	Medium	Yes	Located 2.2km to the south of the PV1 site, the farm residential dwellings look across open ground with the PV panels in the background.
22	Dom. Road Southbound view NW	High	Yes	Located 100m from the PV panels.
25	Dom. Road Northbound view NE and NW	High	Yes	Located 100m from the PV panels.
31	Farmstead 2	Medium to Low	No	Located 3km to the northwest of the site, the views of the PV project would fall in the background.
2	Dom. Road Southbound view SW	High	Yes	Located 100m from the PV panels.

30	Renosterberg Safari view West	High	Yes	With elevated views overlooking the site for non-residential receptors starting at 350m, the tourist receptors would have clear views of the proposed PV landscape change.

6 VISUAL RESOURCE MANAGEMENT

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

6.1 Physiographic Rating Units

The Physiographic Rating Units are the areas within the proposed Roan 2 PV Solar Facility development area that reflect specific physical and graphic elements that define a particular landscape character. These unique landscapes within the project development areas are rated to assess the scenic quality and receptor sensitivity to landscape change, which is then used to define a Visual Resource Management Class for each of the site's unique landscape/s. The exception is Class I, which is determined based on national and international policy / best practice and landscape significance and as such are not rated for scenic quality and receptor sensitivity to landscape change. Based on the SANBI mapping and the site visit to define key landscape features, the following broad-brush areas were tabled and mapped in Figure 22 below.

Table 14: Physiographic Landscape Rating Units.

Landscapes	Motivation
Agriculturally modified Vaal-Vet Sandy Grassland	The area includes the previously modified Vaal-Vet Sandy Grassland located on the northern portion of the proposed development site. The western portion of this site has been recently cultivated and cleared of trees. The eastern portion of this area has been used for cattle farming and the thornveld vegetation has been retained.
Agriculturally modified Klerksdorp Thornveld	This area is located on the southern portion of the proposed PV site where the predominant vegetation is defined as Klerksdorp Thornveld. The area is highly vegetated with many small to medium sized trees that characterised the thornveld.

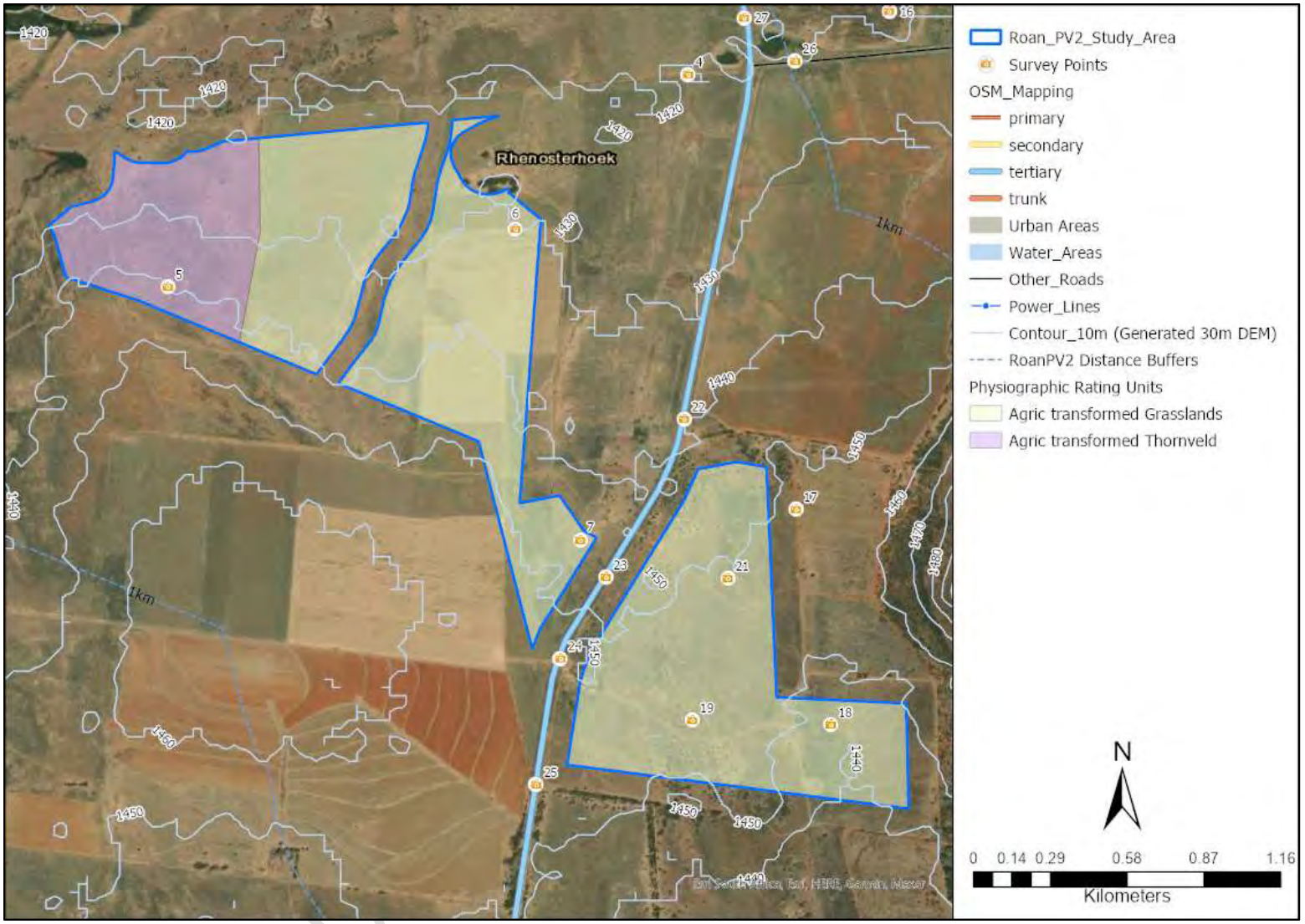


Figure 22: Physiographic Rating Units demarcated within the defined study area.

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)**																
Agric. Transformed Grassland	1	2	3	3	2	4	0	**15**	**B**	M	M	L	M	L	**L**	**IV**	**III**
Agric. Transformed Thornveld	1	2	3	3	2	4	0	**15**	**B**	M	M	L	M	L	**L**	**IV**	**III**

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

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

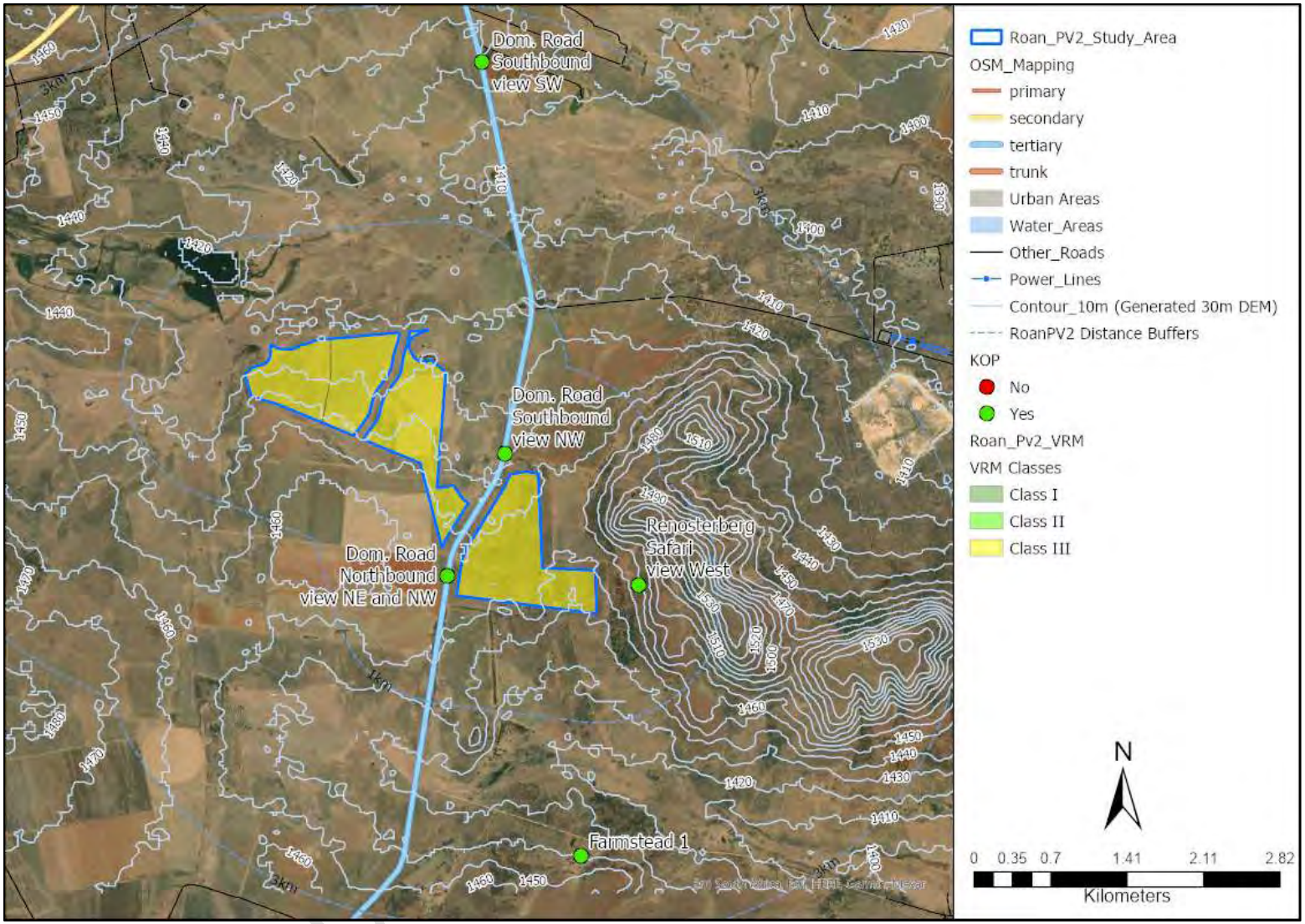


Figure 23: Visual Resource Management Classes map.

6.2 Scenic Quality Assessment

The scenic quality of the proposed development site is rated Medium. This is predominantly due to the Thornveld vegetation, the proximity to the Renosterberg Hill as well as the surrounding rural agricultural landscapes. While water is not apparent on site, there are likely to be drainage lines, but they are not a dominating feature in the landscape. Terrain of the area is essentially flat in gradient, with some slope on the southern portion of the land. Colours were interesting with the darker greens of the thornveld contrasting with the khaki colours of the grasslands. Adjacent Scenery includes the Renosterberg Hill, adding value to the locality.

6.3 Receptor Sensitivity Assessment

Receptor sensitivity to landscape changes is rated Medium to Low. Type of Users would be related to rural agricultural practices of the region, with amount of use Limited. As this type of rural agricultural landscape is fairly common in the region, Public Interest is likely to be Low. Adjacent Users is rated Medium due to the close proximity views from the non-residential Renosterberg Safari & Farm, when using the eastern portions of the hill for hunting.

6.4 Visual Resource Management (VRM) Classes

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

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

6.4.1 Class I

Class I is assigned when legislation restricts development in certain areas. The visual objective is to preserve the existing character of the landscape, the level of change to the characteristic landscape should be very low and must not attract attention. A Class I visual objective was assigned to the following features within the proposed development area due to their protected status within the South African legislation:

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

6.4.2 VRM Class II

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

- ***Not applicable***

While the proposed landscape change would be visible from the Renosterberg Safari & Farm hunters, views of the hill also include towns as well as views of Rietkuil Uranium Mine Tailings, as well as cultivated landscapes in this rural agricultural landscape.

6.4.3 VRM Class III

The Class III objective is to partially retain the existing character of the landscape, where the level of change to the characteristic landscape should be moderate. Management activities may attract attention but should not dominate the view of the casual observer, and changes should repeat the basic elements found in the predominant natural features of the characteristic landscape. The following landscape was defined as having Class III Visual Objectives where development would be most suitable:

- **Agric. Transformed Vaal-Vet Sandy Grassland**
- **Agric. Transformed Klerksdorp Thornveld**

With Medium Scenic Quality ratings and Medium to Low Receptor Sensitivity likely, the resulting Visual Inventory rating is Class IV. However, as this is not an industrial type location, and where the surrounding rural agricultural landscape has landscape value, the Class IV was assigned as Visual Resource Management Class III. This change is also motivated based on the areas also falling within the Klerksdorp REDZ where renewable energy project is promoted.

6.4.4 VRM Class IV

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

7 VISUAL IMPACT ASSESSMENT

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

7.1 Contrast Rating 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 DoC:

- **None**: The element contrast is not visible or perceived.
- **Weak**: The element contrast can be seen but does not attract attention.

- **Moderate**: The element contrast begins to attract attention and begins to dominate the characteristic landscape.
- **Strong**: The element contrast demands attention, will not be overlooked, and is dominant in the landscape.

As this is a Basic Assessment due to the location of the study area within the Klerksdorp REDZ, no photomontages were generated. The expected positioning of the PV area in the landscape was provisionally depicted on KOP photographs in the Annexure. The following table identified the KOP that would need to be used to assess the suitability of the landscape change. The scale and positioning of the PV areas was informed by a 3D model that replicated the view of the area where the landscape change is proposed as per the example below.

Figure 24: 3D model view as seen from Farmstead 1 Key Observation Point with the PV Survey Area represented as blue line.

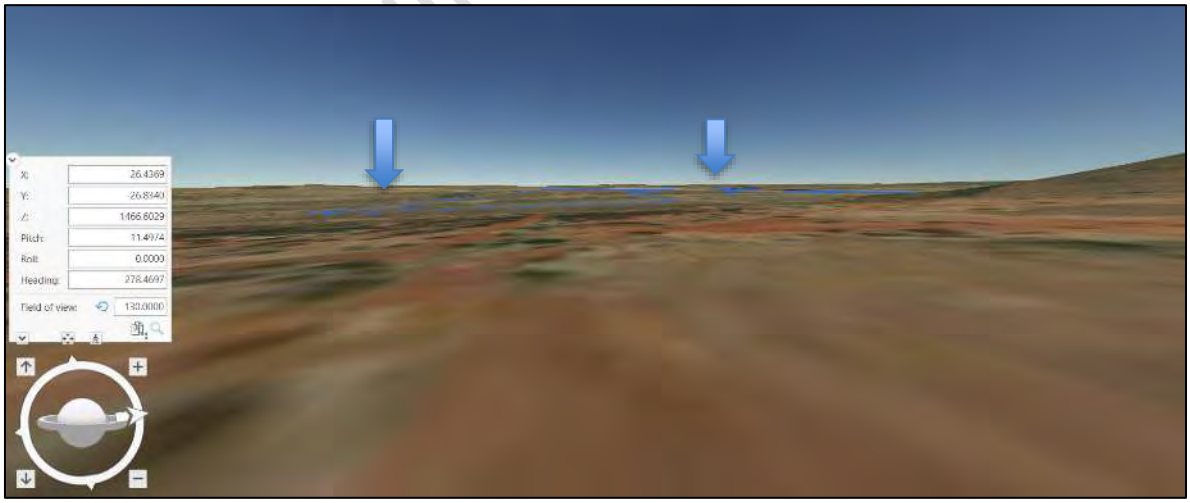


Figure 25: 3D model view as seen from Renosterberg Safari 'side of hill' Key Observation Point.

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?**
Dominionville Road Southbound	100m	Medium	W/Out	W	M	S	S	MS	No
			With	W	M	M	M	M	Yes
Farmstead 1	2.2km	Medium	W/Out	W	W	W	M	MW	Yes
			With	Not required					
Renosterberg Safari hill views	350m	High	W/Out	W	M	M	S	M	Yes
			With	Not required					

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

Dominionville Road

As seen from the Dominionville Road travelling in a north and southbound direction at a similar height, there is unlikely to be much visible Form change as the PV structures would be placed on surface of the ground with limited excavation (if at all). Without vegetation screening along the road, the Line created by the PV panels would be Strong, as well as the black colour and shiny texture. Without mitigation the visual intensity is likely to be strongly experienced, detracting from the higher scenic quality of the rural agrarian landscape. With mitigation and the planting of Thornveld trees in the buffer between the road and the PV site, the trees would effectively screen the panels over time. As such, the Class III visual objective would be met allowing for the retaining of the local landscape character, but with the landscape change still being a visual element in the landscape. As there are existing Thornveld trees along the road indicating that the trees can be established in the region, the mitigation confidence is rated High.

In terms of visual contrast generated by the monopoles crossing the road, the expected DoC is rated as Moderate. While the structures would clearly be noticeable, the T-junction already has a higher VAC levels with existing vertical poles for telephone and 88kV farm power line routing. The visual preference is for Alternative 1 routing that is located to the south of the minor road, keeping the northern views to the Jagskuil River open as much as possible. The mining context created by the Rietkuil Uranium Mine Tailing Dam also degrades the local landscape character to some degree, increasing the VAC levels for the site and surrounds.

Farmstead 1

The proposed PV area appears fragmented in the landscape, with a low rise to the south of the site breaking up combined views of the PV site. As the PV would not require large excavations and would follow the natural terrain, Form change is minimal. Colours in the natural landscape include grey brown and darker greens, that would allow some reduction of colour contrast to the black colour of the PV panels. Due to the distance, Texture contrast is also likely to be moderated. The expected DoC is Medium that would be acceptable to the rural agricultural landscape without mitigation, as rural landscape has higher VAC levels

which would need to accommodate larger structure (sheds/ barns) as well as large shade areas over sun-sensitive crops as well as different coloured crops.

Renosterberg Safari Hill View

Located on the side of the Renosterberg Hill overlooking the proposed PV site with High levels of Visual Exposure (500m), no screening mitigation is achievable on site. Form change would be limited as the PV panels would follow the landform. Colours in the natural landscape include grey brown and darker greens as well as different textures created by different planting of crops, that would allow some reduction of colour contrast to the black colour of the PV panels. Due to the elevated location, Texture contrast is also likely to be Strong with the panels creating a shiny surface.

The resulting Medium DoC would meeting the Class III Visual Resource Management Objective without Mitigation. The landscape change would however be clearly noticeable but would not significantly detract from the working rural agricultural landscape of the receiving landscape.

7.2 Roan 2 PV Project Impact Ratings and Motivation

The following visual impacts could take place during the lifetime of the ***proposed*** Roan 2 PV Solar Facility project:

Construction:

- Loss of site landscape character due to the removal of vegetation and the construction of the PV structures and associated infrastructure.
- Wind-blown dust due to the removal of large areas of vegetation.
- Possible soil erosion from temporary roads crossing drainage lines.
- Wind-blown litter from the laydown and construction sites.

Operation:

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

Decommissioning:

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

Cumulative:

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

Table 17: Construction Phase Impacts Table

Project phase	**Construction Phase**
Impact	**Short-term landscape change from the current rural agricultural sense of place to the semi-industrial RE landscape.**
Description of impact	• Loss of site landscape character due to the removal of vegetation and the construction of the PV structures and associated infrastructure. • Wind-blown dust due to the removal of large areas of vegetation.

	• Possible soil erosion from temporary roads crossing drainage lines. • Wind-blown litter from the laydown and construction sites.			
Mitigability	Medium	The mitigation will partially reduce the significance of the visual and landscape impacts		
Potential mitigation	• Planting of indigenous, endemic thornveld trees along the R505 road in a scattered pattern reflecting natural scattered growth patterns. • 3 trees per 2500m square. • Allow nature growth of the trees in the buffer without the trees becoming a fire risk. • Allow cattle access to the buffer areas to keep managing grasslands and retain a link to the rural agricultural sense of place.			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Short term	Impact will last approximately 12 months.	Short term	Impact will last approximately 12 months.
Extent	Local	Contained within the Foreground/ Mid Ground (approx. 6km from site)	Local	Contained within the Foreground/ Mid Ground (approx. 6km from site)
Intensity	Medium	Natural and/ or social functions and/ or processes are clearly altered.	Medium to Low	Natural and/ or social functions and/ or processes are partially altered.
Probability	Likely	The impact is likely to occur	Likely	The impact is likely to occur.
Confidence	Sure	Substantive supportive data exists to verify the assessment	Sure	Substantive supportive data exists to verify the assessment
Reversibility	Medium	The affected landscape will be able to recover from the impact as there are minimal cut/fills and the thornveld vegetation will regrow over time to some degree.	Medium	The affected landscape will be able to recover from the impact as there are minimal cut/fills and the thornveld vegetation will regrow over time to some degree.
Significance	**Medium (-ve)**		**Medium to Low (-ve)**	
Comment on significance	Without mitigation, the High Exposure views from the adjacent road would detract from the local landscape character.		Mitigation for dust and retaining/ encouraging of existing growth in the road buffers would assist in reducing the intensity of the PV landscape change.	
Cumulatives	**Low (-ve)**		**Low (-ve)**	
Cumulative impacts	As the development takes place within the Klerksdorp REDZ, RE landscape change is planned and is likely to become more common in the landscape. While views from Renosterberg hill would have clear views overlooking the PV2 sites, the accommodation area have views to the east and would not be impacted (with mitigation).		NA	

Table 18: Operation Phase Impacts Table

Project phase	Operation Phase			
Impact	**Short-term landscape change from the current rural agricultural sense of place to the semi-industrial RE landscape.**			
Description of impact	• Loss of site landscape character due to the operation of the PV structures and associated infrastructure.			
Mitigability	Medium	The mitigation will partially reduce the significance of the visual and landscape impacts		
Potential mitigation	• Planting of indigenous, endemic thornveld trees along the R505 road in a scattered pattern reflecting natural scattered growth patterns. • 3 trees per 2500m square. • Allow nature growth of the trees in the buffer without the trees becoming a fire risk. • Allow cattle access to the buffer areas to keep managing grasslands and retain a link to the rural agricultural sense of place.			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Long term	Impact will last approximately 20 years	Long term	Impact will last approximately 20 years
Extent	Local	Contained within the Foreground/ Mid Ground (approx. 6km from site)	Local	Contained within the Foreground/ Mid Ground (approx. 6km from site)
Intensity	Medium	Natural and/ or social functions and/ or processes are clearly altered.	Medium to Low	Natural and/ or social functions and/ or processes are partially altered.
Probability	Likely	The impact is likely to occur	Likely	The impact is likely to occur.
Confidence	Sure	Substantive supportive data exists to verify the assessment	Sure	Substantive supportive data exists to verify the assessment
Reversibility	Medium	The affected landscape will be able to recover from the impact as there are minimal cut/fills and the thornveld vegetation will regrow over time to some degree.	Medium	The affected landscape will be able to recover from the impact as there are minimal cut/fills and the thornveld vegetation will regrow over time to some degree.
Significance	**Medium to High (-ve)**		**Medium (-ve)**	
Comment on significance	Without mitigation, the High Exposure views from the adjacent road would detract from the local landscape character. However, the proposed PV development in the rural agricultural landscape will be clearly noticeable to local receptors. The intensity of the landscape change is moderated by the REDZ planning.		Mitigation for dust and retaining/ encouraging of existing growth in the road buffers would assist in reducing the intensity of the PV landscape change as seen from road receptors. The views from the Renosterberg Safari hill where hunting does take place, will include the PV panels and would detract from the current rural agricultural sense of place. The intensity of the landscape change is moderated by the REDZ planning.	

Cumulatives	Low (-ve)	Low (-ve)
Cumulative impacts	As the development takes place within the Klerksdorp REDZ, RE landscape change is planned and is likely to become more common in the landscape. While views from Renosterberg hill would have clear views overlooking the PV2 sites, the accommodation area have views to the east and would not be impacted (with mitigation).	NA

Table 19: Decommissioning Phase Impacts Table

Project phase	Decommissioning Phase			
Impact	**Short-term landscape change from the removal of the PV structures, followed by rehabilitation of the impacted areas back to agricultural lands.**			
Description of impact	• Movement of large vehicles required for the removal of the PV panels, power lines, mono-poles and substations. • Wind-blown dust from impacts to vegetation. • Wind-blown litter from the laydown and construction sites.			
Mitigatability	Medium	The mitigation will reduce the significance of the visual and landscape impacts		
Potential mitigation	• Dust suppression measures. • Litter management measures. • Rehabilitation of impacted areas to agriculturally viable grasslands.			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Short term	Impact will last approximately 8 months.	Short term	Impact will last approximately 8 months.
Extent	Local	Contained within the Foreground/ Mid Ground (approx. 6km from site)	Local	Contained within the Foreground/ Mid Ground (approx. 6km from site)
Intensity	Medium	Natural and/ or social functions and/ or processes are moderately altered.	Medium	Natural and/ or social functions and/ or processes are moderately altered.
Probability	Likely	The impact is likely to occur	Likely	The impact is likely to occur.
Confidence	Sure	Substantive supportive data exists to verify the assessment	Sure	Substantive supportive data exists to verify the assessment
Reversibility	Medium	The affected landscape will be able to recover from the impact as there are minimal cut/fills and the thornveld vegetation will regrow over time to some degree.	Medium	The affected landscape will be able to recover from the impact as there are minimal cut/fills and the thornveld vegetation will regrow over time to some degree.
Significance	**Medium (-ve)**		**Low (-ve)**	

Comment on significance	The dust and vehicle movement impacts are short-term in Duration, and outside the main views of the Renosterberg Safari accommodation.	Visual Intrusion from wind blown dust and from vehicle movement is limited and short-term in Duration.
Cumulatives	**Medium (-ve)**	**None (-ve)**
Cumulative impacts	Without rehabilitation, the return of the vegetation to the site and the associated visual impacts would last a longer time period. However, as this is likely to occur naturally, the cumulative risk is limited.	Effective management of rehabilitation can result in the return of the landscape to that of a functional agricultural area.

8 PRELIMINARY ENVIRONMENTAL MANAGEMENT PLAN

8.1 PV Project

8.1.1 Construction Phase

- Bushveld trees surrounding the proposed PV sites should be retained for visual screening, with further indigenous trees allowed to grow.
- In order to retain the functional rural agricultural sense of place, the buffer areas around the PV site should be fenced off and used for cattle grazing to reduce the risk of fire.
- 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 should be simple, diamond shaped (to catch wind-blown litter) and appear transparent from a distance. The fences should be checked on a monthly basis for the collection of litter caught on the fence.
- Signage on the Dominionville Road should be moderated.
- Lights at night have the potential to significantly increase the visual exposure of the proposed project. It is recommended that mitigations be implemented to reduce light spillage (refer to appendix for general guidelines).
- Limit the height of the PV panels to 3.5m above ground level.

8.1.2 Operation Phase

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

8.1.3 Decommissioning Phase

- All structures should be removed and where possible, recycled.
- Building structures should be broken down (including foundations).
- The rubble should be managed according to NEMWA and deposited at a registered landfill if it cannot be recycled or reused.

- All compacted areas should be rehabilitated according to a rehabilitation specialist.
- Monitoring for soil erosion should be undertaken on a routine basis.

9 PRELIMINARY OPPORTUNITIES AND CONSTRAINTS

9.1 Roan 2 PV Project

9.1.1 Opportunities

- The ZVI is contained to the local area with Foreground/ Mid Ground distancing due to undulating terrain and thornveld vegetation. This would result in a moderate zone of visual influence.
- National energy objectives for renewable energy and job creation will be met with the site located within the REDZ area.
- Although interesting, the Renosterberg hill is not significant landscape feature in the landscape.

9.1.2 Constraints

- High Exposure views from adjacent Renosterberg Safari & Farm game farm hunting areas.

9.2 No-Go Option

9.2.1 Opportunities

- The current rural agricultural land uses of the property do add to the regional sense of place, due to the remoteness of the locality and the undulating fynbos landscape.
- Agricultural productivity from cattle farming creates some employment opportunities.

9.2.2 Constraints

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

PV Component Comparative Finding

As the Roan 2 PV project is located within the REDZ area there is a positive alignment to local and regional planning, the recommendation of the visual and landscape assessment is that the Roan 2 PV is preferred to the No-go Option.

9.3 Roan 2 Grid Connect Alt 1

9.3.1 Opportunities

- The ZVI is contained to some degree due to thornveld vegetation and topographic screening to the south.
- National energy objectives for renewable energy and job creation will be met with the site located within the REDZ area.
- No significant landscape features located within the ZVI with the old Rietkuil Uranium Mine Tailings Dam significantly degrading the local landscape character.

9.3.2 Constraints

- High Exposure views from adjacent minor road.

9.4 Roan 2 Grid Connect Alt 2

9.4.1 Opportunities

- The ZVI is contained to some degree due to thornveld vegetation and topographic screening to the south.
- National energy objectives for renewable energy and job creation will be met with the site located within the REDZ area.
- No significant landscape features located within the ZVI with the old Rietkuil Uranium Mine Tailings Dam significantly degrading the local landscape character.

9.4.2 Constraints

- High Exposure views from adjacent minor road.
- Possible channelling effects should power line routing take place on both sides of the minor road to the Rietkuil Mine.

Grid Connect Comparative Finding

As the Roan 2 PV project is located within the REDZ area there is a positive alignment to local and regional, however, care should be taken to reduce the visual intrusion to rural receptors. For this reason, the Alt 1 Grid Connection is preferred due to the location to the south of the Rietkuil Mine Road, allowing open views to the north down to the Jagspruit River and Hartbeesfontein Town. However, as this locality does fall within the ZVI of the Rietkuil Uranium Mine Tailings Dam, the visual preference is weighted Medium.

10 CONCLUSION (PENDING SCOPING INPUTS)

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

- Alignment with National REDZ and local planning related to energy and job creation.
- Moderated ZVI that does include mining related landforms that do detract from the local sense of place to some degree.
- Receptors sensitive to landscape change are likely to be limited but do include the Renosterberg Safari & Farm who have expressed concern regarding the location of the PV in from on their eco-tourism accommodation. The accommodation views are not impacted by Roan PV2, and are addressed in Roan PV1.

Mitigation required to ensure that the landscape change remains congruent with the rural agricultural landscape character:

- Retain a 100m buffer from the tarred roads where existing Thornveld trees are retained and encouraged to grow but fenced in such a manner as to allow cattle access to the buffer strips for grazing and grass management purposed. This would need to be managed such that this area does not become a fire risk to the project.

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12 ANNEXURE A: SITE VISIT PHOTOGRAPHS AND COMMENTS

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

ID	1
NAME	Hartbeesfontein Sense of Place
REMARKS	View from Hartbeesfontein towards the Rietkuil Uranium Mine Tailings Dam that does influence the sense of place.
REC_TIME	01/22/2022 07:51:04.000 SAST
LATITUDE	-26.77074
LONGITUDE	26.44128

ID	2
NAME	Hartbeesfontein Sense of Place
REMARKS	View from Hartbeesfontein of the large grain silo defining the area as a agricultural town.
REC_TIME	01/22/2022 07:51:04.000 SAST
LATITUDE	-26.77074
LONGITUDE	26.44128

ID	2
NAME	Dominionville Road
REMARKS	KOP view north towards Roan PV1 northern site with the Rietkuil Tailings Dam in the background
REC_TIME	01/22/2022 08:06:21.000 SAST
LATITUDE	-26.7906
LONGITUDE	26.42388167

ID	3
NAME	Dominionville Road Receptor
REMARKS	KOP view north towards Roan PV2 northern site as seen from the Dominionville Road southbound.
REC_TIME	01/22/2022 08:06:21.000 SAST
LATITUDE	-26.7906
LONGITUDE	26.42388167

ID	3
NAME	Roan PV1 Site
REMARKS	Site SoP of western portion depicting grasslands and small scattered trees.
REC_TIME	01/22/2022 08:10:17.838 SAST
LATITUDE	-26.80301597
LONGITUDE	26.42876733

ID	4
NAME	Roan PV2 Power Line Site
REMARKS	View from the farm road along the proposed Roan PV2 power line corridor.
REC_TIME	01/22/2022 08:37:09.000 SAST
LATITUDE	-26.8114
LONGITUDE	26.42591333

ID	5
NAME	Roan PV2 PV Site
REMARKS	View from the western portion of PV2 to the northwest with Jagspruit River and farm dams in the midground.
REC_TIME	01/22/2022 08:49:20.541 SAST
LATITUDE	-26.81860458
LONGITUDE	26.40825748

ID	5
NAME	Roan PV2 PV Receptors
REMARKS	Zoomed view across the valley to the town of Hartbeesfontein to the north.
REC_TIME	01/22/2022 08:49:20.541 SAST
LATITUDE	-26.81860458
LONGITUDE	26.40825748

ID	6
NAME	Roan PV2 Central Site
REMARKS	View east from the Roan PV2 central site with the grasslands in the foreground and the Renosterberg hill in the background.
REC_TIME	01/22/2022 09:02:56.689 SAST
LATITUDE	-26.81663394
LONGITUDE	26.42005082

ID	7
NAME	Roan PV2 Central Site
REMARKS	View east from the Roan PV2 central site of typical limited agricultural infrastructure and the Renosterberg hill in the background.
REC_TIME	01/22/2022 09:20:28.000 SAST
LATITUDE	-26.82720333
LONGITUDE	26.42225167

ID	7
NAME	Roan PV2 Central Receptor
REMARKS	View east towards the telephone poles located along the Dominionsville Road located 100m from the road.
REC_TIME	01/22/2022 09:20:28.000 SAST
LATITUDE	-26.82720333
LONGITUDE	26.42225167

ID	8
NAME	Roan PV1 South Site
REMARKS	View east from site of the Rietkuil Mine Tailings Dam located adjacent to the site that degrades the local sense of place.
REC_TIME	01/22/2022 10:02:42.065 SAST
LATITUDE	-26.82275011
LONGITUDE	26.45243179

ID	8
NAME	Roan PV1 South Site
REMARKS	Zoomed view of the Rietkuil Mine Tailings Dam and partial rehabilitation on the top and erosion of the side walls.
REC_TIME	01/22/2022 10:02:42.065 SAST
LATITUDE	-26.82275011
LONGITUDE	26.45243179

ID	9
NAME	Roan PV1 South Site
REMARKS	View west from the site of the Renosterberg Hill in the background owned by Renosterberg Safari and Farming.
REC_TIME	01/22/2022 10:06:55.000 SAST
LATITUDE	-26.83191667
LONGITUDE	26.45622333

ID	10
NAME	Roan PV1 South Receptor
REMARKS	Zoomed view of the Renosterberg Safari accommodation and Lion enclosures overlooking the southern portion of the site, located 550m from the proposed development area.
REC_TIME	01/22/2022 10:14:51.000 SAST
LATITUDE	-26.83263833
LONGITUDE	26.45306333

ID	11
NAME	Roan PV1 South Site
REMARKS	View southwest from site along the existing fence line important for management of existing cattle farming.
REC_TIME	01/22/2022 10:27:01.040 SAST
LATITUDE	-26.82550812
LONGITUDE	26.4476645

ID	12
NAME	Roan PV1 South Site
REMARKS	Elevated view of the slimes dam located adjacent to the site.
REC_TIME	01/22/2022 10:38:12.000 SAST
LATITUDE	-26.81976
LONGITUDE	26.447505

ID	12
NAME	Roan PV1 South Site
REMARKS	View west of the higher ground and steeper slopes adjacent to the site.
REC_TIME	01/22/2022 10:38:12.000 SAST
LATITUDE	-26.81976
LONGITUDE	26.447505

ID	13
NAME	Roan PV1 North Site
REMARKS	Reservoir infrastructure located on the Roan PV1 northern site.
REC_TIME	01/22/2022 10:51:19.000 SAST
LATITUDE	-26.80860333
LONGITUDE	26.43819167

ID	14
NAME	Roan PV1 North Site
REMARKS	Lower lying areas that could be associated with water holding soils.
REC_TIME	01/22/2022 10:55:05.000 SAST
LATITUDE	-26.802795
LONGITUDE	26.43955333

ID	15
NAME	Roan PV Power Line Corridor Site
REMARKS	View of substation build to power the now defunct Rietkuil Uranium Mine.
REC_TIME	01/22/2022 11:15:05.000 SAST
LATITUDE	-26.81289833
LONGITUDE	26.45345333

ID	16
NAME	Roan PV1 North Stie
REMARKS	Previously cultivated areas on the western portion of the Roan PV1 North site.
REC_TIME	01/22/2022 11:21:36.724 SAST
LATITUDE	-26.80924539
LONGITUDE	26.43272627

ID	17
NAME	Roan PV2 Eastern Site
REMARKS	Game fence around the Renosterberg Game Farm that is located 100m to the east of the site.
REC_TIME	01/22/2022 12:32:32.000 SAST
LATITUDE	-26.82615667
LONGITUDE	26.42957167

ID	18
NAME	Roan PV2 Eastern Site
REMARKS	Photograph southeast of the previously cultivated lands on the site as well as a continuation of the game fence.
REC_TIME	01/22/2022 12:41:40.207 SAST
LATITUDE	-26.83345926
LONGITUDE	26.43075384

ID	19
NAME	Roan PV2 Eastern Site
REMARKS	View south of the site of the slightly elevated knoll to the south of the site the restricts views from southern receptors to some degree.
REC_TIME	01/22/2022 12:42:38.064 SAST
LATITUDE	-26.83331117
LONGITUDE	26.42605126

ID	20
NAME	Roan PV2 Eastern Receptor
REMARKS	Zoomed view to the south of the local farm receptor 2km distance.
REC_TIME	01/22/2022 12:45:25.233 SAST
LATITUDE	-26.8564069
LONGITUDE	26.43212914

ID	21
NAME	Roan PV2 Eastern Site
REMARKS	View north from the moderately elevated site depicting open views to Hartbeesfontein located in the background
REC_TIME	01/22/2022 12:52:48.524 SAST
LATITUDE	-26.82849286
LONGITUDE	26.42725591

ID	22
NAME	Roan PV2 Central Site
REMARKS	View northwest towards the Roan PV2 Central Site as seen from the Dominionville Road KOP
REC_TIME	01/22/2022 13:10:33.000 SAST
LATITUDE	-26.82308833
LONGITUDE	26.42577333

ID	23
NAME	Roan PV2 Eastern Site
REMARKS	View southeast towards the elevated Roan PV2 Eastern Site that creates a skyline as seen from the Dominionville Road KOP
REC_TIME	01/22/2022 13:10:33.000 SAST
LATITUDE	-26.82308833
LONGITUDE	26.42577333

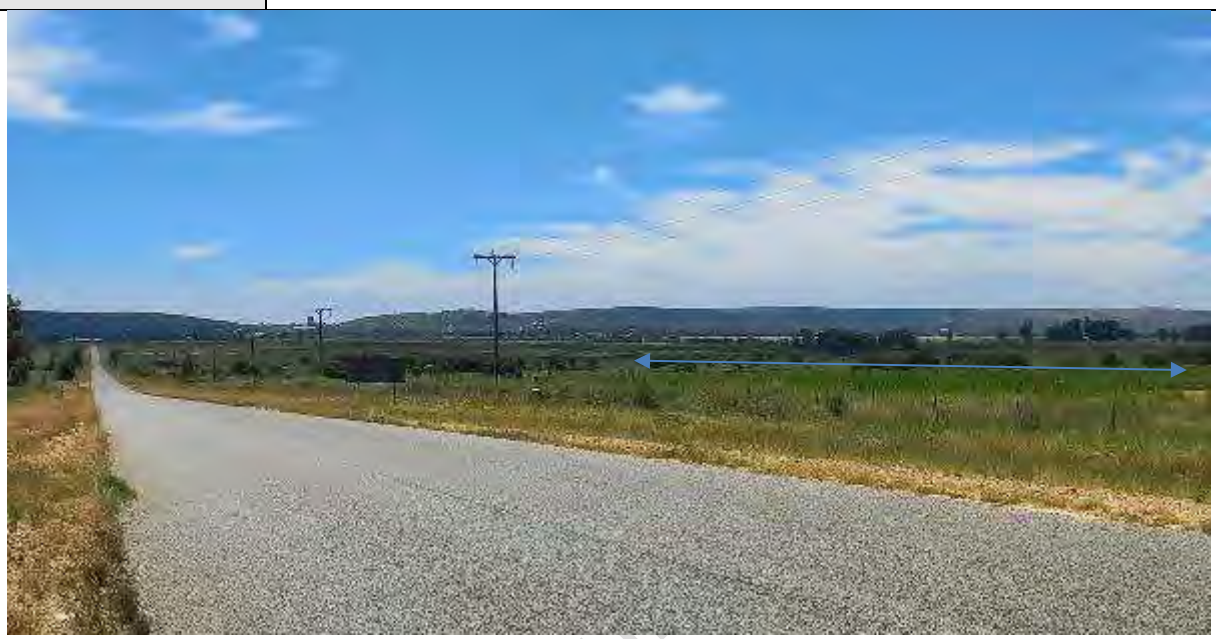
ID	24
NAME	Roan PV2 Central Receptor
REMARKS	View northwest towards the Roan PV2 Central Site in the midground as seen from the Dominionville Road KOP
REC_TIME	01/22/2022 13:18:20.000 SAST
LATITUDE	-26.83121333
LONGITUDE	26.42158333

ID	25
NAME	Roan PV2 Eastern Receptor
REMARKS	View northeast from the Dominionville Road of the Roan PV2 Eastern Site.
REC_TIME	01/22/2022 13:20:59.000 SAST
LATITUDE	-26.83549333
LONGITUDE	26.42076

ID	25
NAME	Dominionville Road Landscape
REMARKS	Photograph south of the Dominionville Road with gum trees along the route limited views of the proposed PV landscape change.
REC_TIME	01/22/2022 13:20:59.000 SAST
LATITUDE	-26.83549333
LONGITUDE	26.42076

ID	26
NAME	Roan PV2 Grid Connect Receptor
REMARKS	Photograph west along the 'Uranium Mine' road of the existing telephone and power line infrastructure that increases the visual absorption capacity.
REC_TIME	01/22/2022 13:40:27.000 SAST
LATITUDE	-26.81094333
LONGITUDE	26.42954833

ID	27
NAME	Roan PV1 North Receptor
REMARKS	Key Observation Point for the Dominionville northbound towards the Roan PV1 Northern Site.
REC_TIME	01/22/2022 13:42:50.000 SAST
LATITUDE	-26.809475
LONGITUDE	26.42780667



ID	28
NAME	Roan PV1 North Receptor Dwelling
REMARKS	Zoomed photograph of the well vegetation screened farmstead KOP located 800m to the north of the proposed development.
REC_TIME	01/22/2022 13:47:04.256 SAST
LATITUDE	-26.79364921
LONGITUDE	26.43231589

ID	29
NAME	Roan PV1 South Receptor Dwelling
REMARKS	Main accommodation of the Renosterberg Safari & Farm
REC_TIME	01/22/2022 13:47:04.256 SAST
LATITUDE	-26.83295191
LONGITUDE	26.44525988

ID	29
NAME	Roan PV1 South Receptor View
REMARKS	View as seen from the main accommodation area to the east overlooking the proposed PV site.
REC_TIME	01/22/2022 13:47:04.256 SAST
LATITUDE	-26.83295191
LONGITUDE	26.44525988

ID	29
NAME	Roan PV1 South Receptor Dwelling
REMARKS	Photograph of the lower tented camp located on the game farm also view east over the proposed PV site.
REC_TIME	01/22/2022 13:47:04.256 SAST
LATITUDE	-26.83295191
LONGITUDE	26.44525988

ID	30
NAME	Roan PV1 South Receptor View
REMARKS	Elevated view from the top of Renosterberg Safari & Farm depicting the extent of the PV landscape change.
REC_TIME	01/22/2022 13:47:04.256 SAST
LATITUDE	-26.8300335
LONGITUDE	26.44125301

ID	31
NAME	Roan PV2 Western Receptor Dwelling
REMARKS	Zoomed view to the adjacent farm located 3km to the northwest.
REC_TIME	01/22/2022 13:47:04.256 SAST
LATITUDE	-26.80291937
LONGITUDE	26.37847703

13 ANNEXURE B: SPECIALIST INFORMATION

13.1 Professional Registration Certificate

APHP

Association of Professional Heritage Practitioners

MEMBERSHIP CERTIFICATE

THIS CERTIFIES THAT

STEPHEN STEAD
MEMBERSHIP NUMBER: 0063

has been accredited as a

PROFESSIONAL HERITAGE PRACTITIONER (PHP)

This membership is subject to the *Standards for Accreditation* 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 2021 – 1 JULY 2022

CHAIRPERSON

[Issued by the Association of Professional Heritage Practitioners Executive Committee]

Image Source: Salvage of Materials at the UCT Jagger Library, *https://photos.google.com/share/AF1QipM8rU-Vqzrp-laS7WBzr_amP8lkH5QJvzkx8P8PLNT16wAiuyyRvIE46sl47NQdg?key=VEZ2ZUZtdmpQcDFjRG5yc1h3TlNqVXlNdzNHSjF3*

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

13.2 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 20: VRM Africa Projects Assessments Table

YEAR	NAME	DESCRIPTION	LOCATION
2020	Dysanklip & Re Capital 3C BESS	Battery Storage	Northern Cape (SA)
2020	Hotazel PV 2	Solar Energy	Northern Cape (SA)
2020	Hotazel PV Amend	Solar Energy	Northern Cape (SA)
2020	Penhill Water Reservoir	Infrastructure	Western Cape (SA)
2020	Kenhardt BESS x 6	Battery Storage	Northern Cape (SA)
2020	Humansdorp BESS	Battery Storage	Northern Cape (SA)
2020	Bloemsmond PV BESS x 5	Battery Storage	Northern Cape (SA)
2020	Mulilo Prieska BESS x 5	Battery Storage	Northern Cape (SA)
2020	Mulilo De Arr BESS x 3	Battery Storage	Northern Cape (SA)
2020	Sandpiper Estate	Residential	Western Cape (SA)
2020	Obetsebi Lampley Interchange	Infrastructure	Ghana
2019	Port Barry Residential	Settlement	Western Cape (SA)
2019	Gamsberg Smelter	Plant	Northern Cape (SA)
2019	Sandpiper Nature Reserve Lodge	Residential	Western Cape (SA)
2019	Bloemsmond PV 4 - 5	Solar Energy	Northern Cape (SA)

2019	Mphepo Wind (Scoping Phase)	Wind Energy	Zambia
2018	Mogara PV	Solar Energy	Northern Cape (SA)
2018	Gaetsewe PV	Solar Energy	Northern Cape (SA)
2017	Kalungwishi Hydroelectric (2) and power line	Hydroelectric	Zambia
2017	Mossel Bay UISP (Kwanoqaba)	Settlement	Western Cape (SA)
2017	Pavua Dam and HEP	Hydroelectric	Mozambique (SA)
2017	Penhill UISP Settlement (Cape Town)	Settlement	Western Cape (SA)
2016	Kokerboom WEF * 3	Wind Energy	Northern Cape (SA)
2016	Hotazel PV	Solar Energy	Northern Cape (SA)
2016	Eskom Sekgame Bulkop Power Line	Infrastructure	Northern Cape (SA)
2016	Ngonye Hydroelectric	Hydroelectric	Zambia
2016	Levensdal Infill	Settlement	Western Cape (SA)
2016	Arandis CSP	Solar Energy	Namibia
2016	Bonnievale PV	Solar Energy	Western Cape (SA)
2015	Noblesfontein 2 & 3 WEF (Scoping)	Wind Energy	Eastern Cape (SA)
2015	Ephraim Sun SEF	Solar Energy	Nothern Cape (SA)
2015	Dyasonsklip and Sirius Grid TX	Solar Energy	Nothern Cape (SA)
2015	Dyasonsklip PV	Solar Energy	Nothern Cape (SA)
2015	Zeerust PV and transmission line	Solar Energy	North West (SA)
2015	Bloemsmond SEF	Solar Energy	Nothern Cape (SA)
2015	Juwi Copperton PV	Solar Energy	Nothern Cape (SA)
2015	Humansrus Capital 14 PV	Solar Energy	Nothern Cape (SA)
2015	Humansrus Capital 13 PV	Solar Energy	Nothern Cape (SA)
2015	Spitzkop East WEF (Scoping)	Solar Energy	Western Cape (SA)
2015	Lofdal Rare Earth Mine and Infrastructure	Mining	Namibia
2015	AEP Kathu PV	Solar Energy	Nothern Cape (SA)
2014	AEP Mogobe SEF	Solar Energy	Nothern Cape (SA)
2014	Bonnievale SEF	Solar Energy	Western Cape (SA)
2014	AEP Legoko SEF	Solar Energy	Northern Cape (SA)
2014	Postmasburg PV	Solar Energy	Northern Cape (SA)
2014	Joram Solar	Solar Energy	Northern Cape (SA)
2014	RERE PV Postmasberg	Solar Energy	Northern Cape (SA)
2014	RERE CPV Upington	Solar Energy	Northern Cape (SA)
2014	Rio Tinto RUL Desalinisation Plant	Industrial	Namibia
2014	NamPower PV * 3	Solar Energy	Namibia
2014	Pemba Oil and Gas Port Expansion	Industrial	Mozambique
2014	Brightsource CSP Upington	Solar Energy	Northern Cape (SA)
2014	Witsand WEF (Scoping)	Wind Energy	Western Cape (SA)
2014	Kangnas WEF	Wind Energy	Western Cape (SA)
2013	Cape Winelands DM Regional Landfill	Industrial	Western Cape (SA)
2013	Drennan PV Solar Park	Solar Energy	Eastern Cape (SA)

2013	Eastern Cape Mari-culture	Mari-culture	Eastern Cape (SA)
2013	Eskom Pantom Pass Substation	Substation /Tx lines	Western Cape (SA)
2013	Frankfort Paper Mill	Plant	Free State (SA)
2013	Gibson Bay Wind Farm Transmission lines	Transmission lines	Eastern Cape (SA)
2013	Houhoek Eskom Substation	Substation /Tx lines	Western Cape (SA)
2013	Mulilo PV Solar Energy Sites (x4)	Solar Energy	Northern Cape (SA)
2013	Namies Wind Farm	Wind Energy	Northern Cape (SA)
2013	Rossing Z20 Pit and WRD	Mining	Namibia
2013	SAPPI Boiler Upgrade	Plant	Mpumalanga (SA)
2013	Tumela WRD	Mine	North West (SA)
2013	Weskusfleur Substation (Koeburg)	Substation /Tx lines	Western Cape (SA)
2013	Yzermyn coal mine	Mining	Mpumalanga (SA)
2012	Afrisam	Mining	Western Cape (SA)
2012	Bitterfontein	Solar Energy	Northern Cape (SA)
2012	Kangnas PV	Solar Energy	Northern Cape (SA)
2012	Kangnas Wind	Solar Energy	Northern Cape (SA)
2012	Kathu CSP Tower	Solar Energy	Northern Cape (SA)
2012	Kobong Hydro	Hydro & Powerline	Lesotho
2012	Letseng Diamond Mine Upgrade	Mining	Lesotho
2012	Lunsklip Windfarm	Wind Energy	Western Cape (SA)
2012	Mozambique Gas Engine Power Plant	Plant	Mozambique
2012	Ncondezi Thermal Power Station	Substation /Tx lines	Mozambique
2012	Sasol CSP Tower	Solar Power	Free State (SA)
2012	Sasol Upington CSP Tower	Solar Power	Northern Cape (SA)
2011	Beaufort West PV Solar Power Station	Solar Energy	Western Cape (SA)
2011	Beaufort West Wind Farm	Wind Energy	Western Cape (SA)
2011	De Bakke Cell Phone Mast	Structure	Western Cape (SA)
2011	ERF 7288 PV	Solar Energy	Western Cape (SA)
2011	Gecko Industrial park	Industrial	Namibia
2011	Green View Estates	Residential	Western Cape (SA)
2011	Hoodia Solar	Solar Energy	Western Cape (SA)
2011	Kalahari Solar Power Project	Solar Energy	Northern Cape (SA)
2011	Khanyisa Power Station	Power Station	Western Cape (SA)
2011	Olvyn Kolk PV	Solar Energy	Northern Cape (SA)
2011	Otjikoto Gold Mine	Mining	Namibia
2011	PPC Rheebieck West Upgrade	Industrial	Western Cape (SA)
2011	George Southern Arterial	Road	Western Cape (SA)
2010	Bannerman Etango Uranium Mine	Mining	Namibia
2010	Bantamsklip Transmission	Transmission	Eastern Cape (SA)

2010	Beaufort West Urban Edge	Mapping	Western Cape (SA)
2010	Bon Accord Nickel Mine	Mining	Mpumalanga (SA)
2010	Etosha National Park Infrastructure	Housing	Namibia
2010	Herolds Bay N2 Development Baseline	Residential	Western Cape (SA)
2010	MET Housing Etosha	Residential	Namibia
2010	MET Housing Etosha Amended MCDM	Residential	Namibia
2010	MTN Lattice Hub Tower	Structure	Western Cape (SA)
2010	N2 Herolds Bay Residential	Residential	Western Cape (SA)
2010	Onifin(Pty) Ltd Hartenbos Quarry Extension	Mining	Western Cape (SA)
2010	Still Bay East	GIS Mapping	Western Cape (SA)
2010	Vale Moatize Coal Mine and Railway	Mining / Rail	Mozambique
2010	Vodacom Mast	Structure	Western Cape (SA)
2010	Wadrif Dam	Dam	Western Cape (SA)
2009	Asazani Zinyoka UISP Housing	Residential Infill	Western Cape (SA)
2009	Eden Telecommunication Tower	Structure	Western Cape (SA)
2009	George SDF Landscape Characterisation	GIS Mapping	Western Cape (SA)
2009	George SDF Visual Resource Management	GIS Mapping	Western Cape (SA)
2009	George Western Bypass	Road	Western Cape (SA)
2009	Knysna Affordable Housing Heidevallei	Residential Infill	Western Cape (SA)
2009	Knysna Affordable Housing Hornlee Project	Residential Infill	Western Cape (SA)
2009	Rossing Uranium Mine Phase 2	Mining	Namibia
2009	Sun Ray Wind Farm	Wind Energy	Western Cape (SA)
2008	Bantamsklip Transmission Lines Scoping	Transmission	Western Cape (SA)
2008	Erf 251 Damage Assessment	Residential	Western Cape (SA)
2008	Erongo Uranium Rush SEA	GIS Mapping	Namibia
2008	Evander South Gold Mine Preliminary VIA	Mining	Mpumalanga (SA)
2008	George SDF Open Spaces System	GIS Mapping	Western Cape (SA)
2008	Hartenbos River Park	Residential	Western Cape (SA)
2008	Kaaimans Project	Residential	Western Cape (SA)
2008	Lagoon Garden Estate	Residential	Western Cape (SA)
2008	Moquini Beach Hotel	Resort	Western Cape (SA)
2008	NamPower Coal fired Power Station	Power Station	Namibia
2008	Oasis Development	Residential	Western Cape (SA)
2008	RUL Sulphur Handling Facility Walvis Bay	Mining	Namibia
2008	Walvis Bay Power Station	Structure	Namibia
2007	Calitzdorp Retirement Village	Residential	Western Cape (SA)
2007	Calitzdorp Visualisation	Visualisation	Western Cape (SA)
2007	Camdeboo Estate	Residential	Western Cape (SA)
2007	Destiny Africa	Residential	Western Cape (SA)

2007	Droogfontein Farm 245	Residential	Western Cape (SA)
2007	Floating Liquified Natural Gas Facility	Structure tanker	Western Cape (SA)
2007	George SDF Municipality Densification	GIS Mapping	Western Cape (SA)
2007	Kloofsig Development	Residential	Western Cape (SA)
2007	OCGT Power Plant Extension	Structure Power Plant	Western Cape (SA)
2007	Oudtshoorn Municipality SDF	GIS Mapping	Western Cape (SA)
2007	Oudtshoorn Shopping Complex	Structure	Western Cape (SA)
2007	Pezula Infill (Noetzie)	Residential	Western Cape (SA)
2007	Pierpoint Nature Reserve	Residential	Western Cape (SA)
2007	Pinnacle Point Golf Estate	Golf/Residential	Western Cape (SA)
2007	Rheebok Development Erf 252 Appeal	Residential	Western Cape (SA)
2007	Rossing Uranium Mine Phase 1	Mining	Namibia
2007	Ryst Kuil/Riet Kuil Uranium Mine	Mining	Western Cape (SA)
2007	Sedgefield Water Works	Structure	Western Cape (SA)
2007	Sulphur Handling Station Walvis Bay Port	Industrial	Namibia
2007	Trekkopje Uranium Mine	Mining	Namibia
2007	Weldon Kaya	Residential	Western Cape (SA)
2006	Farm Dwarsweg 260	Residential	Western Cape (SA)
2006	Fynboskruin Extention	Residential	Western Cape (SA)
2006	Hanglip Golf and Residential Estate	Residential	Western Cape (SA)
2006	Hansmoeskraal	Slopes Analysis	Western Cape (SA)
2006	Hartenbos Landgoed Phase 2	Residential	Western Cape (SA)
2006	Hersham Security Village	Residential	Western Cape (SA)
2006	Ladywood Farm 437	Residential	Western Cape (SA)
2006	Le Grand Golf and Residential Estate	Residential	Western Cape (SA)
2006	Paradise Coast	Residential	Western Cape (SA)
2006	Paradyskloof Residential Estate	Residential	Western Cape (SA)
2006	Riverhill Residential Estate	Residential	Western Cape (SA)
2006	Wolwe Eiland Access Route	Road	Western Cape (SA)
2005	Harmony Gold Mine	Mining	Mpumalanga (SA)
2005	Knysna River Reserve	Residential	Western Cape (SA)
2005	Lagoon Bay Lifestyle Estate	Residential	Western Cape (SA)
2005	Outeniquabosch Safari Park	Residential	Western Cape (SA)
2005	Proposed Hotel Farm Gansevallei	Resort	Western Cape (SA)
2005	Uitzicht Development	Residential	Western Cape (SA)
2005	West Dunes	Residential	Western Cape (SA)
2005	Wilderness Erf 2278	Residential	Western Cape (SA)
2005	Wolwe Eiland Eco & Nature Estate	Residential	Western Cape (SA)
2005	Zebra Clay Mine	Mining	Western Cape (SA)
2004	Gansevallei Hotel	Residential	Western Cape (SA)
2004	Lakes Eco and Golf Estate	Residential	Western Cape (SA)

2004	Trekkopje Desalination Plant	Structure Plant	Namibia (SA)
1995	Greater Durban Informal Housing Analysis	Photogrammetry	KwaZulu-Natal (SA)

14 ANNEXURE C: VRM CHECKLISTS AND TERMINOLOGY

Table 21: Scenic Quality Checklist

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

Table 22: Sensitivity Level Rating Checklist

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

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

Table 23: VRM Terminology Table

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

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

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

15 ANNEXURE D: GENERAL LIGHTS AT NIGHT MITIGATIONS

Mitigation:

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

Mesopic Lighting

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

The Mesopic Street Lighting Demonstration and Evaluation Report by the Lighting Research Centre (LRC) in New York found that the 'replacement of white light sources (induction and ceramic metal halide) were tuned to optimize human vision under low light levels while remaining in the white light spectrum. Therefore, outdoor electric light sources that are tuned to how humans see under mesopic lighting conditions can be used to reduce the luminance of the road surface while providing the same, or better, visibility. Light sources with shorter wavelengths, which produce a "cooler" (bluer and greener) light, are needed to produce better mesopic vision. Based on this understanding, the LRC developed a means of predicting visual performance under low light conditions. This system is called the unified photometry system. Responses to surveys conducted on new installations revealed that area residents perceived higher levels of visibility, safety, security, brightness, and colour rendering with the new lighting

systems than with the standard *High-Purity Standards* (HPS) systems. The new lighting systems used 30% to 50% less energy than the HPS systems. These positive results were achieved through tuning the light source to optimize mesopic vision. Using less wattage and photopic luminance also reduces the reflectance of the light off the road surface. Light reflectance is a major contributor to light pollution (sky glow).' *(Lighting Research Centre. New York. 2008)*

'Good Neighbour – Outdoor Lighting'

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

(NELPAG)

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

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

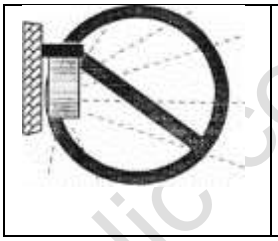
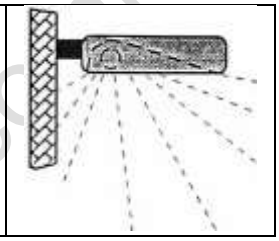
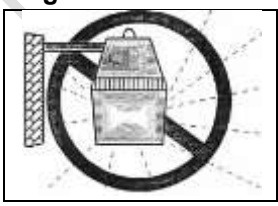
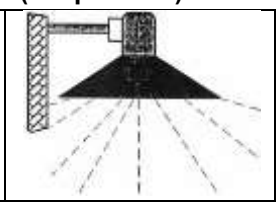
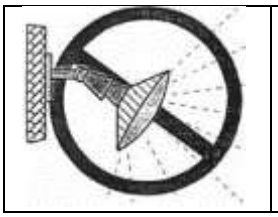
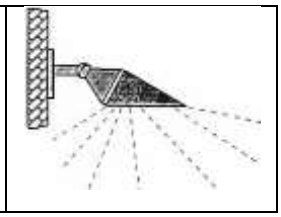
Glare Here's the basic rule of thumb: If you can see the bright bulb from a distance, it's a bad light. With a good light, you see lit ground instead of the dazzling bulb. "Glare" is light that beams directly from a bulb into your eye. It hampers the vision of pedestrians, cyclists, and drivers.

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

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

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

Good and Bad Light Fixtures

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

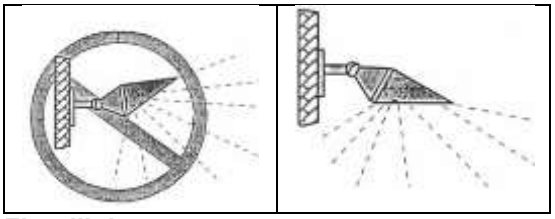
How do I switch to good lighting?

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

- Aim lights down. Choose “full-cut-off shielded” fixtures that keep light from going uselessly up or sideways. Full-cut-off fixtures produce minimum glare. They create a pleasant-looking environment. They increase safety because you see illuminated people, cars, and terrain, not dazzling bulbs.
- Install fixtures carefully to maximize their effectiveness on the targeted area and minimize their impact elsewhere. Proper aiming of fixtures is crucial. Most are aimed too high. Try to install them at night, when you can see where all the rays actually go. Properly aimed and shielded lights may cost more initially, but they save you far more in the long run. They can illuminate your target with a low-wattage bulb just as well as a wasteful light does with a high-wattage bulb.
- If colour discrimination is not important, choose energy- efficient fixtures utilising yellowish high-pressure sodium (HPS) bulbs. If “white” light is needed, fixtures using compact fluorescent or metal-halide (MH) bulbs are more energy-efficient than those using incandescent, halogen, or mercury-vapour bulbs.
- Where feasible, put lights on timers to turn them off each night after they are no longer needed. Put home security lights on a motion-detector switch, which turns them on only when someone enters the area; this provides a great deterrent effect!

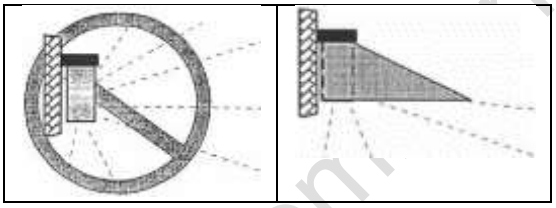
What You Can Do To Modify Existing Fixtures

Change this . . . to this (aim downward)



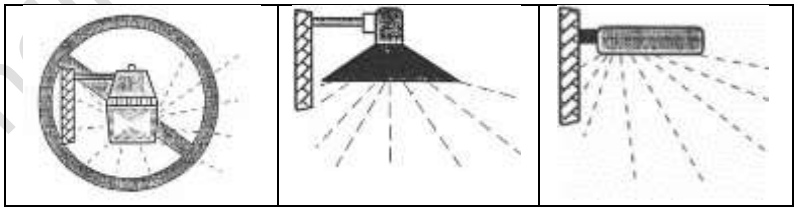
Floodlight:

Change this . . . to this (aim downward)



Wall Pack

Change this . . . to this or this



Yard Light | Opaque Reflector | Show Box

Replace bad lights with good lights.

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