Visual Impact Report

Kotulo Tsatsi Energy PV3 Solar Energy Facility

Impact Assessment

March 2023

VISUAL IMPACT REPORT

Kotulo Tsatsi Energy PV3 Solar Energy Facility, Northern Cape

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ACRONYMS, ABBREVIATIONS AND GLOSSARY

Acronyms & Abbreviations	
BAR	Basic Assessment Report
CA	Competent Authority
CBA	Critical Biodiversity Area
EA	Environmental Authorization
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
ESA	Ecological Support Area
GIS	Geographical Information Systems
GYLA	Graham Young Landscape Architect
HA	Hectars
KTE	Kotulo Tsatsi Energy
MW	Megawatts
OHL	Overhead Line
PV	Photovoltaic
REDz	Renewable Energy Development Zones
SACLAP	South African Council for the Landscape Architectural Profession
VAC	Visual Absorption Capacity
VIA	Visual Impact Assessment
Glossary	
Aesthetic Value	Aesthetic value is the emotional response derived from the experience of the environment with its natural and cultural attributes. The response can be either to visual or non-visual elements and can embrace sound, smell and any other factor having a strong impact on human thoughts, feelings, and attitudes (Ramsay, 1993). Thus, aesthetic value encompasses more than the seen view, visual quality, or scenery, and includes atmosphere, landscape character and sense of place (Schapper, 1993).
Aesthetically significant place	A formally designated place visited by recreationists and others for the express purpose of enjoying its beauty. For example, tens of thousands ofpeople visit Table Mountain on an annual basis. They come from around the country and even from around the world. By these measurements,one can make the case that Table Mountain (a designated National Park) is an aesthetic resource of national significance. Similarly, a resource thatis visited by large numbers who come from across the region probably has regional significance. A place visited primarily by people whose place of origin is local is generally of local significance. Unvisited places either have no significance or are "no trespass" places. (After New York, Department of Environment 2000).
Aesthetic impact	Aesthetic impact occurs when there is a detrimental effect on the perceived beauty of a place or structure. Mere visibility, even startling visibility of a Project proposal, should not be a threshold for decision making. Instead, a Project, by its visibility, must clearly interfere with or reduce (i.e., visual impact) the public's enjoyment and/or appreciation of the appearance of a valued resource e.g., cooling tower blocks a view from a National Park overlook (after New York, Department of Environment 2000).
Cumulative Effects	The summation of effects that result from changes caused by a development in conjunction with the other past, present, or reasonably foreseeable actions.

Glare	The sensation produced by luminance within the visual field that is sufficiently greater than the luminance to which the eyes are adapted, which causes annoyance, discomfort, or loss in visual performance and visibility. *See* Glint. (USDI 2013:314)
Glint	A momentary flash of light resulting from a spatially localized reflection of sunlight. *See* Glare. (USDI 2013:314)
Landscape Character	The individual elements that make up the landscape, including prominent or eye-catching features such as hills, valleys, woods, trees, water bodies, buildings, and roads. They are generally quantifiable and can be easily described.
Landscape Impact	Landscape effects derive from changes in the physical landscape, whichmay give rise to changes in its character and how this is experienced (Institute of Environmental Assessment & The Landscape Institute 1996).
Study area	For the purposes of this report this Project the study area refers to the proposed Project footprint / Project site as well as the 'zone of potential influence' (the area defined as the radius about the centre point of the Project beyond which the visual impact of the most visible features will be insignificant) which is a 5,0km radius surrounding the proposed Project footprint / site.
Project Footprint / Site	For the purposes of this report the Project *site* / *footprint* refers to theactual layout of the Project as described.
Sense of Place (genius loci)	Sense of place is the unique value that is allocated to a specific place or area through the cognitive experience of the user or viewer. *A genius locus literally means* 'spirit of the place'.
Sensitive Receptors	Sensitivity of visual receptors (viewers) to a proposed development.
Viewshed analysis	The two-dimensional spatial pattern created by an analysis that defines areas, which contain all possible observation sites from which an object would be visible. The basic assumption for preparing a viewshed analysis is that the observer eye height is 1,8m above ground level.
Visibility	The area from which Project components would potentially be visible.Visibility depends upon general topography, aspect, tree cover or other visual obstruction, elevation, and distance.
Visual Exposure	Visibility and visual intrusion qualified with a distance rating to indicate the degree of intrusion and visual acuity, which is also influenced by weatherand light conditions.
Visual Impact	Visual effects relate to the changes that arise in the composition of available views because of changes to the landscape, to people's responses to the changes, and to the overall effects with respect to visual amenity available views because of changes to the landscape, to people's responses to the changes, and to the overall effects with respect to visualamenity.
Visual Intrusion	The nature of intrusion of an object on the visual quality of the environment resulting in its compatibility (absorbed into the landscape elements) or discord (contrasts with the landscape elements) with the landscape and surrounding land uses.
Visual absorption capacity	Visual absorption capacity is defined as the landscape's ability to absorb physical changes without transformation in its visual character and quality. The landscape's ability to absorb change ranges from low- capacity areas, in which the location of an activity is likely to cause visual change in the character of the area, to high-capacity areas, in which the visual impact of development will be minimal (Amir & Gidalizon 1990).
Worst-case Scenario	Principle applied where the environmental effects may vary, for example, seasonally or collectively to ensure the most severe potential effect isassessed.
Zone of Potential Visual Influence	By determining the zone of potential visual influence, it is possible to identify the extent of potential visibility and views which could be affected by the proposed development. Its maximum extent is the radius around an object beyond which the visual impact of its most visible features will be insignificant primarily due to distance.

EXECUTIVE SUMMARY

Project Site and Study Area

The Applicant, Kotulo Tsatsi Energy (Pty) Ltd, is proposing the construction of a photovoltaic (PV) solar energy facility (known as the Kotulo Tsatsi Energy PV3) located on a site located approximately 70km south-west of the town of Kenhardt and 60km north-east of Brandvlei in the Northern Cape Province. The solar energy facility will comprise several arrays of PV panels and associated infrastructure and will have a contracted capacity of up to 480MW. The facility will be located within the farm Portion 2 of Farm Styns Vley 280. The PV facility is planned to be located within an area previously authorised for CSP project infrastructure, which is adjacent to the authorised Kotulo Tsatsi Energy PV1 and PV2 Facilities as well as the authorised CSP3 facility and associated infrastructure. The project site falls under the Hantam Local Municipality which is part of Namakwa District Municipality. The site is accessible via an existing gravel farm road (known as Soafskolk Road) which provides access to the farm off of the R27 which is located east of the project site.

The PV infrastructure assessed in this application is in response to the Applicant's need to change the authorized generation technology for the facility located on the farm Portion 2 of Farm Styns Vely 280. That is, a technology change from the previously authorised CSP project infrastructure to PV project infrastructure. In this regard, the solar PV facility will be connected to the grid via a 132kV grid connection solution to the authorised 400kV collector substation located on Portion 2 of Farm Styns Vley 280, and will comprise on-site switching substations, facility substations and a 132kV power line within a 500m wide corridor.

A development area[1] of ~ 1840ha was defined through the Scoping evaluation of the site and has now been assessed for the facility footprint. The development footprint[2] has an extent of ~1200ha.

Infrastructure associated with the solar PV facility contracted capacity of up to 480MW will include:

- Solar PV array comprising PV modules and mounting structures.
- Inverters and transformers.
- Cabling between the project components.
- BESS, O&M and laydown area hubs, including:
    - Battery Energy Storage System (BESS).
    - Site offices and maintenance buildings, including workshop areas for maintenance and storage.
    - Laydown areas and temporary construction camp area.
- Access roads, internal distribution roads and fencing around the development area.
- On-site facility substations, switching substations and 132kV power line to facilitate the connection between the PV Facility and the authorised 400kV collector substation.

As of 2019, the Industrial sector was the leading electricity consumer in South Africa, with up to 56 percent of the total consumption (Ratshomo 2019). Mining and quarrying accounted for 10% of the industrial consumption while non-ferrous metals and non-metallic both accounted for 8% and 5%, respectively (Chamber of Mines of South Africa, 2017). and South Africa. This will assist the Free State in creating green jobs and reducing Green House Gas emissions, while reducing the energy demand on the Eskom national grid.

Approach to Study

The effects of the development on a landscape resource and visual amenity are complex since it is determined through a combination of quantitative and qualitative evaluations. When assessing visual impact, the worst-case scenario is considered. Landscape and visual assessments are separate, although linked, procedures. The landscape, its analysis, and the assessment of impacts on the landscape all contribute to the baseline for visual impact

[1] The development area is that identified area (located within the project site) where the Kotulo Tsatsi Energy PV3 facility is planned to be located. This area has been selected as a practicable option for the facility, considering technical preference and constraints. The development area is ~1834ha in extent.

[2] The development footprint is the defined area (located within the development area) where the PV panel array and other associated infrastructure for Kotulo Tsatsi Energy PV3 is planned to be constructed. This is the actual footprint of the facility, and the area which would be disturbed.

assessment studies. The assessment of the potential impact on the landscape is carried out as an impact on an environmental resource, i.e., the physical landscape. Visual impacts, on the other hand, are assessed as one of the interrelated effects on people (i.e., the viewers and the impact of an introduced object into a view or scene).

The study was undertaken using Geographical Information Systems (GIS) software as a tool to generate viewshed analyses and to apply relevant spatial criteria to the proposed infrastructure. A detailed Digital Terrain Model (DTM) for the study area was created from topographical data provided by the Japan Aerospace Exploration Agency (JAXA), Earth Observation Research Centre, in the form of the ALOS Global Digital Surface Model "ALOS World 3D - 30m" (AW3D30) elevation model.

The scope of work for this report includes:

- Identify potentially sensitive visual receptors within the receiving environment.
- Determine the Visual Absorption Capacity of the landscape.
- Determine Visual Distance/Observer Proximity to the facility.
- Determine Viewer Incidence/Viewer Perception.
- Determine Significance of identified impacts.
- Propose mitigation to reduce or alleviate potential adverse visual impacts (to be structured as an EMPr).
- Assess the glint and glare of the PV panels
- Conclude with an Impact Statement of Significance and a project recommendation.

Conclusion

Key visual management actions include locating the substation and other buildings, as well as construction camps, in an unobtrusive position in the landscape away from public roads. The arid landscape is particularly fragile and therefore new access roads and disturbance generally should be kept to a minimum for both the proposed SEF and connecting power line. **There are no fatal flaws from a visual perspective arising from the proposed project** and given the marginal nature of agriculture in the area, the renewable energy project is probably an inherently suitable land use that should receive authorisation, provided the mitigations are implemented.

The proposed SEF and connecting powerlines are in a remote and arid part of the Northern Cape, with no particular visual or scenic features. The only potential receptors are users of the Gravel Route, the farmstead on the property and several surrounding farmsteads, all more than 6km away, some of which are in a view shadow. The proposed SEF and powerline would therefore have very low visibility.

The proposed Solar PV facility utilises a renewable source of energy to generate power. It does not emit any harmful by-products or pollutants and is not negatively associated with health risks to observers. It is therefore perceived to be accepted in a more favourable light by visual receptors.

The facility has a generally unfamiliar novel and futuristic design that invokes a curiosity factor not generally present with other conventional power generating plants, to the effect that people may actually visit the area to see the facility. A number of mitigation measures have been proposed (Section 8), which, if implemented and maintained, will reduce the significance of certain visual impacts associated with the proposed facility.

The existing visual condition of the landscape that may be affected by the proposed Project has been described. The study areas scenic quality has been rated moderate within the context of the sub-region, sensitive viewing areas and landscape types identified and mapped indicating potential sensitivity to the Project. The site itself is in a landscape type rated as moderate.

Visual impacts will be caused by activities associated with the Kotulo Tsatsi Energy PV3 Solar Energy Facility Project. The significance of visual impact is based on the worst-case scenario. This scenario assumes that all facilities along with the associated grid infrastructure and sub-stations would be constructed at the same time. At the time of writing there was no evidence to the contrary. This assumption is also based on the nature of the visual impact and the fact that receptors would experience all facilities in the same visual envelope from their respective locations or as they travel along adjacent roads.

Visual impacts that would potentially result from Project activities are likely to be moderately adverse, long-term, and will most likely cause loss of landscape and visual resources. If mitigation is undertaken as recommended, it is concluded that the significance of anticipated visual impacts will remain at acceptable levels. As such, the facility and the proposed ancillary infrastructure would be considered to be acceptable from a visual perspective.

The cause of these anticipated visual impacts would be:

- Construction Phase:
    - Removal of vegetation, the building of access roads, earthworks, and exposure of earth to establish the areas to be developed.
    - Physical presence of construction camps and the movement of construction vehicles within the site and along local roads.
    - Generation of dust by construction activities.
- Operational Phase
    - Reduction in the rural sense of place for the study area.
    - Light pollution.
- Decommissioning Phase
    - Physical presence of the activities associated with removing the structures and rehabilitating the site.

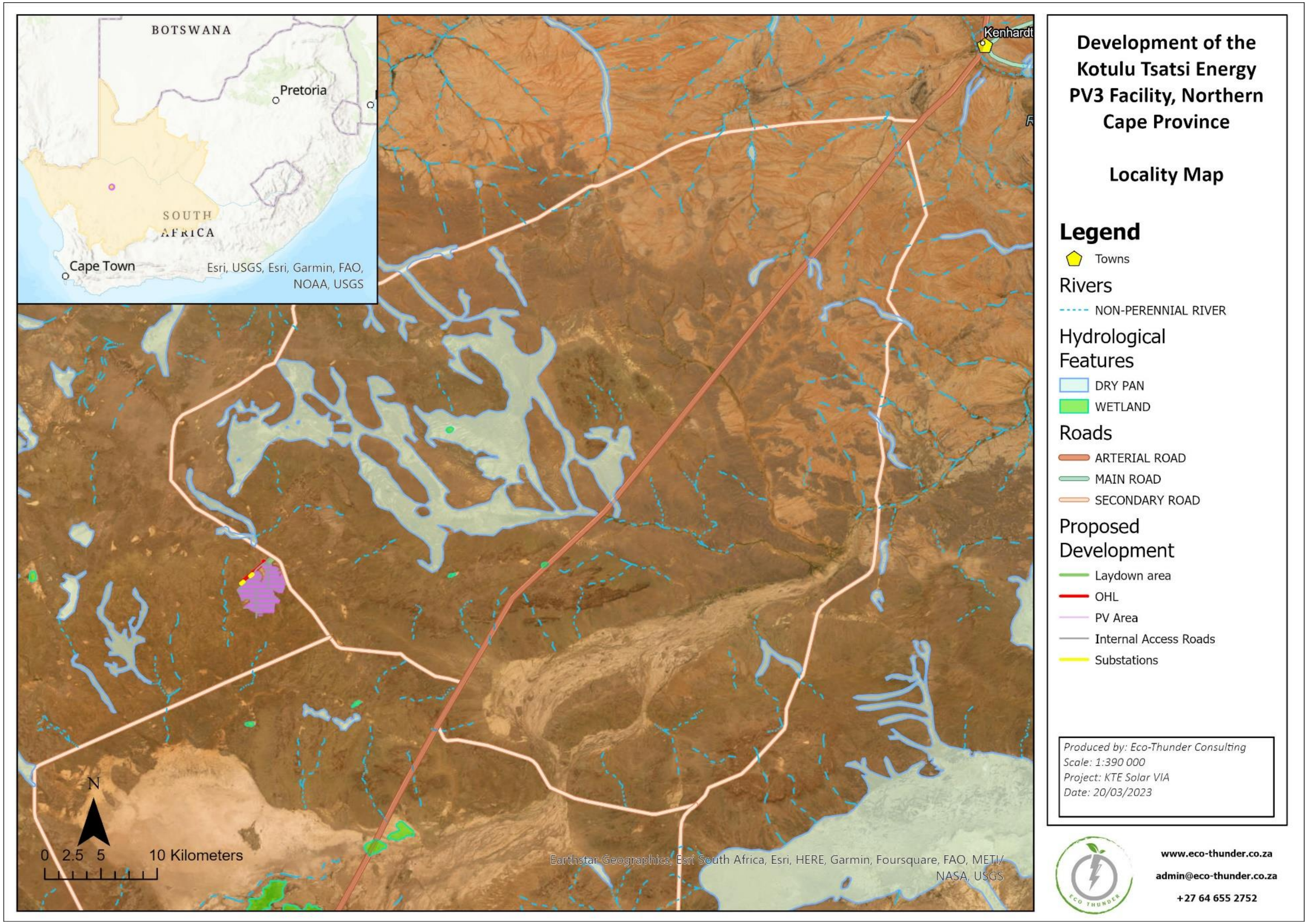

Figure 1: Locality Map

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1. INTRODUCTION

1.1. Project Overview and Background

Eco-Thunder Consulting was commissioned by Savannah Environmental (Pty) Ltd to carry out a Visual Impact Assessment (VIA) of the proposed Kotulo Tsatsi Energy PV3 Solar Energy Facility, which is are based ~70km south-west of the town of Kenhardt, Northern Cape Province.

The VIA focuses on the potential impact of the physical aspects of the proposed developments (i.e., form, scale, and bulk), and their potential impact within the local landscape and receptor context.

1.2. Project Site and Study Area

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1.3. Objective of the Specialist Study

The main aim of the study is to document the baseline and to ensure that the visual/aesthetic consequences of the proposed Project are understood. The report therefore aims to identify scenic resources, and visually sensitive areas or receptors. It also aims to identify key concerns or issues relating to potential visual impacts arising from the Project, and which must be addressed in the assessment phase.

1.4. Terms and Reference

A specialist study is required to establish the visual baseline and to identify and potential visual impacts arising from the proposed development based on the general requirements for a comprehensive VIA. The following terms of reference were established:

- Data collected allows for a description and characterization of the receiving environment.
- Describe the landscape character, quality and assess the visual resource of the study area.
- Describe the visual characteristics of the components of the Project.
- Identify issues that must be addressed in the impact assessment phase.
- Propose mitigation options to reduce the potential impact of the Project.

1.5. Specialist Details

Eco-Thunder Consulting (ETC) is a 100% woman-owned, private company that specializes in a range of specialist studies, such as Visual Impact Assessments socio-economic research, economic development planning, development programme design and implementation as well as community trust management.

Eco-Thunder Consulting is registered with ECSA and landscape architects with interest and experience in landscape architecture, urban design, and environmental planning. The company has carried out visual impact assessments throughout Africa and specialize in project optimization in the environmental space. Aspects of this work also include landscape characterization studies, end-use studies for quarries, and computer modelling and visualization.

Based in Johannesburg, South Africa, Eco-Thunder has established itself as an expert on the conditions, needs and assets of communities that are linked to independent power generation facilities.

ETC also implements development programmes in energy communities, which ensures a comprehensive understanding of the how to drive positive social impact.

1.6. Level of Confidence

Level of confidence[5] is determined as a function of:

- The information available, and understanding of the study area by the practitioner:
  - 3: A high level of information is available of the study area and a thorough knowledge base could be established during site visits, surveys etc. The study area was readily accessible.
  - 2: A moderate level of information is available of the study area and a moderate knowledge base could be established during site visits, surveys etc. Accessibility to the study area was acceptable for the level of assessment.
  - 1: Limited information is available of the study area and a poor knowledge base could be established during site visits and/or surveys, or no site visit and/or surveys were carried out.

- The information available, understanding of the study area and experience of this type of project by the practitioner:
  - 3: A high level of information and knowledge is available of the project and the visual impact assessor is well experienced in this type of project and level of assessment.
  - 2: A moderate level of information and knowledge is available of the project and/or the visual impact assessor is moderately experienced in this type of project and level of assessment.
  - 1: Limited information and knowledge is available of the project and/or the visual impact assessor has a low experience level in this type of project and level of assessment.

[5] Adapted from Oberholzer (2005).

The level of confidence for this assessment is determined to be **9** and indicates that the author's confidence in the accuracy of the findings is high:

- The information available, and understanding of the study area by the practitioner is rated as **3** and
- The information available, understanding and experience of this type of project by the practitioner is rated as **3**.

1.7. Assumptions, Uncertainties, and Limitations

The following assumptions and limitations have been made in the study:

- The assessment has been based on the requirements of the Western Cape Guidelines.
- Whilst the majority of homesteads and housing areas were visited during the site visit in order to confirm their nature and likely visibility of the development, it was not possible to visit all homesteads and housing areas.
- The description of project components is limited to what has been supplied to the author before the date of completion of this report.
- The Project report uses the concept of 'worst case scenario' to identify issues and rate visual impacts. This scenario assumes that all facilities along with the associated grid infrastructure and sub-stations would be constructed at the same time. At the time of writing there was no evidence to the contrary. This assumption is also based on the nature of visual impact and the fact that receptors would experience all facilities with in the same visual envelope from their respective locations or as they travel along adjacent roads.
- The assessment of cumulative impacts is partly based on information provided by the DFFE Website. This source provides detail of all other renewable energy applications and has been used to indicate other possible solar energy sites within 30km of the application site.

2. LEGAL REQUIREMENTS AND GUIDELINES

There is little legislation relating directly to visual impact assessments. However, there are guidelines that provide direction for visual assessment as well as a number of laws which aim to protect visual resources and others that apply to specialists in general.

The African Development Bank (AfDB) do not provide guidelines for visual impact assessments.

The IFC Performance Standard 3: Resource Efficiency and Pollution Prevention provides limited guidance on visual impact assessments but does define pollution to include the creation of potential for visual impacts including light.

This report adheres to the following legal requirements and guideline documents.

2.1. International Good Practice

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

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

2.1.1. Guidelines for Landscape and Visual Impact Assessment, Second Edition

The Landscape Institute and the Institute of Environmental Management and (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 built environment.

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); 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 are an equally important part of our landscape heritage" (Landscape Institute, 2003: Pg. 9). The guideline identifies the following reasons why landscape is important in both urban and rural contexts:

- 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
- Valuable recreation and resources

2.1.2. International Finance Corporation (IFC)

The IFC Performance Standards (IFC, 2012) assessment thereof do not explicitly cover visual impacts or Under IFC PS 6, ecosystem services are organized into four categories, with the third category related to cultural services which are defined as "the material benefits people obtain from ecosystems" and "may include natural areas that are red 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 generation 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 va rocks, lakes, and waterfalls" ties who (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 community use or standing cultural purposes; or

(ii) Legally protected cultural heritage areas, including those proposed by host governments for such designation" Legally protected cultural heritage areas are Cultural use, such as sacred groves, have used within living memory the cultural heritage for long (IFC, 2012).

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).

2.1.3. 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, being 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.

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).

2.2. National Legislation and Guidelines

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.

National Environmental Management Act (Act 107 of 1998), EIA Regulations

The specialist report is in accordance with the specification on conducting specialist studies as per Government Gazette (GN) R 982 of the National Environmental Management Act (NEMA) Act 107 of 1998. The mitigation measures as stipulated in the specialist report can be used as part of the Environmental Management Programme (EMPr) and will be in support of the Environmental Impact Assessment (EIA) and Appendix 6 of the EIA Regulations 2014, as amended on 7 April 2017.

Specialist Screening Protocols are also required by the 2014 EIA Regulations. These were taken into consideration for each of the five projects. However, the Landscape (Solar) Theme Sensitivity was referenced as there is no specific 'visual' protocol.

Western Cape Department of Environmental Affairs & Development Planning: Guideline for Involving Visual and Aesthetic Specialists in EIA Processes Edition 1 (CSIR, 2005)

Although the guidelines were specifically compiled for the Province of the Western Cape[6], they provide guidance that is appropriate for any EIA process. The Guideline document also seeks to clarify instances when a visual specialist should get involved in the EIA process.

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

The process that ETC 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.

[6] The Western Cape Guidelines are the only official guidelines for visual impact assessment reports in South Africa and can be regarded as best practice throughout the country.

3. APPROACH AND METHODOLOGY

3.1. Approach

The effects of the development on a landscape resource and visual amenity are complex since it is determined through a combination of quantitative and qualitative evaluations. When assessing visual impact,the worst-case scenario is considered. Landscape and visual assessments are separate, although linked, procedures. The landscape, its analysis, and the assessment of impacts on the landscape all contribute to the baseline for visual impact assessment studies. The assessment of the potential impact on the landscape is carried out as an impact on an environmental resource, i.e., the physical landscape. Visual impacts, on the other hand, are assessed as one of the interrelated effects on people (i.e., the viewers and the impact of an introduced object into a view or scene).

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The scope of work for this report includes:

- Identify potentially sensitive visual receptors within the receiving environment.
- Comply with the IFC (International Finance Corporation) Standards
- Determine the Visual Absorption Capacity of the landscape.
- Determine Visual Distance/Observer Proximity to the facility.
- Determine Viewer Incidence/Viewer Perception.
- Determine Significance of identified impacts.
- Propose mitigation to reduce or alleviate potential adverse visual impacts (to be structured as an EMPr).
- Assess the glint and glare of the PV panels
- Conclude with an Impact Statement of Significance and a project recommendation.

Visual Impact Assessment (VIA)

The VIA is determined according to the nature, extent, duration, intensity or magnitude, probability, and significance of the potential visual impacts, and will propose management actions and/or monitoring programs and may include recommendations related to the proposed Solar PV Facility.

The visual impact is determined for the highest impact-operating scenario (worst-case scenario) and varying climatic conditions (i.e., different seasons, weather conditions, etc.) are not considered.

The VIA considers potential cumulative visual impacts, or alternatively the potential to concentrate visual exposure/impact within the region.

The determination of the potential visual impacts is undertaken in terms of nature, extent, duration, magnitude, probability and significance of the construction and operation of the proposed infrastructure.

Table 1: Visual Features and Sensitive Receptors

Scenic Resources	Features in Proximity to the Development
Topographical Features	There are few topographic features within the study area, the main features being the tree-lined drainage features, which provide some visual interest in the expansive arid landscape.
Water Features	In the dry landscape, drainage courses provide visual and amenity value, the area is predominantly non perineal rivers and dry pans.

Cultural Landscape	Intact wilderness or rural landscapes, contribute to scenic value and sense of place, along with green patches of cultivated land and trees around farmsteads. Cultural landscapes include archaeological and historical sites identified in the Heritage Assessment.
Ancillary infrastructure	Gridline infrastructure has the ability to create visual intrusion, however the development is located next to the existing Aries/Hellios 400 kV powerline, which significantly reduces the impact.
Sensitive Receptor	**Features in proximity to development**
Protected Area	There are no nature reserves or other protected areas in or around the study area.
Private Reserves/ game farms/ recreational facilities	These facilities potentially have value for the local economy; however, no facilities were identified within a 10km radius of the site. These facilities potentially have value for the local economy; however, no facilities were identified within a 10km radius of the site.
Human Settlements	Besides the Styns Vley 280 farmstead on the property, there are 4 farmsteads within 10km of the proposed SEF. The closest town is approximately 70km south-west of the development, known as Kenhardt.
Roads	The site is accessible via an existing gravel farm road (known as Soafskolk Road) which provides access to the farm off of the R27 which is located east of the project site. The latter is used by residents and visitors to the area, and therefore has some visual sensitivity.
Airports	No airports have been identified within the study area; however, the Civil Aviation authority must be contacted for confirmation.
Cultural and Heritage Sites	These form part of the heritage study but could have visual implications.
Cumulative Impact	The PV facility is planned to be located within an area previously authorised for CSP project infrastructure, which is adjacent to the authorised Kotulo Tsatsi Energy PV1 and PV2 Facilities as well as the authorised CSP3 facility and associated infrastructure

Scenic Resources	Very high sensitivity (No-go)	High visual sensitivity	Medium visual sensitivity	Low visual sensitivity
Topographic features	Feature	Within 250m	-	-
Steep slopes	Slopes > 1:4	Slopes > 1:10	-	-
Drainage courses	Feature	Within 50m	-	-
Protected Landscapes / Sensitive Receptors				
Private reserves / game farms	within 500m	within 1 km	within 2 km	-
Farmsteads outside site	within 500m	within 1 km	within 2 km	-
Farmsteads inside site	within 250m	within 500m	-	
Arterial routes	within 250m	within 500m	within 1km	-

Figure 2: Guide on identifying sensitivities

It is envisaged that the features identified above may constitute a visual impact at a local scale.

3.2. Factors

It is necessary to explore some generic aspects of visual impact associated with developments and structures before exploring the site-specific impacts.

The larger a structural feature, the more it is likely to be visible. Spatial footprint is also an important factor, as the larger the spatial footprint of a development, the more it will be likely to occupy a large portion of a landscape, thus having a greater potential to alter the visual character of the landscape.

3.2.1. Viewing distance

The distance of the viewer / receptor location away from an object is the most important factor in the context of the experiencing of visual impacts. Beyond a certain distance, even large structural features tend to be much less visible and are difficult to differentiate from the surrounding landscape. The visibility of an object is likely to decrease exponentially with increasing distance away from the object, with maximum impact being exerted on receptors at a distance of 500m or less. The impact decreases exponentially as one moves away from the source of impact, with the impact at 1000m being a quarter of the impact at 500m away At 5000m away or more, the impact would be negligible.

3.2.2. Presence of receptors

It is important to note that visual impacts are only experienced when there are receptors present to experience the impact; thus, in a context where there are no human receptors or viewers present there are not likely to be any visual impacts experienced.

3.2.3. Viewer perception

Value can be placed in a landscape in terms of its aesthetic quality, or in terms of its sense of identity or sense of place with which it is associated. If no such values are held with respect to a landscape, there is less likely to a perception of visual impact if the landscape is visually altered. On the opposite side of the scale, development within a landscape may not be perceived negatively at all if the development is associated with progress or upliftment of the human condition. The perception of visual impacts is thus highly subjective and thus involves 'value judgements' on behalf of the receptor.

The context of the landscape character, the scenic / aesthetic value of an area, and the types of land use practiced tend to affect the perception of whether new developments are considered to be an unwelcome intrusion into that landscape. Sensitivity to visual impacts is typically most pronounced in areas set aside for the conservation of the natural environment (such as protected natural areas or conservancies), or in areas in which the natural character or scenic beauty of the area acts as a draw card for visitors (tourists) to visit an area, and accordingly where amenity and utilitarian ecological values are associated with the landscape. When landscapes have a highly natural or scenic character, amenity values are typically associated with such a landscape. Structural features such as high voltage power lines are not a feature of the natural environment but are rather representative of human (anthropogenic) change to a landscape. Thus when placed in a largely natural landscape, such structural features can be perceived to be highly incongruous in the context of the setting, especially if they affect or change the visual quality of a landscape. It is in this context of incongruity with a natural setting that new developments are often perceived to be a source of visual impact.

3.2.4. Landform (topographical) and micro-topographical context

The landform context of the environment in which the object is placed is an important factor. The location of the feature within the landform setting – i.e. in a valley bottom or on a ridge top is important in determining the relative visibility of the feature. In the latter case, the feature would be much more visible and would 'break' the horizon, if a viewer was located 'inferior' to the object in the topographical context. Similarly the landform context in which the viewer is located is important in that topography can inherently block views towards an object if the viewer is located in a setting such as a steep-sided valley or on an aspect facing away from the object. The morphological character of a slope is important in determining visibility of objects from other parts of the slope; typically where a slope is concave topography does not screen objects from view, but convex slopes reduce the visibility of the objects on the same slope. The micro-topography within the landscape setting in which the viewer and object are located is also important; the presence of micro-topographical features and objects such as buildings or vegetation that would screen views from a receptor position to an object can remove any visual impact factor associated with it.

3.2.5. Landscape development context

The presence / existence of other anthropogenic objects associated with the built environment may influence the perception of whether a new development is associated with a visual impact. Where buildings and other infrastructure exists, the visual environment could be considered to be already altered from a natural context and thus the introduction of a feature into this setting may be considered to be less of a visual impact than if there was no existing built infrastructure visible.

3.2.6. Receptor type and nature of the view

Visual impacts can be experienced by different types of receptors, such as people driving along roads, or people living / working in the area in which the structural feature is visible. The receptor type in turn affects the nature of the typical 'view' of a potential source of visual impact, with views being permanent in the case of a residence or other place of human habitation, or transient in the case of vehicles moving along a road. The nature of the view experienced affects the intensity of the visual impact experienced.

3.2.7. Weather and visibility

Meteorological factors, such as weather conditions (presence of haze, or heavy mist) which would affect visibility can impact the nature and intensity of a potential visual impact associated with a structural feature.

The VIA is determined according to the nature, extent, duration, intensity or magnitude, probability, and significance of the potential visual impacts, and will propose management actions and/or monitoring programs and may include recommendations related to the proposed Solar PV Facility.
The VIA considers potential cumulative visual impacts, or alternatively the potential to concentrate visual exposure/impact within the region.

The determination of the potential visual impacts is undertaken in terms of nature, extent, duration, magnitude, probability and significance of the construction and operation of the proposed infrastructure.

3.2.8. Significance of Visual Impact

A combined quantitative and qualitative methodology, as supplied by the Environmental Practitioner, was used to describe the significance of impacts. Significance of impact is rated as *consequence* of impact multiplied by the *probability* of the impact occurring. Consequence is determined using intensity, spatial scale, and duration criteria. A summary of each of the qualitative descriptions along with the equivalent quantitative rating scale is given in Annexure C.

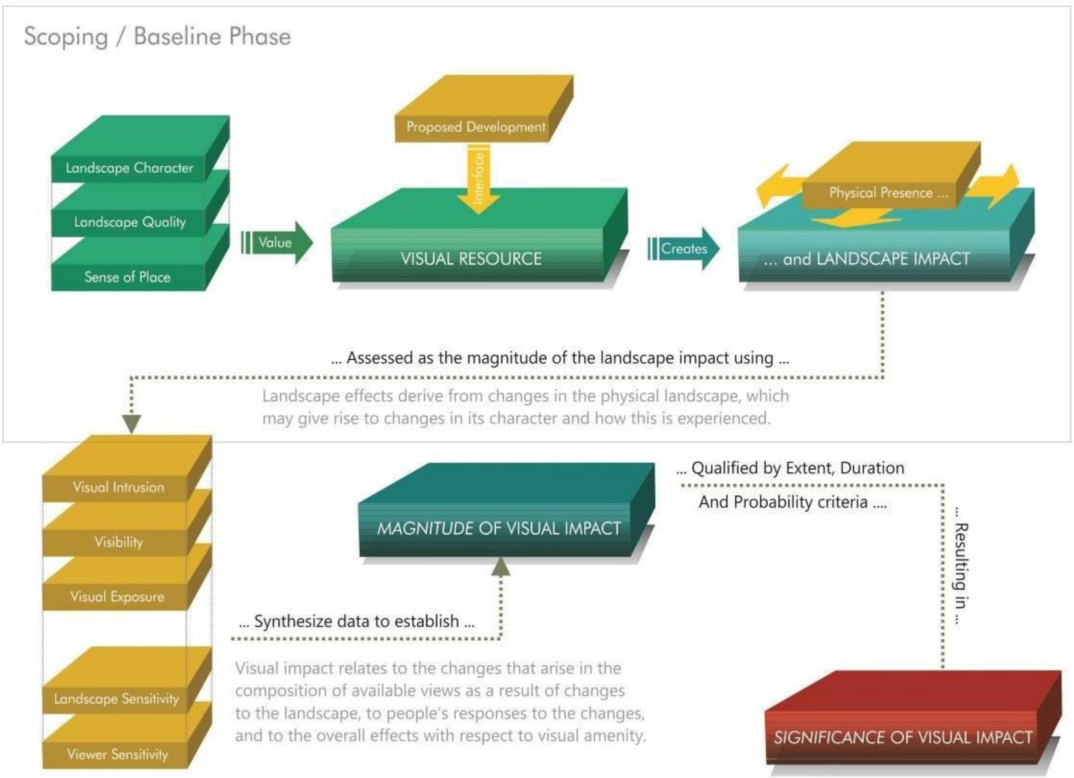

Figure 3: VIA Process

3.3. Methodology

The following method was used:

- Site visit: A field survey was undertaken so the extent of the receiving environment could be documented and adequately described. The climate conditions were mostly sunny with some cloud cover.
- Project components: The physical characteristics of the Project components were described and illustrated

based on information supplied by Savannah Environmental.

- General landscape characterization: The visual resource (i.e., receiving environment) was mapped using the field survey, Google Earth imagery, and Mucina and Rutherford's (2006) reference book, The Vegetation of South Africa, Lesotho, and Swaziland. The description of the landscape focused on the nature of the land rather than the response of a viewer (refer to Appendix A).
- The character of the landscape was described and rated in terms of its aesthetic appeal using recognised contemporary research in perceptual psychology as the basis, and its sensitivity as a landscape receptor.
- The sense of place of the study area was described as to its uniqueness and distinctiveness. The primary informant of these qualities was the spatial form and character of the natural landscape together with the cultural transformations associated with the historic/current use of the land.
- The creation of viewshed analyses from the proposed Project site in order to determine the visual exposure and the topography's potential to absorb the potential visual impact. The viewshed analyses consider the dimensions of the proposed structures and activities
- The potential impact on the visual environment of the proposed Projects were identified; and rated according to Savannah's significance rating criteria.
- Measures to mitigate the negative impacts of the proposed Project were recommended.

4. DESCRIPTION OF THE PROJECT

4.1. Project Facilities

Kotulo Tsatsi Energy (Pty) Ltd is looking to supplement its energy supply by implementing Photovoltaic (PV) generation, aiding their transition to a more sustainable and environmentally friendly energy mix.

The development of a solar photovoltaic (PV) facility with a generating capacity of up to 480MW. The PV facility is planned to be located within an area previously authorised for CSP project infrastructure, which is adjacent to the authorised Kotulo Tsatsi Energy PV1 and PV2 Facilities as well as the authorised CSP3 facility and associated infrastructure. The site is located approximately ~70km south-west of the town of Kenhardt within the Hantam Local Municipality, which is part of Namakwa District Municipality, Northern Cape Province. The solar PV development will be known as Kotulo Tsatsi Energy PV3 Solar Energy Facility.

The PV infrastructure assessed in this application is in response to the Applicant's need to change the authorized generation technology for the facility located on the farm Portion 2 of Farm Styns Vely 280. That is, a technology change from the previously authorised CSP project infrastructure to PV project infrastructure. In this regard, the solar PV facility will be connected to the grid via a 132kV grid connection solution to the authorised 400kV collector substation located on Portion 2 of Farm Styns Vley 280, and will comprise on-site switching substations, facility substations and a 132kV power line within a 500m wide corridor.

A development area of ~ 1840ha was defined through the Scoping evaluation of the site and has now been assessed for the facility footprint. The development footprint has an extent of ~1200ha.

Infrastructure associated with the solar PV facility contracted capacity of up to 480MW will include:

- Solar PV array comprising PV modules and mounting structures.
- Inverters and transformers.
- Cabling between the project components.
- BESS, O&M and laydown area hubs, including:
    - Battery Energy Storage System (BESS).
    - Site offices and maintenance buildings, including workshop areas for maintenance and storage.
    - Laydown areas and temporary construction camp areas.
- Access roads, internal distribution roads and fencing around the development area.
- On-site facility substations, switching substations and 132kV power line to facilitate the connection between the PV Facility and the authorised 400kV collector substation.

The site is accessible via an existing gravel farm road (known as Soafskolk Road) which provides access to the farm off of the R27 which is located east of the project site.

4.2. Project Phases and Activities

Activities to be undertaken during each of the phases are described in the following sections:

4.2.1. Site Preparation Phase

This phase would include the clearance of vegetation, installation of perimeter fencing and levelling of the site and preliminary earthworks. Thereafter the Project site will be marked out, a construction camp set up and the access road to the site is constructed. The clearance of vegetation is not anticipated to be site wide and will depend on the detailed layout of the proposed Project.

4.2.2. Construction Phase

The construction phase of the proposed Project will be initiated following the completion of the site preparation activities. The construction phase will include the following:

- Excavation of cable trenches;
- Ramming or drilling of the mounting structure frames;

- Installation of the PV modules onto the frames;
- Installation of measuring equipment;
- Laying of cables between the module rows to the inverter stations;
- Optionally laying of gravel or aggregate from nearby quarries placed in the rows between the PV panel array for enhanced reflection onto the panels, assisting in vegetation control and drainage;
- Construction of foundations for the inverter stations and installation of the inverters;
- Construction of operations and maintenance buildings;
- Undertaking of rehabilitation on cleared areas where required;
- Testing and commissioning; and
- Removal of equipment and disassembly of construction camp.

The construction phase of the proposed Project will be for a period of up to 12 – 18 months.

4.2.3. Operational Phase

The proposed Project will be operated on a 24 hour, 7 days a week basis. The operation phase of the proposed Project will comprise the following activities:

- Regular cleaning of the PV modules by trained personnel;
- Vegetation management under and around the PV modules and within the transmission line servitude to allow maintenance and operation at full capacity;
- Office management and maintenance of operations and maintenance of buildings;
- Supervision of the solar PV facility operations; and
- Site security monitoring.

4.2.4. Decommissioning Phase

The proposed Project is expected to operate for at least 25 years. Once the solar PV facility reaches the end of its life, the facility and the grid connection infrastructure will be decommissioned or continue to operate following the issuance of a new Power Purchase Agreement (PPA) by Eskom. If decommissioned, all components will be removed, and the site rehabilitated. Where possible all materials will be recycled, otherwise they will be disposed of in accordance with local regulations and international best practice.

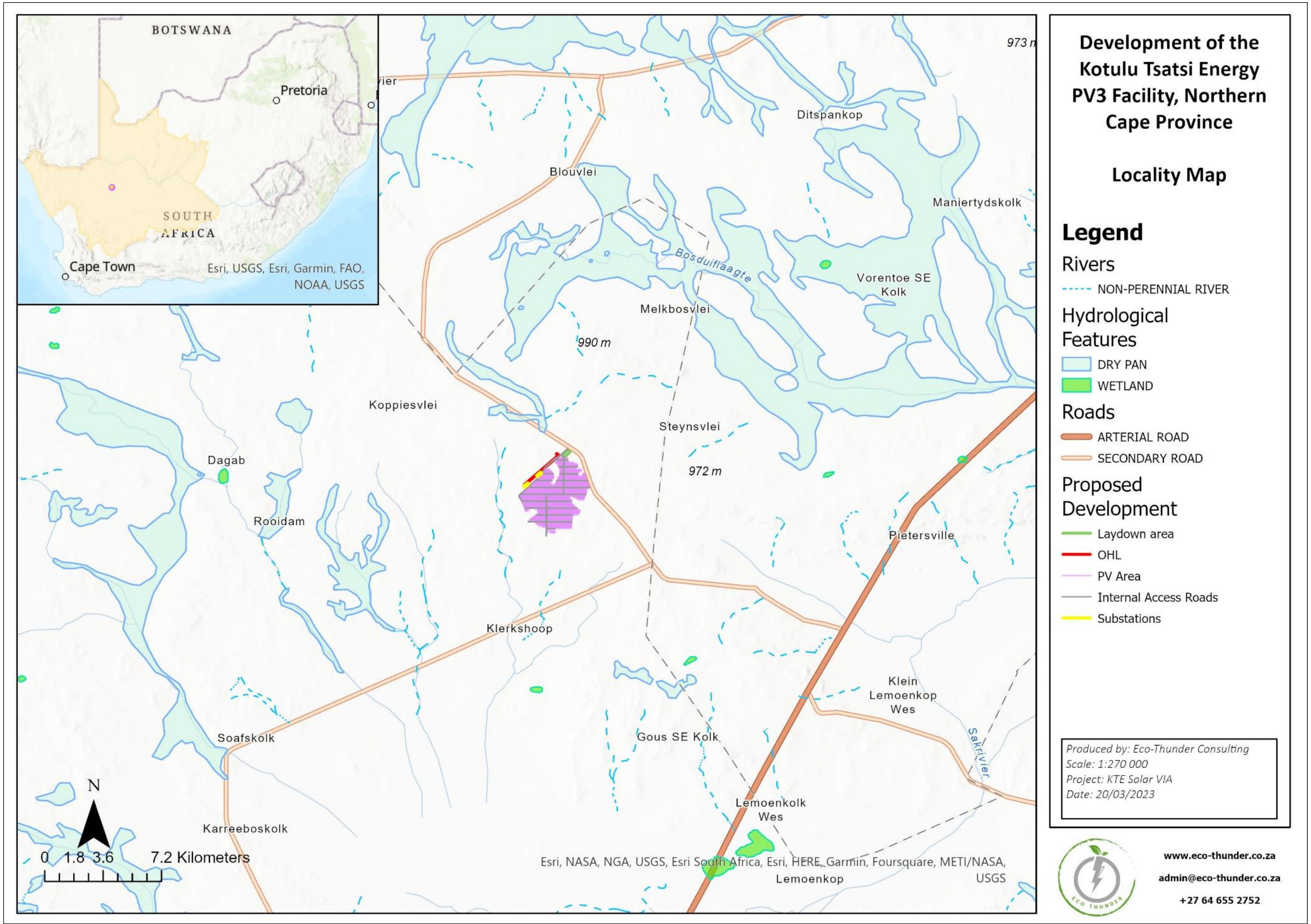

Figure 4: Facility layout map

5. ENVIROMENTAL SETTING

5.1. Landscape Character

The proposed 480MW Kotulo Tsatsi Energy PV3 Solar Energy Facility is located on Farm Styns Vely 280, Portion 2. The development is located ~70km south-west of the town of Kenhardt within the Hantam Local Municipality, which is part of Namakwa District Municipality, Northern Cape Province.

There is a great need in the area for electricity and grid upgrades in the Northern Cape. In addition to this, the Northern Cape has a very high solar resource availability which provides the province with an opportunity for the construction and operation of Solar Renewable projects in the area. The need for job opportunities and electricity necessitates that these types of projects be undertaken in the area. The preferred project site is currently being used for agricultural purposes, predominantly grazing. Should the proposed KTE PV projects proceed, approximately 1000ha of the land will be developed on and it is not expected that this will significantly threaten the agricultural activities present on site however this is to be confirmed in the Soils and Agricultural Potential Study to determine the impact of the proposed project in terms of the land use and agricultural potential.

Climatic Conditions: The climate of the Northern Cape is semi-arid with a late summer-autumn rainfall regime. Average rainfall of the area varies from 50 mm to 400 mm per year. Evaporation levels within this province exceed the annual rainfall. Climate conditions are extreme (i.e. very cold in winter and extremely hot in summer). The Kenhardt area (in which the proposed projects fall) has a very low rainfall level, 183 mm per annum, with a standard deviation of 71 mm, according to the South African Rain Atlas (Water Research Commission, undated). It typically receives the lowest rainfall (0 mm) in June and the highest (23 mm) in March (GEOSS, 2015)

Since the area receives most of its rainfall during autumn it has a semi-arid to arid climate (as noted above). The relevance of this information is that the rainfall occurs whilst temperatures are quite high still and associated evaporation rates will be high. The highest temperatures are reached in the summer months (December to January) and the lowest in the winter months (June to August). The average temperature of the area is 19.6° C, with an annual average high temperature of 28° C and an annual average low temperature of 11° C.

The average daily solar radiation levels in South Africa range between 4.5 and 6.5 kilowatt-hour per square meter (kWh/m2). In South Africa the measured solar radiation is the highest in the Northern Cape, North West Province and the Free State., the site has high solar radiation levels of 2300 kWh/m2 per annum or 6.3 kWh/m2 per day.

Topography and Landscape: The topography of the region is flat with gentle, open undulations (West-East elevations ranging between 930 m and 937 m, and North-South elevations ranging between 915 m and 950 m, as shown in Figure 6 and Figure 7 below) (Holland, 2015).

Vegetation consists of low shrubs and grassland with occasional trees and produces a mottled background to most views which is effective at making some development types such as power lines and pylons blend in with the background (Holland, 2015). Furthermore, the proposed development site lies across a low ridge that effectively bisects the area into two watersheds (SDP, 2015). Slopes across the site are almost entirely less than 2% with slightly steeper relief in some isolated spots (Lanz, 2015).

Based on the preliminary sensitivity screening undertaken for the site, the proposed project falls within areas which have biodiversity value (CBA 1 and 2 area) in addition to this the Boesmanland Vloere Habitat and Valley Floor habitat are noted as high sensitivities. There are no National Protected Areas, National Protected Area Expansion Strategy (NPAES) Focus Areas or areas of conservation planning. The closest protected area is approximately 180 km away from the proposed project site.

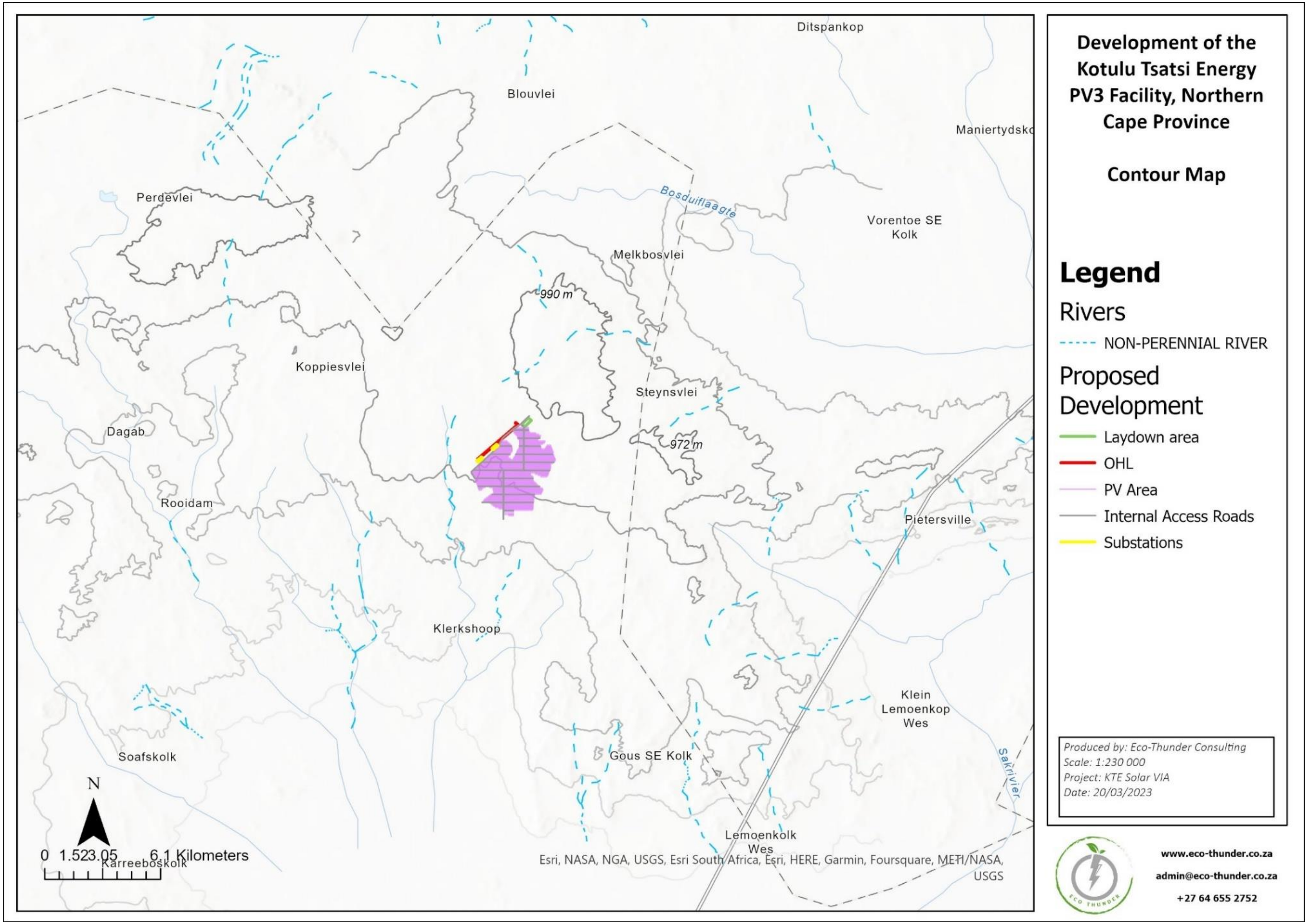

Figure 5: Proposed KTE PV3 Development Topographical Map

Roads: The proposed project site can be accessed via an existing gravel road (known as Soafskolk Road) and the existing Transnet Service Road (private). The R27 extends from Kenhartd (in the north) to Brandvlei in the south. The R27 is 6 m wide and falls within a 45 m road reserve. This National Road is designed for minimum daily traffic exceeding 1000 vehicle units. The gravel road can be accessed from the R27. The gravel road is 7- 8 m wide. Should the Road be considered the preferred access road, it is proposed that an internal gravel road be constructed from the road to the proposed site as per current designs. This internal gravel road is not expected to exceed 6 m in width. The R27, a major road between Cape Town and Upington, is more than 16 km west of the proposed site. The road is relatively busy and tourists visiting towns along the Orange River valley form part of its users. Based on the distance between these roads and the proposed site, it is highly unlikely to be visible to anyone other than local residents making use of the gravel road in the area.

Cultural and Natural Landscape (i.e. Visual Baseline) The cultural landscape is rather weakly developed and relates to the keeping of small stock in the region. The landscape is characterised by wide open space with occasional fence lines, water troughs, farm tracks and wind pumps and is rather more natural than cultural in nature. The site is located well away from the R27 which may be considered a scenic route.

5.2. Land Use

The natural landscape lacks visually interesting and sensitive features (ASHA Consulting, 2015). The proposed sites for the PV plant are in a remote and sparsely populated region with the nearest town, Kenhardt, more than 70 km from the site. Sheep farming is the major agricultural activity and the sites is located on sheep farming land. Shade trees around farmsteads include the Eucalyptus. Farming activity consists mainly of grazing by merino and dorper sheep, the small flocks often seeking shade near farmsteads. Antelope have also suffered from the drought and are now scarce, although one, possibly a duiker, was seen on the site.

The KTE 1 and 2 PV facilities were authorized and are located on the adjacent Farms. The area therefore lends itself to an industrial character to the immediate landscape, as is being proposed. Solar PV facilities are not very tall and, if an earthy coloured paint is used for the buildings, they can be almost invisible from as little as 1 km away (ASHA Consulting, 2015).

The following farm settlements or residences are located within the study area:

- Steynsvlei
- Melbosvlei
- Koppiesvlei
- Blouvlei
- Pietersville
- Klerkshoop
- Soafskolk
- Karreeboskolk
- Lemoenkolk Wes

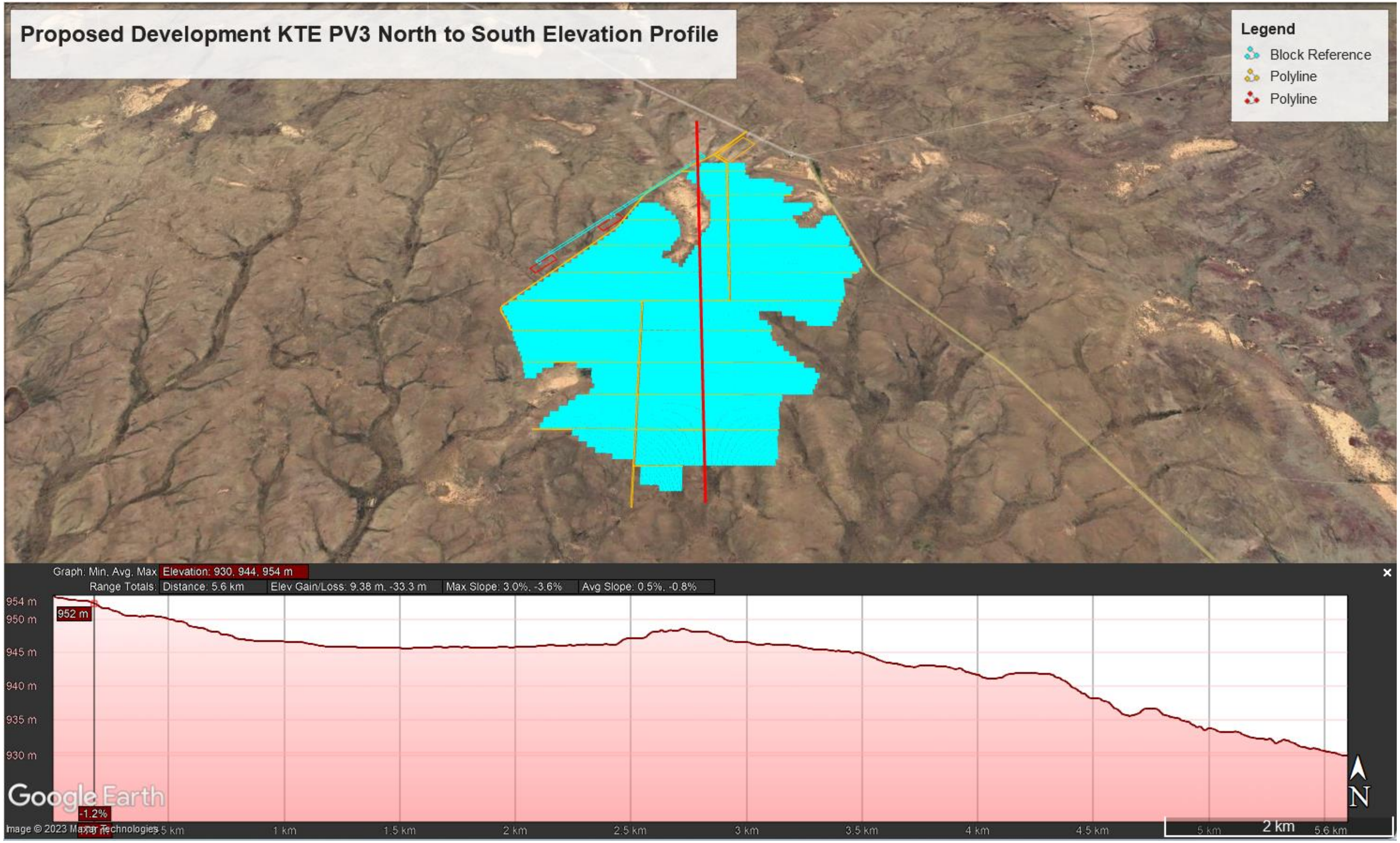

Figure 6: North to South Elevation Profile of Proposed KTE PV3 Development

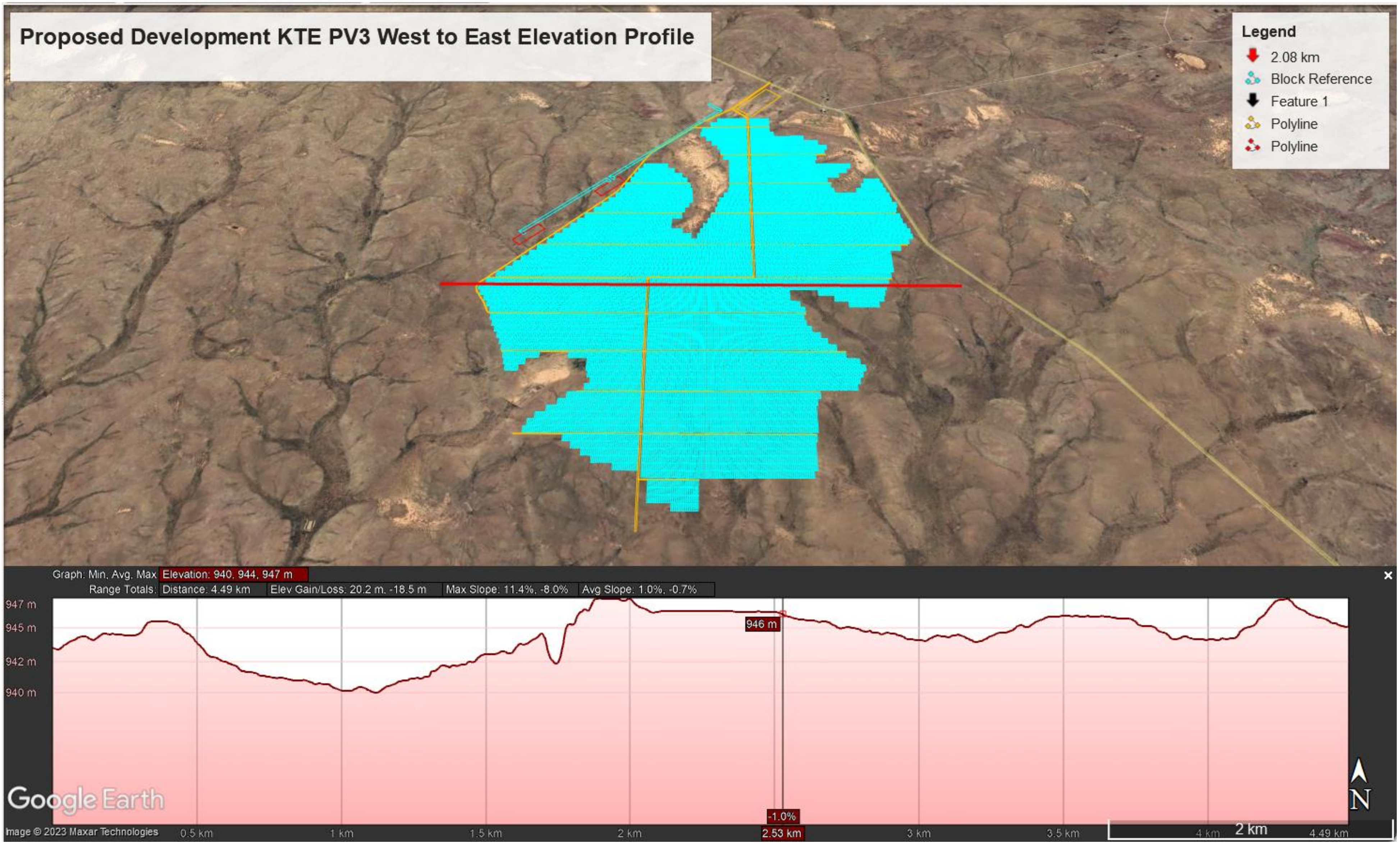

Figure 7: West to East Elevation Profile of Proposed KTE PV3 Development

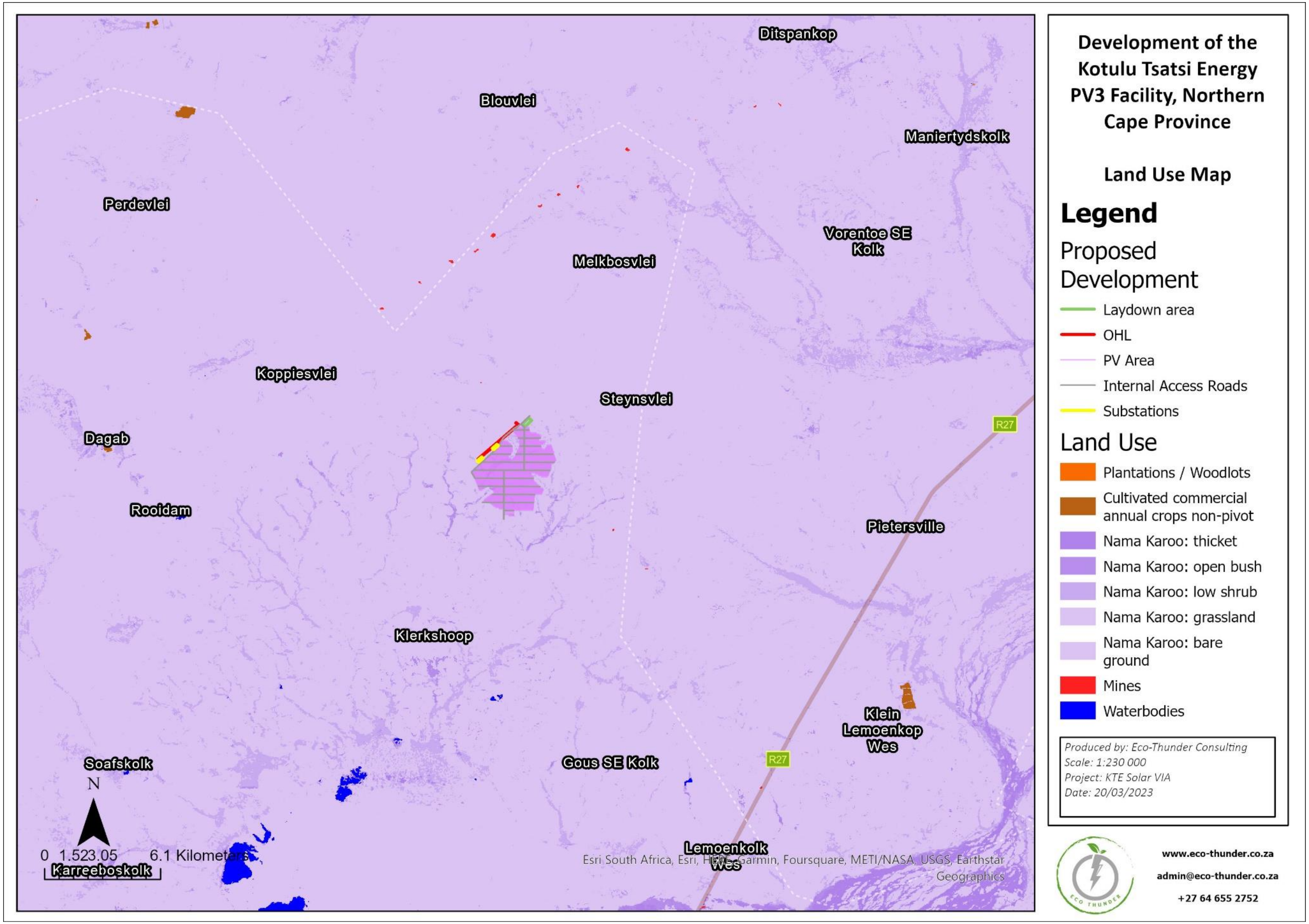

Figure 8: Proposed KTE PV3 Development Land Use Map

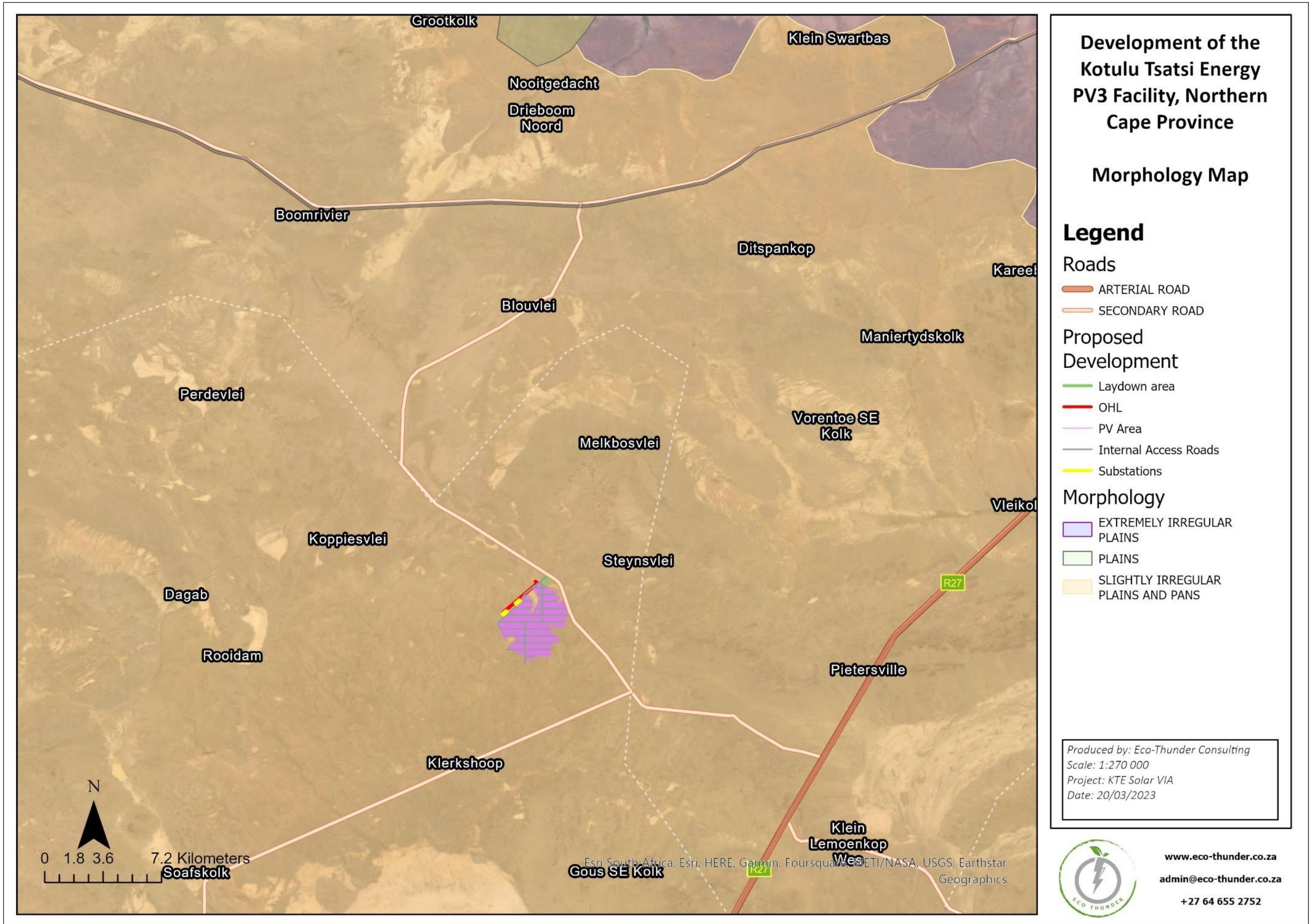

Figure 9: Proposed KTE PV3 Development Morphology Map


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Time: 19-03-2023 12:05
Note: 6
Powered by NoteCam


Latitude: -29.762424
Longitude: 20.588447
Elevation: 913.95 m
Accuracy: 10.4 m
Time: 19-03-2023 12:06
Note: 6
Powered by NoteCam


Latitude: -29.760951
Longitude: 20.586295
Elevation: 914.68 m
Accuracy: 10.3 m
Time: 19-03-2023 12:07
Note: 6
Powered by NoteCam


Latitude: -29.760951
Longitude: 20.586295
Elevation: 914.68 m
Accuracy: 10.3 m
Time: 19-03-2023 12:07
Note: 6
Powered by NoteCam


Latitude: -29.758521
Longitude: 20.582609
Elevation: 914.03 m
Accuracy: 10.2 m
Time: 19-03-2023 12:09
Note: 6
Powered by NoteCam


Latitude: -29.760245
Longitude: 20.585241
Elevation: 914.15 m
Accuracy: 9.4 m
Time: 19-03-2023 12:24
Powered by NoteCam


Latitude: -29.760739
Longitude: 20.585971
Elevation: 915.17 m
Accuracy: 9.5 m
Time: 19-03-2023 12:25
Powered by NoteCam


Latitude: -29.761061
Longitude: 20.586455
Elevation: 916.31 m
Accuracy: 10.8 m
Time: 19-03-2023 12:25
Powered by NoteCam


Latitude: -29.762797
Longitude: 20.589314
Elevation: 915.45 m
Accuracy: 9.8 m
Time: 19-03-2023 12:27
Powered by NoteCam


Latitude: -29.859496
Longitude: 20.735833
Elevation: 876.73±3 m
Accuracy: 3.9 m
Time: 19-03-2023 13:22
Note: rubble structure
Powered by NoteCam


Latitude: -29.859487
Longitude: 20.735825
Elevation: 875.86±3 m
Accuracy: 3.9 m
Time: 19-03-2023 13:23
Note: rubble structure
Powered by NoteCam


GANNAKOM
BOERDERY
Latitude: -29.822744
Longitude: 20.630324
Elevation: 894.06 m
Accuracy: 8.8 m
Time: 19-03-2023 11:22
Note: 6
Powered by NoteCam


Latitude: -29.82654
Longitude: 20.62354
Elevation: 902.71 m
Accuracy: 9.7 m
Time: 19-03-2023 11:35
Note: 6
Powered by NoteCam


Latitude: -29.824299
Longitude: 20.627644
Elevation: 900.85 m
Accuracy: 10.8 m
Time: 19-03-2023 11:36
Note: 6
Powered by NoteCam


Latitude: -29.823551
Longitude: 20.628941
Elevation: 897.6 m
Accuracy: 9.6 m
Time: 19-03-2023 11:37
Note: 6
Powered by NoteCam


Latitude: -29,83078
Longitude: 20,613206
Elevation: 915,18±15 m
Accuracy: 12,0 m
Time: 19-03-2023 11:31


Latitude: -29,856555
Longitude: 20,723865
Elevation: 859,16±33 m
Accuracy: 17,3 m
Time: 19-03-2023 10:26

Figure 10 - 59: Site Photos

6. VISUAL RESOURCE

6.1. Visual Resource Value, Scenic Quality and Landscape Sensitivity

The development of a solar PV facility will alter the visual character and quality of the landscape over which it traverses. The visual impact study is intended to assess the extent of the visual intrusion on the existing landscape and to identify alternatives that will have the least visual impact. In addition, visual impact mitigation guidelines will be presented.

The assessment of tourism and eco-tourism issues take place within the context of "sense of place." The concept of sense of place is applicable to tourist areas. People go on holiday for various and different reasons, e.g., to escape, to be entertained, to enjoy nature, to socialise, etc. In choosing a destination the image of the place is being considered, e.g. its authenticity, its offering, and/or its status.

The way in which these landscapes are managed are important to maintain the image (e.g. signs of erosion), and badly managed interference (e.g. not rehabilitating the land once a PV facility has been erected) could negatively affect the image of a tourist destination. In essence, expectations of an area have to be met. For example, people will not be accepting of a pylon in the middle of an area marketed as "pristine."

Experience has shown that it is possible to reclaim/ rehabilitate land around PV facilities, but it does complicate the process, and land for cultivation is lost. This is because the use of implements, equipment and infrastructure that can be problematic.

The visual impact of the project and associated structures will reduce exponentially as the viewer moves further away from the proposed structures (Hull and Bishop, 1988).

Critical views were determined during the field trip, land cover maps and from the 1:50 000 topographical maps. The major critical viewing area is the area identified as having a medium to high visual sensitivity.

6.2. Visual Character

Visual character is based on human perception and the observer's response to the relationships between and composition of the landscape, the land uses and identifiable elements in the landscape. The description of the visual character includes an assessment of the scenic attractiveness regarding those landscape attributes that have aesthetic value and contribute significantly to the visual quality of the views, vistas and / or viewpoints of the study area (ALA, 2013).

6.3. The Viewshed

The viewshed represents the area from which the proposed site would potentially be visible. The extent of the viewshed is influenced primarily by the combination of topography and vegetation, which determine the extent to which the site would be visible from surrounding areas. The viewshed was determined by Eco Thunder through the following steps and presumptions: The likely viewshed was determined by desktop study (ArcGIS) using contour plans (20m interval); and an offset of 2m (maximum) for the observer and an offset of 6m (maximum) for the proposed PV Facility was utilized during the spatial analysis.

Site visibility is an assessment of the extent to which the proposed development would potentially be visible from surrounding areas. It takes account of the context of the view, the relative number of viewers, duration of view and view distance. Based on a combination of all these factors an overall rating of visibility was applied to each observation point. For the purpose of this report, categories of visibility have been defined as high (H), moderate (M) or low (L).

The cone of vision is relatively wide, and the viewer tends to scan back and forth across the landscape. In contrast views from a moving vehicle are dynamic as the visual relationship between the proposed development is constantly changing as well as the visual relationship between the proposed PV Facility in which they see it. The view cone for motorists, particularly drivers, is generally narrower than for static views.

The elevation of the viewer relative to the object observed significantly influences the visibility of the object by changing the background and therefore the visual contrast. In situations where the viewer is at a higher elevation than the building/structure it will be seen against a background of landscape. The level of visual contrast between the proposed PV Facility and the background will determine the level of visibility. A white/bright coloured structure seen against a background of dark/pale coloured tree-covered slopes will be highly visible compared to a background of light-coloured slopes covered by yellow/brown dry vegetation.

The visibility of structures will increase with the period over which they are seen. The longer the period of view the higher the level of visibility. However, it is presumed that over an extended period the level of visibility declines as people become accustomed to the new element in the landscape.

Long term views of the proposed PV facility will generally be associated with farm houses, and informal settlements located within the viewshed. Short term and moderate term views will generally relate to commuters moving through the viewshed mostly by vehicle.

Potential views to the proposed PV are likely to be blocked in some localized situations by buildings, vegetation or local landform features at specific locations within the viewshed. Similarly, glimpses of the proposed PV may be available from some isolated high-elevation locations outside the plotted viewshed.

When the criteria are considered and understood within the context of the sub-region, a visual resource value of low (power utility and mining areas), moderate (drainage lines, open farmland, and urban recreation development), and high (bush-covered low hills), is allocated.

Table 2: Value of the Visual Resource

(After: LiEMA 2013)

High	Moderate	Low
This landscape type is considered to have a *high* value because it is a: Distinct landscape that exhibits an extremely positive character with valued features that combine to give the experience of unity, richness, and harmony. It is a landscape that may be of particular importance to conserve, and which has a strong sense of place. Sensitivity: It is sensitive to change in general and will be detrimentally affected ifchange is inappropriately dealt. with.	This landscape type is considered to have a *moderate* value because it is a: Common landscape that exhibits some positive character, but which has evidence of alteration / degradation / erosion of features resulting in areas of more mixed character. Sensitivity: It is potentially sensitive to change in general and change may be detrimental if inappropriately dealt with.	This landscape type is considered to have a *low* value because it is a: Minimal landscape generally negative in character with few, ifany, valued features. Sensitivity: It is not sensitive to change ingeneral and change may be detrimental if inappropriately dealt with.

6.4. Sense of Place

According to Lynch (1992), a sense of place is the extent to which a person can recognize or recall a place as being distinct from other places - as having a vivid, unique, or at least particular character of its own. The sense of place for the study area derives from a combination of the local landscape types described above, their relative 'intactness', and their impact on the senses.

Sense of place goes hand in hand with place attachment, which is the sense of connectedness a person/community feels towards certain places. Place attachment may be evident at different geographic levels, e.g. site specific (e.g. a house, burial site, or tree where religious gatherings take place), area specific (e.g. Zululand), and physiography specific (e.g. wetlands). Territorial behaviour is viewed as a set of behaviours and cognition a group exhibits based on perceived ownership. The concept of sense of place attempts to integrate the character of a setting with the personal emotions and memories associated with it.

Much of what is valuable in a culture is embedded in place, which cannot be measured in monetary terms. It is because of a sense of place and belonging that people are loath to be moved from their dwelling place, despite the fact that they will be compensated for the inconvenience and impact on their lives. Places/natural resources should be assessed in terms of its cultural value by studying visiting and consumption patterns, behaviour patterns, etc.

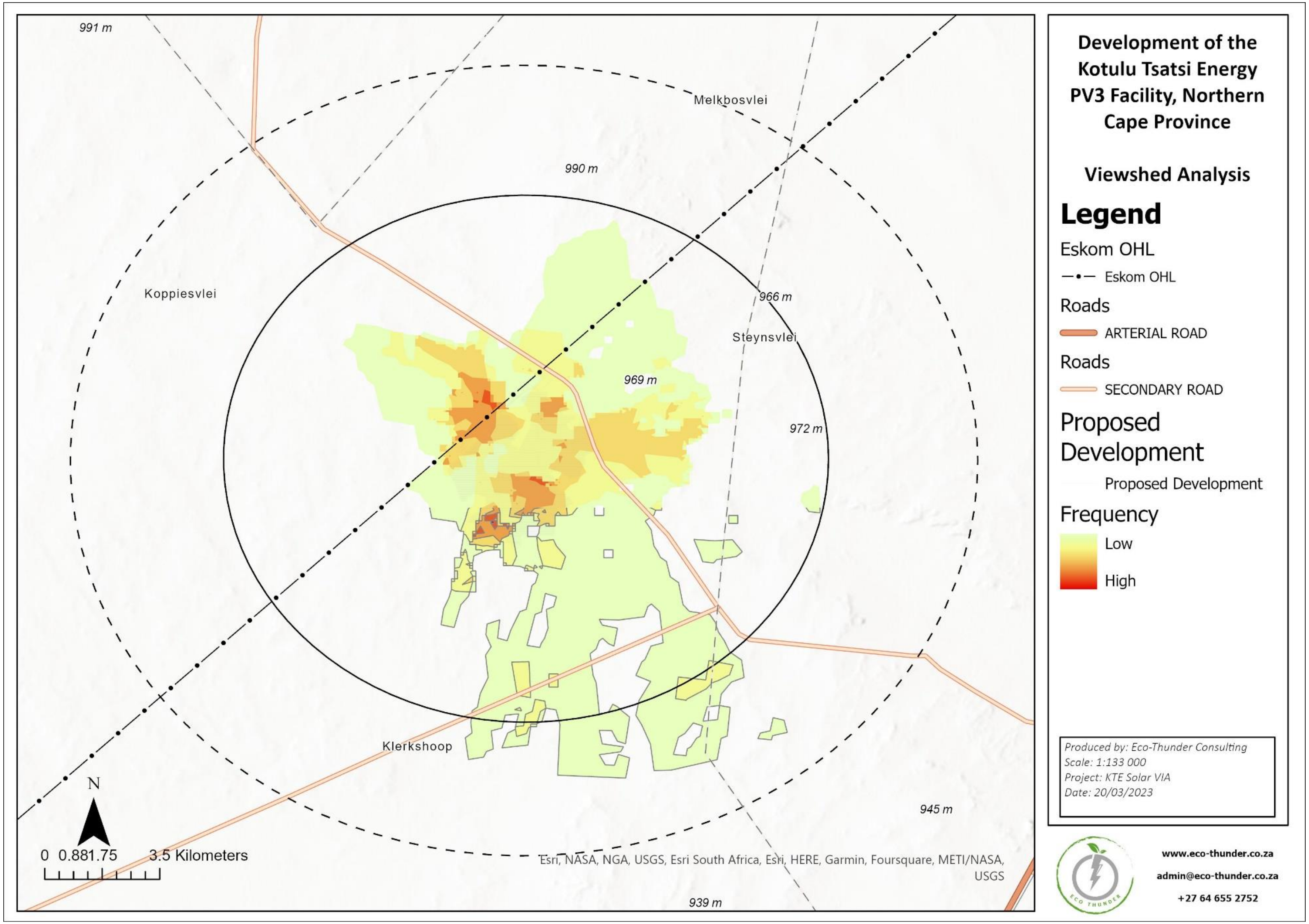

Figure 60: Viewshed analysis

7. VISUAL IMPACT ASSESSMENT

The *intensity* of impact is assessed through a synthesis of visual intrusion, visibility, visual exposure, and viewer sensitivity criteria. Once the intensity of impact has been established this value is further qualified with spatial, duration and probability criteria to determine the *significance* of the visual impact.

In assessing the intensity of visual impact, the study assumes the worst-case scenario, i.e., that the facility (PV and Grid Connections) will be built at the same time. Figure 61 shows that the facilities and grid connection infrastructure are located immediately adjacent to each other, resulting in all Project components being observed within the same visual envelope (to a greater or lesser degree) from the sensitive viewing areas.

It is anticipated that visual impacts will result from the activities and infrastructure in all Project phases i.e., construction, operational, and closure. Activities associated with the Project will be visible, to varying degrees from varying distances around the Project site. During the establishment phase, the Project's visibility will be influenced due to the preparatory activities, primarily earthworks and infrastructure establishment. During the operation phase, the visibility of the Project will be the result of the established PV arrays, the substation, and associated powerline infrastructure (grid connections).

Typical issues associated with solar PV Projects are:

- Who will be able to see the new development?
- What will it look like, and will it contrast with the receiving environment?
- Will the development affect sensitive views in the area and if so, how?
- What will be the impact of the development during the day and at night?
- What will the cumulative impact be if any?

These potential impacts will be considered and rated in the following sections.

7.1. Visual exposure and area of study

The result of the viewshed analyses for the proposed facility is shown on **Figure 65.** The viewshed analyses was undertaken from a number of vantage points within the proposed development area at an offset of 6m above average ground level. This was done in order to determine the general visual exposure (visibility) of the area under investigation, simulating the maximum height of the proposed structures (PV panels) associated with the facility.

Visual exposure as follow:

0 – 1 KM (**Very High sensitivity area**)

The main project components are anticipated to fall within this area, the anticipated visual exposure of the facility is contained to a core area on the site itself and within a 1 km radius thereof. There is only one farm, which is located on the same property as the proposed development within this zone. The gravel road falls directly northeast of the development within this zone. Observers travelling along this road will be exposed to the project infrastructure. In addition the existing Aries OHL runs to the north of the facility.

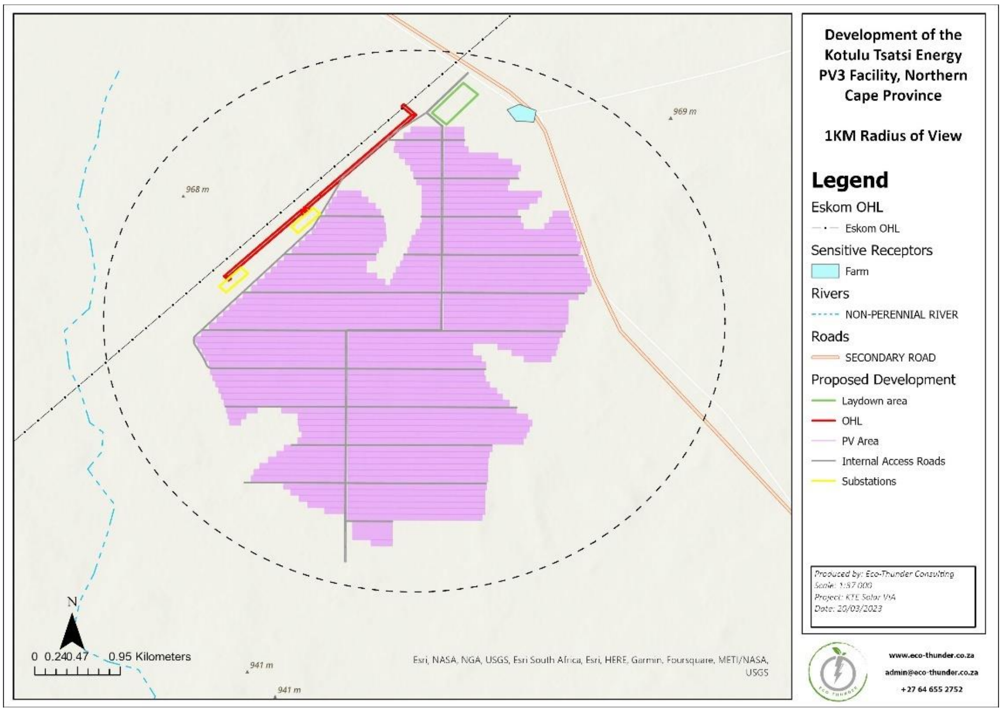

Figure 61: 1 KM Visual exposure area

1 – 3 KM (**High Sensitivity**)

Potential visual exposure in the short to medium distance (i.e., between 1 and 3km), is largely very scattered with the most line of sight being from the additional stretches of the gravel road.

The majority of this area is agricultural or vacant land. There are some areas in which the topography is relatively flat with little to no tall vegetation.

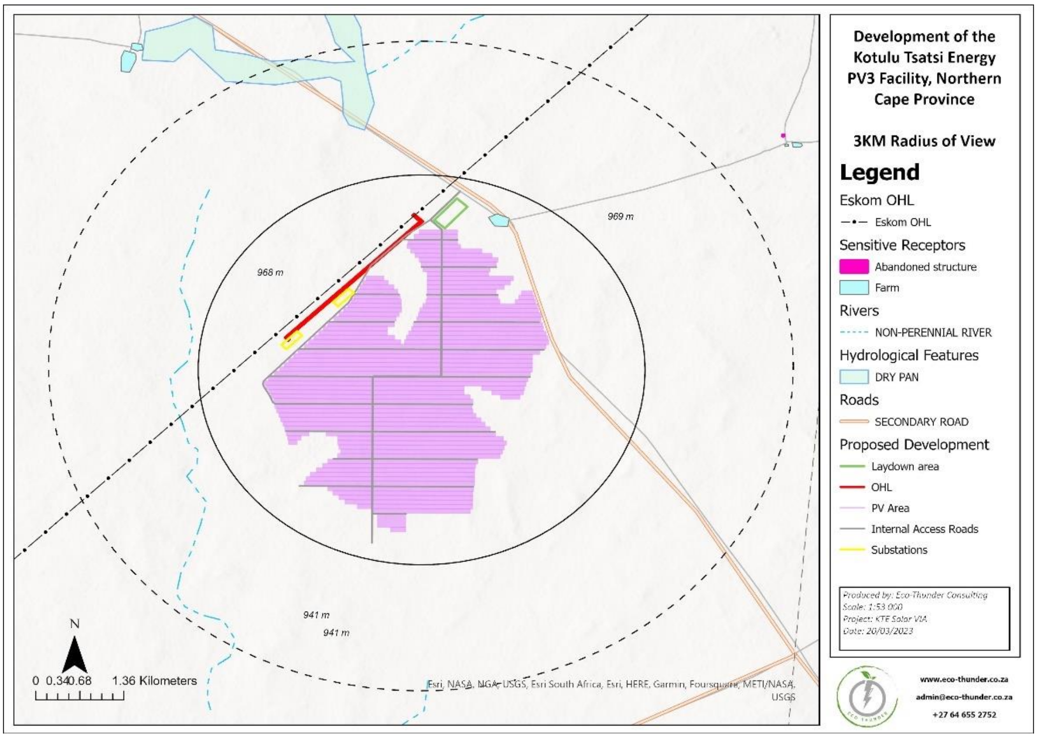

Figure 62: 3KM Visual exposure area

3 - 6KM (**Moderate Sensitivity**)

Within this observation the visual exposure becomes very scattered and interrupted some additional settlements and additional roads falling within this zone of observation.

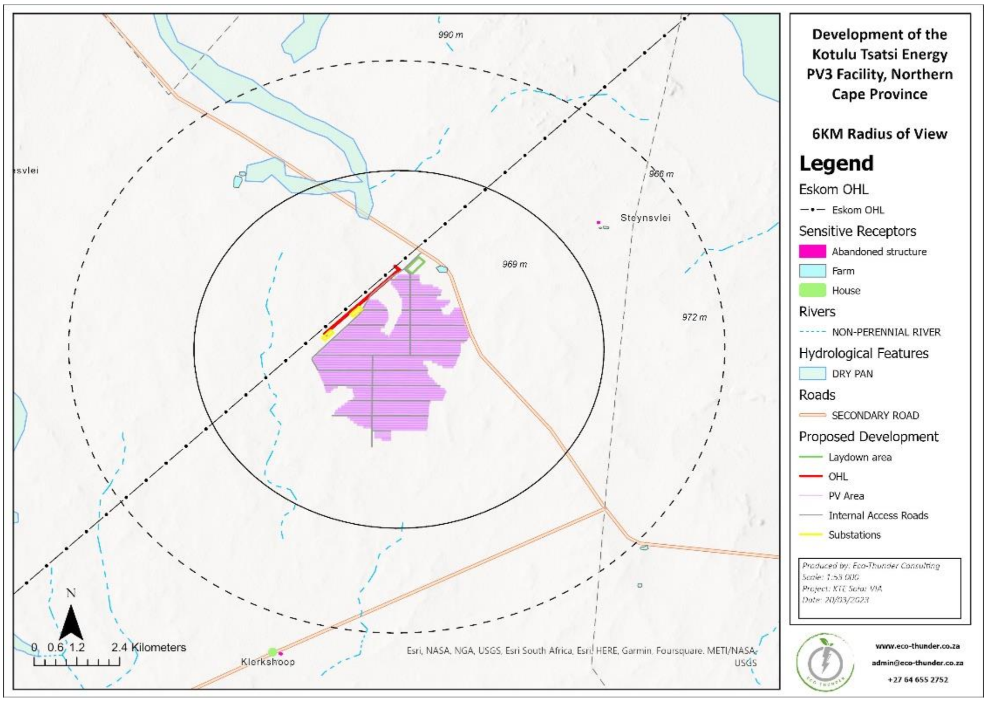

Figure 63: 6KM Visual exposure area

6 – 10 KM (**Very Low Sensitivity**)
At distances exceeding 6km the intensity of visual exposure is expected to be very low and highly unlikely due to the distance between the object (development) and the observer.

It is clear that the relatively constrained dimensions of the PV facility would amount to a fairly limited area of potential visual exposure. The visual exposure would largely be contained within a 6km radius of the proposed development site.

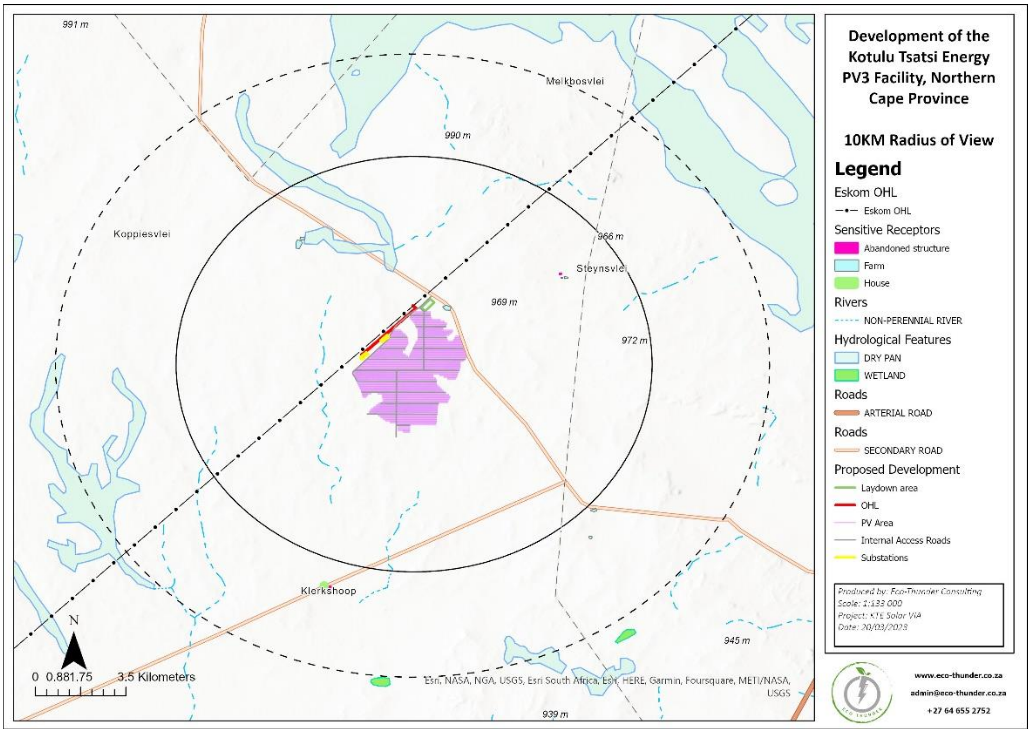

Figure 64: 10KM Visual exposure area

7.2. Impact Index

The combined results of the visual exposure, viewer incidence / perception and visual distance of the proposed PV facility is displayed on Figure 65. Here the weighted impact and the likely areas of impact have been indicated as a visual impact index. Values have been assigned for each potential visual impact per data category and merged to calculate the visual impact index.

An area with short distance visual exposure to the proposed infrastructure, a high viewer incidence and a potentially negative perception (i.e., a sensitive visual receptor) would therefore have a higher value (greater impact) on the index. This helps in focusing the attention to the critical areas of potential impact and determining the potential magnitude of the visual impact.

The index indicates that potentially sensitive visual receptors within a 1km radius of the PV facility may experience a very high visual impact. The magnitude of visual impact on sensitive visual receptors subsequently subsides with distance to; high within a 1 – 3km radius (where/if sensitive receptors are present) and moderate within a 3 – 6km radius (where/if sensitive receptors are present). Receptors beyond 6km are expected to have a low potential visual impact.

7.3. Visual Absorption Capacity

Overall, the Visual Absorption Capacity (VAC) of the receiving environment is deemed low by virtue of the nature of the vegetation and the low occurrence of urban development. In addition, the scale and form of the structures mean that it is unlikely that the environment will visually absorb them in terms of texture, colour, form, and light / shade characteristics.

Where homesteads and settlements occur, some more significant vegetation and trees may have been planted, which would contribute to visual absorption. However, as this is not a consistent occurrence, VAC will not be considered for any of the homesteads or settlements, thus assuming a worst-case scenario in the impact assessment.

Closer to the proposed development site, the occurrence of existing mining is expected to greatly influence the visual exposure of the proposed PV structures and ancillary infrastructure. The existing mining infrastructure is expected to be especially effective in reducing visual exposure to the east and south of the proposed development's location (i.e., along roads and at residence settlements)

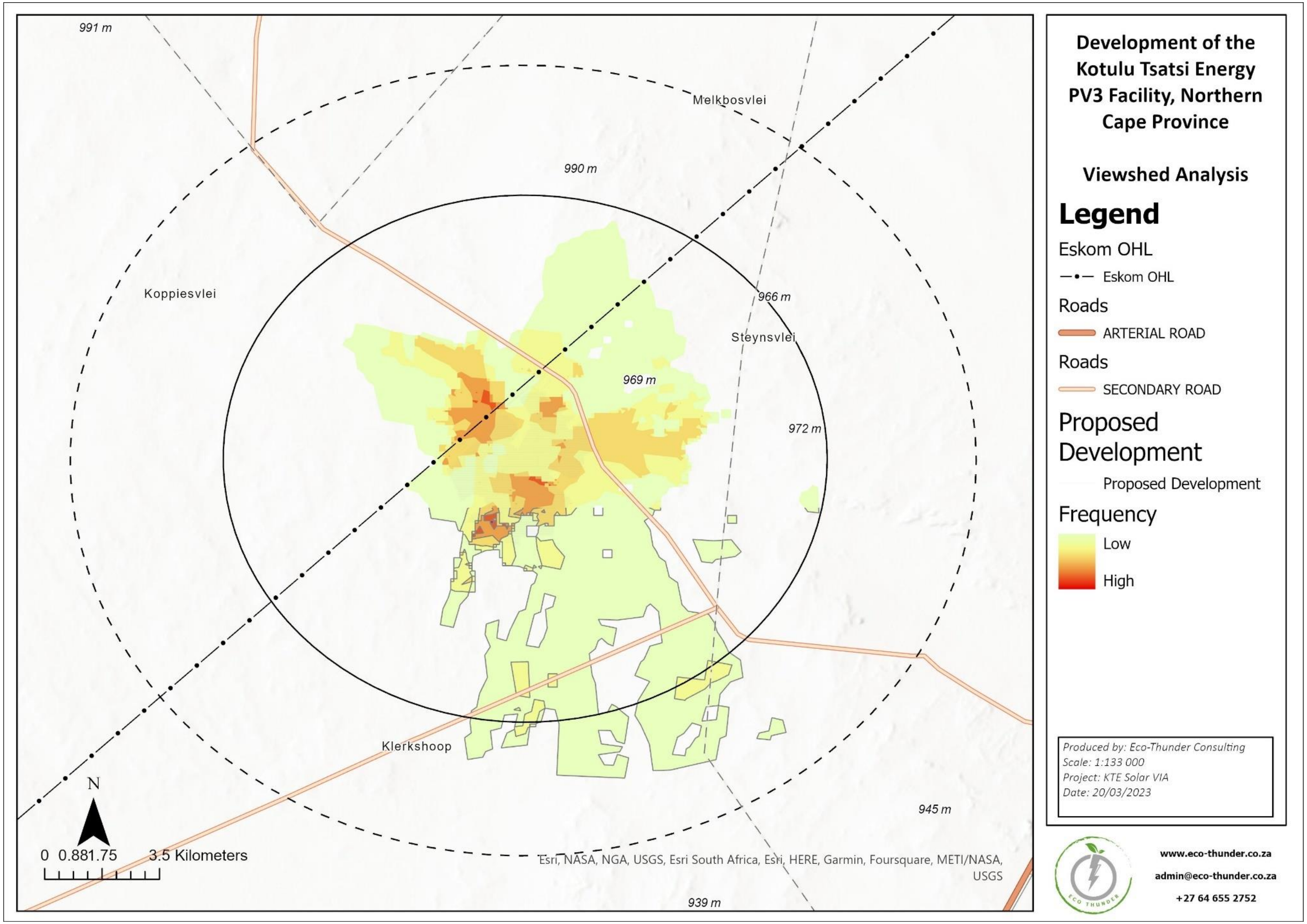

Figure 65: Viewshed analysis of the proposed development

7.4. VIA Rating Methodology

This section will attempt to quantify the potential visual impacts in their respective geographical locations and in terms of the identified issues related to the visual impact.

The methodology for the assessment of potential visual impacts states the **nature** of the potential visual impact (e.g., the visual impact on users of major roads in the vicinity of the proposed power line alignment) and includes a table quantifying the potential visual impact according to the following criteria:

- **Extent** - long distance (very low = 1), medium to longer distance (low = 2), short distance (medium = 3) and very short distance (high = 4)[7].
- **Duration** - very short (0 – 1yrs. = 1), short (2 – 5yrs. = 2), medium (5 – 15yrs. = 3), long (>15 yrs. = 4), and permanent (= 5).
- **Magnitude** - None (= 0), minor (= 2), low (= 4), medium / moderate (= 6), high (= 8) and very high (= 10)[8].
- **Probability** – very improbable (= 1), improbable (= 2), probable (= 3), highly probable (= 4) and definite (= 5).
- **Status** (positive, negative, or neutral).
- **Reversibility** - reversible (= 1), recoverable (= 3) and irreversible (= 5).
- **Significance** - low, medium, or high.

The *significance* of the potential visual impact is equal to the *consequence* multiplied by the *probability* of the impact occurring, where the consequence is determined by the sum of the individual scores for magnitude, duration, and extent (i.e., *significance = consequence (magnitude + duration + extent) x probability*).

The significance weighting for each potential visual impact (as calculated above) is as follows:

- <30 points: Low (where the impact would not have a direct influence on the decision to develop in the area)
- 31-60 points: Medium / moderate (where the impact could influence the decision to develop in the area)
- >60: High (where the impact must have an influence on the decision to develop in the area)

7.5. Visual Impact Assessment

The identification and assessment of environmental impacts is a multi-faceted process, using a combination of quantitative and qualitative descriptions and evaluations. It involves applying scientific measurements and professional judgement to determine the significance of environmental impacts associated with the proposed project. The process involves consideration of, inter alia: the purpose and need for the Project; views and concerns of interested and affected parties (I&APs); social and political norms, and the public's interest.

The following tables summarise the consequence and significance of the visual impact of the Project. These results are based on worst-case scenario when the impacts of all aspects of the Project are taken together (PV facilities, grid connection and battery systems). Consequence of impact is a function of intensity, duration, and spatial extent (SLR 2020). Intensity of impact is taken from the worst-case situation. These facilities are rated together, from a visual impact perspective, as the one would not exist without the other and they must be understood as the collective / cumulative.

7.5.1. Construction Phase

Table 3: Construction of a PV Facility
The development of the proposed solar power plants will require approximately 1000ha of land. The preparation (earthworks and infrastructure development) will cause a major local contrast with the existing open land, as soil is exposed to create service roads, trenches, erecting structures for the arrays, distribution lines, sub-stations, etc. Construction activities may potentially result in a **moderate** (significance rating = 48), temporary visual impact, that may be

[7] Long distance = > 3km. Medium to longer distance = 1.5 – 3km. Short distance = 0.5 – 1.5km. Very short distance = < 0.5km (refer to Section 6.3. Visual distance / observer proximity to the grid connection infrastructure).

[8] This value is read from the visual impact index. Where more than one value is applicable, the higher of these will be used as a worst-case scenario.

mitigated to **Low** (significance rating = 30). The clearing of vegetation and exposure of soil during the establishment period will contrast dramatically with the natural layout of the site's vegetation. Once the solar PV arrays have been installed, they will also contrast with the existing landscape due to their dark appearance.			
	Rating	**Motivation**	**Significance**
Prior to Mitigation			
Duration	Short (2)	Changes in the physical characteristics by changing the fabric and character of the landscape	**Moderate (48)**
Extent	Very Short Distance (4)	Partial loss of features that contribute to the existing landscape by the introduction of new elements and structures	
Magnitude	Moderate (4)		
Probability	Highly probable (4)	If development is approved there is a high probability the landscape will be impacted	
Mitigation/Enhancement Measures			
Mitigation: • Retain and maintain natural vegetation (if present) immediately adjacent to the development footprint. • Ensure that vegetation cover adjacent to the development footprint (if present) is not unnecessarily removed during the construction phase, where possible. • Plan the placement of laydown areas and temporary construction equipment camps to minimise vegetation clearing (i.e., in already disturbed areas) wherever possible. • Restrict the activities and movement of construction workers and vehicles to the immediate construction site and existing access roads. • Ensure that rubble, litter, and disused construction materials are appropriately stored (if not removed daily) and then disposed regularly at licensed waste facilities. • Reduce and control construction dust using approved dust suppression techniques as and when required (i.e., whenever dust becomes apparent). • Restrict construction activities to daylight hours whenever possible to reduce lighting impacts. • Rehabilitate all disturbed areas (if present / if required) immediately after the completion of construction works.			
Post Mitigation/Enhancement Measures			
Duration	Short (2)	Changes in the physical characteristics by changing the fabric and character of the landscape	**Low (30)**
Extent	Very Short Distance (4)	Partial loss of features that contribute to the existing landscape by the introduction of new elements and structures	
Magnitude	Low (4),		
Probability	Probable (3)	If development is approved there is a high probability the landscape will be impacted	
Cumulative Impacts: The construction of the Solar PV facility is expected to increase the cumulative visual impact within the region, considering the visual exposure of the power line infrastructure already present at this locality as well as the existing authorized KTE 1 and KTE 2 PV Facilities. Alternatively, the close proximity of the proposed site to the existing visual disturbances (power lines) allows for the effective connection with the power grid without incurring any additional expanded visual impacts.			
Residual Risks: The visual impact will be removed after decommissioning, provided the solar PV infrastructure is removed and the site is rehabilitated to its original (current) status. Failing this, the visual impact will remain.			

Table 4: Impact of PV facility on Roads in Close Proximity
The Solar PV facility could potentially have a **moderate** visual impact on road users travelling along the main road traversing south and east of the facility. These roads are however expected to be frequented primarily by local users going about their daily business (i.e., not sight-seeing), potentially lessening the probability of the impact significance.

	Rating	Motivation	Significance
Prior to Mitigation			
Duration	Long term (4)	Development of the PV facility will be visible for its entire lifespan	**Moderate (42)**
Extent	Local (4)	Only road users in the area will be subjected to the impact	
Magnitude	Moderate (6)		
Probability	Probable (3)	Road users will most likely be able to see the PV facility when using the roads	
Mitigation/Enhancement Measures			

Mitigation:

Mitigation of this impact is possible and both specific measures as well as general "best practice" measures are recommended to reduce / mitigate the potential visual impact to **low**. The table below illustrates this impact assessment.

General mitigation / management:

Planning:

- Retain and maintain natural vegetation in all areas outside of the development footprint.

Operations:

- Maintain the general appearance of the facility as a whole.

Decommissioning:

- Remove infrastructure not required for the post-decommissioning use of the
- facility.
- Rehabilitate all areas. Consult an ecologist regarding rehabilitation specifications.
- Monitor rehabilitated areas post-decommissioning and implement remedial actions.

Site specific mitigation measures:

- Plant indigenous vegetation where possible to increase the sense of place of the area.

Post Mitigation/Enhancement Measures			
Duration	Local (4)	Development of the PV facility will be visible for its entire lifespan	**Low (24)**
Extent	Long Term (4)	Only road users in the area will be subjected to the impact	
Magnitude	Low (4)		
Probability	Improbable (2)	Vegetation will shield any possible visual intrusion	

Cumulative Impacts:

The construction of the Solar PV facility is expected to increase the cumulative visual impact within the region, considering the visual exposure of the power line infrastructure already present at this locality as well as the existing authorized KTE 1 and KTE 2 PV Facilities. Alternatively, the close proximity of the proposed site to the existing visual disturbances (power lines) allows for the effective connection with the power grid without incurring any additional expanded visual impacts.

Residual Risks:

The visual impact will be removed after decommissioning, provided the PV facility infrastructure is removed and the site is rehabilitated to its original (current) status. Failing this, the visual impact will remain.

Table 5: Visual Impact on Residence and Homesteads in Close Proximity

The potential visual impact on residents of homesteads and homes in close proximity to the Solar PV facility is expected to be of **Low** significance after mitigation. The residences in question include the property owners farming development, as well as very scattered small holdings within the area.

	Rating	Motivation	Significance
Prior to Mitigation			
Duration	Long term (4)	The residence surrounding the development will be able to see the PV facility	**Moderate (36)**
Extent	Local (4)	The development is proposed to only disrupt local visual receptors	
Magnitude	Low (4)		
Probability	Probable (3)	Residence will most likely be able to see the	

		PV facility	
Mitigation/Enhancement Measures			
Mitigation: **General mitigation/management:** Planning: • Retain and maintain natural vegetation in all areas outside of the development footprint. Operations: • Maintain the general appearance of the facility as a whole. Decommissioning: • Remove infrastructure not required for the post-decommissioning use of the facility. • Rehabilitate all areas. Consult an ecologist regarding rehabilitation specifications. • Monitor rehabilitated areas post-decommissioning and implement remedial actions. **Site specific mitigation measures:** • Ensure that site is rehabilitated after construction • Where possible incorporate indigenous vegetation to improve the sense of place			
Post Mitigation/Enhancement Measures			
Duration	Long term (4)	The PV facility will be visible for its entire lifespan	**Low (24)**
Extent	Local (4)	The development is proposed to only disrupt local visual receptors	
Magnitude	Low (4)		
Probability	Improbable (2)	With the correct mitigation measures in place, it is highly unlikely that there would be permanent impact on local residence	
Cumulative impacts: The construction of the Solar PV facility is expected to increase the cumulative visual impact within the region, considering the visual exposure of the power line infrastructure already present at this locality as well as the existing authorized KTE 1 and KTE 2 PV Facilities. Alternatively, the close proximity of the proposed site to the existing visual disturbances (power lines) allows for the effective connection with the power grid without incurring any additional expanded visual impacts.			
Residual Risks: If development is not rehabilitated or left abandoned the sense of place will decrease, which may decrease the value of properties in the surrounding area.			

7.5.2. Operation Phase

Table 6: Glint and Glare			
Potential visual impact of solar glint and glare as a visual distraction and possible air / road travel hazard The visual impact of glint and glare relates to the potential it has to negatively affect sensitive visual receptors in relatively close proximity to the source (e.g., residents of neighbouring properties), or road users driving at night. The potential visual impact related to solar glint and glare as a hazard is expected to be of **low** significance. No mitigation of this impact is required since the PV facility is not expected to interfere with aircraft operations or impact the safety of road users.			
	Rating	**Motivation**	**Significance**
Prior to Mitigation			
Duration	Long term (4)	This will be a possible risk for the entire life cycle of the PV facility	**Low (24)**
Extent	Very short distance (4)	This will only be a problem from short distances and at sustain times of day	
Magnitude	Low (4)		
Probability	Probable (4)	Reflection from sunlight, cars traveling on adjacent roads or night-time elimination will trigger this risk	
Mitigation/Enhancement Measures			
Mitigation: N/A			
Post Mitigation/Enhancement Measures			
Duration	N/A		

Extent	N/A		
Magnitude	N/A		
Probability	N/A		
Cumulative Impacts: The cumulation of various PV facilities may have an impact on the road users in the area, it is therefore recommended that the best practice for lighting be implemented.			
Residual Risks: Potential visual impact of night lighting during the construction phase on the nightscape of the region.			

Table 7: Visual Exposure			
Visual exposure is determined by qualifying the visibility of an object, with a distance rating to indicate the degree of intrusion and visual acuity. As distance between the viewer and the object increases, the visual perception of the object reduces exponentially as generally changes in form, line, colour, and texture in the landscape become less perceptible with increasing distance. The basic areas of concern are: • The residential areas surrounding the Project sites.			
	Rating	**Motivation**	**Significance**
Prior to Mitigation			
Duration	Long term (4)	The development will be visible for its life cycle duration	**Moderate (36)**
Extent	Local (4)	Visual receptors within the local area will be subjected to this impact	
Magnitude	Low (4)		
Probability	Probable (3)	Without mitigation there is a high level of certainty that this impact will take place	
Mitigation/Enhancement Measures			
Mitigation: **General mitigation/management:** Planning: • Retain and maintain natural vegetation in all areas outside of the development footprint. Operations: • Maintain the general appearance of the facility as a whole. Decommissioning: • Remove infrastructure not required for the post-decommissioning use of the facility. • Rehabilitate all areas. Consult an ecologist regarding rehabilitation specifications. • Monitor rehabilitated areas post-decommissioning and implement remedial actions. **Site specific mitigation measures:** • Plant vegetation barriers where plausible for the PV facility in order to shield the structures from observers residing at the above-mentioned homesteads.			
Post Mitigation/Enhancement Measures			
Duration	Long term (4)	The development will be visible for its life cycle duration	**Low (24)**
Extent	Local (4)	Visual receptors within the local area will be subjected to this impact	
Magnitude	Low (4)		
Probability	Improbable (2)	With Mitigation this impact is likely to be significantly reduced	
Cumulative Impacts: The construction of the Solar PV facility is expected to increase the cumulative visual impact within the region, considering the visual exposure of the power line infrastructure already present at this locality as well as the existing authorized KTE 1 and KTE 2 PV Facilities. Alternatively, the close proximity of the proposed site to the existing visual disturbances (power lines) allows for the effective connection with the power grid without incurring any additional expanded visual impacts.			
Residual Risks: None			

Table 8: Visual intrusion			
Visual intrusion deals with the notion of contextualism i.e., how well does a Project component fit with or disrupt / enhance the ecological and cultural aesthetic of the landscape as a whole? And ties in with the concept of visual absorption capacity (VAC), which for the Project site is **low**.			
	Rating	**Motivation**	**Significance**
Prior to Mitigation			
Duration	Long term (4)	The development will be visible for its life cycle duration	**Low (30)**
Extent	Local (2)	Visual receptors within the local area will be subjected to this impact	
Magnitude	Moderate (4)		
Probability	Probable (3)	A probability for this to occur exists, which can be mitigated	
Mitigation/Enhancement Measures			
Mitigation:			
Post Mitigation/Enhancement Measures			
Duration	N/A		
Extent	N/A		
Magnitude	N/A		
Probability	N/A		
Cumulative impacts: • The combined effects of these changes will negatively affect the overall character of the landscape.			
Residual Risks: • A possibility for the area to become more ''industrialized'' if large amounts of PV facilities are constructed.			

Table 9: Ancillary Infrastructure			
On-site ancillary infrastructure associated with the PV facility includes a grid connection solution, which consists of an on-site facility and power line/s to facilitate the connection between the solar PV Facility, an authorised 400kV collector substation, which is located north-east of the project site. In addition the development will include a Battery Energy Storage System (BESS) and all associated infrastructure), meteorological measurement station, internal access roads, workshop, office buildings, etc. No dedicated viewshed analyses have been generated for the ancillary infrastructure, as the range of visual exposure will fall within that of the PV arrays. The anticipated visual impact resulting from this infrastructure is likely to be of **low** significance both before and after mitigation.			
	Rating	**Motivation**	**Significance**
Prior to Mitigation			
Duration	Long term (4)	The development will be visible for its life cycle duration	**Low (24)**
Extent	Local (4)	Visual receptors within the local area will be subjected to this impact	
Magnitude	Low (4)		
Probability	Improbable (2)	There is a small chance that this will impact visual receptors.	
Mitigation/Enhancement Measures			
Mitigation: N/A			
Post Mitigation/Enhancement Measures			
Duration	N/A		
Extent	N/A		
Magnitude	N/A		
Probability	N/A		
Cumulative Impacts:			

The combined effects of these changes will negatively affect the overall character of the landscape.
Residual Risks:
In the event that the development deviates from the proposed layout complications may arise, ensure that the gridline solution is kept as short as possible and that all additional infrastructure is within the development area.

Table 10: Sense of place			
Sense of place refers to a unique experience of an environment by a user, based on his or her cognitive experience of the place. Visual criteria, specifically the visual character of an area (informed by a combination of aspects such as topography, level of development, vegetation, noteworthy features, cultural / historical features, etc.), plays a significant role. An impact on the sense of place is one that alters the visual landscape to such an extent that the user experiences the environment differently, and more specifically, in a less appealing or less positive light. The environment surrounding the proposed PV facility has a predominantly rural and undeveloped character. The anticipated visual impact of the proposed PV facility on the regional visual quality, and by implication, on the sense of place, is difficult to quantify, but is generally expected to be of **low** significance. This is due to the relatively low viewer incidence within close proximity to the proposed development site and the lack of features of value.			
	Rating	**Motivation**	**Significance**
Prior to Mitigation			
Duration	Long term (4)	The development will be visible for its life cycle duration	**Low (22)**
Extent	Regional (3)	Visual receptors within the local area will be subjected to this impact	
Magnitude	Low (4)		
Probability	Improbable (2)	There is a small chance that this will impact visual receptors.	
Mitigation/Enhancement Measures			
Mitigation: N/A			
Post Mitigation/Enhancement Measures			
Duration	N/A		
Extent	N/A		
Magnitude	N/A		
Probability	N/A		
Cumulative impacts: The combined effects of these changes will negatively affect the overall character of the landscape.			
Residual Risks: The visual impact will be removed after decommissioning, provided the PV facility infrastructure is removed. Failing this, the visual impact will remain.			

7.5.3. Cumulative Effects

Cumulative landscape and visual effects (impacts) result from additional changes to the landscape or visual amenity caused by the proposed development in conjunction with other developments (associated with or separate to it), or actions that occurred in the past, present or are likely to occur in the foreseeable future. They may also affect how the landscape is experienced. Cumulative effects may be positive or negative. Where they comprise a range of benefits, they may be considered to form part of the mitigation measures.

Cumulative effects can also arise from the intervisibility of a range of developments and /or the combined effects of individual components of the proposed development occurring in different locations or over some time. The separate effects of such individual components or developments may not be significant, but together they may create an unacceptable degree of adverse effect on visual receptors within their combined visual envelopes. Intervisibility depends upon general topography, aspect, tree cover or other visual obstruction, elevation, and distance as this affects visual acuity, which is also influenced by weather and light conditions (LI-IEMA (2013)).

<u>Cumulative effect of the Project</u>

The cumulative impact of the Project, the facilities and infrastructure taken together, is significant, along with the existing power infrastructure that exists in the study area. Intervisibility for the proposed Project and the existing infrastructure would be evident. The VAC for the study area is relatively low, and the combined effect over time of these developments would result in the study area being impacted upon in a moderate manner beyond the anticipated negative impacts of the proposed Project alone.

The cumulative visual impact significance of the KTE PV 3, seen together with the KTE PV 1 and KTE PV 2, as well as the other proposed and approved solar farms within 30km radius, was considered to be moderate during the operational phase and very low after the decommissioning phase, assuming mitigation.

The reasons for this are the remoteness of the subject area, the featureless nature of the landscape, and the fact that the solar farms are within a **REDZ**. The existing 20/30m monopoles for the powerline, that runs to the operational Aries Substation does not require alterations and the proposed grid connections solution is anticipated to be very **short/localised**, therefore the cumulative visual impact was considered to be **low/moderate** during the operational phase and very low after decommissioning.

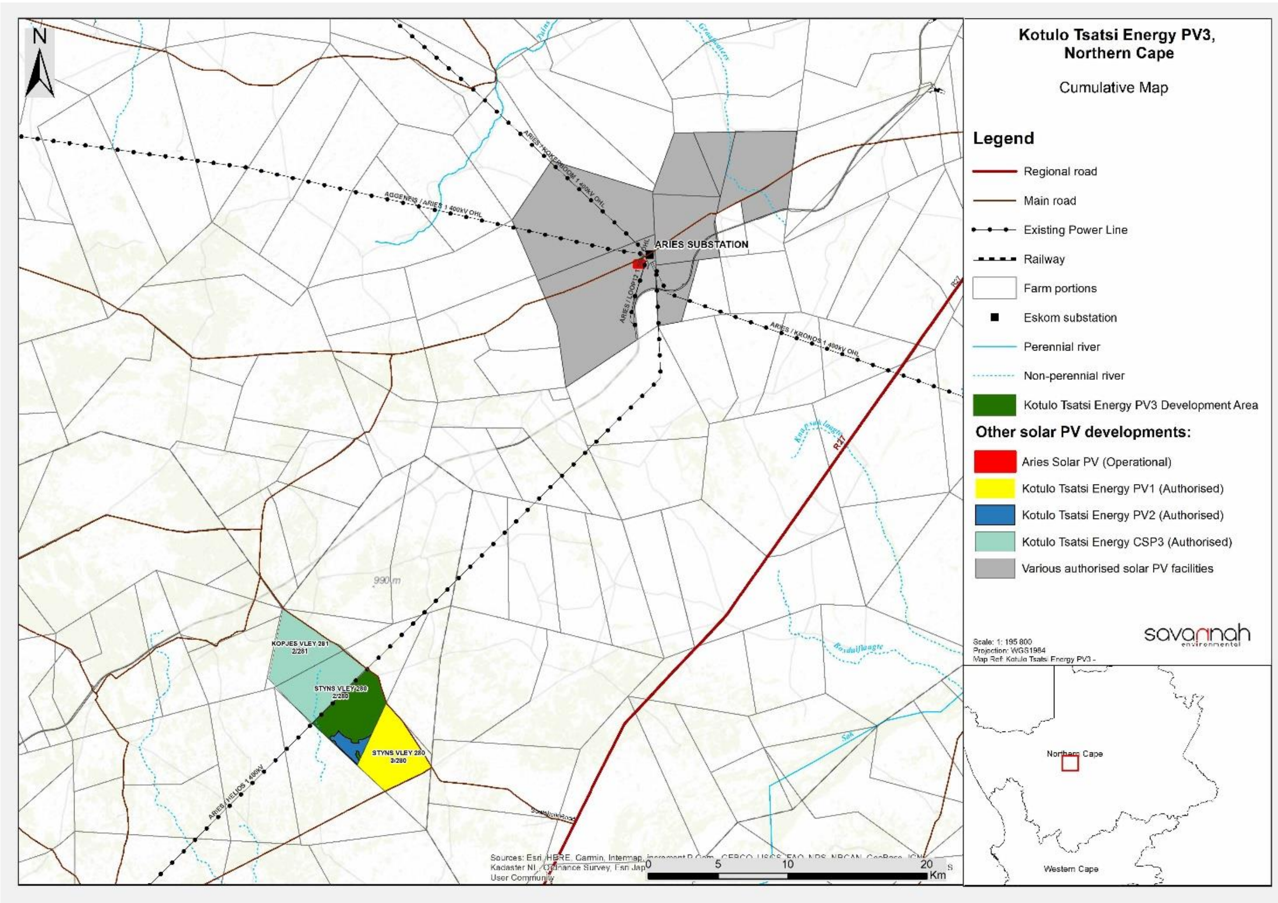

Figure 66: Cumulative Development Map

There are no fatal flaws from a visual perspective and authorisation could therefore be given for the KTE PV3 solar facility, subject to the visual mitigation measures being implemented.

Table 11: Cumulative Impact		
Nature of Impact: The potential cumulative visual impact of the PV facility on the visual quality of the landscape.		
	Overall impact of the proposed project considered in isolation (with mitigation)	***Cumulative impact of the project and other projects within the area (with mitigation)***
Extent	Short distance **(3)**	Medium to longer distance **(2)**

Duration	Long term **(4)**	Long term **(4)**
Magnitude	Low **(3)**	Low **(4)**
Probability	Probable **(3)**	Probable **(3)**
Significance	Low **(30)**	Low **(30)**
Status (positive, neutral, or negative)	Negative	Negative
Reversibility	Reversible **(1)**	Reversible **(1)**
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	No, only best practise measures can be implemented	
Generic best practise mitigation/management measures: Planning: ➢ Retain/re-establish and maintain natural vegetation (if present) immediately adjacent to the development footprint where possible. Operations: ➢ Maintain the general appearance of the facility as a whole. Decommissioning: ➢ Remove infrastructure not required for the post-decommissioning use. ➢ Rehabilitate all affected areas. Consult an ecologist regarding rehabilitation specifications.		
Residual impacts: The visual impact will be removed after decommissioning, provided the PV facility infrastructure is removed. Failing this, the visual impact will remain.		

7.6. Impact Statement

The findings of the Visual Impact Assessment undertaken for the proposed 480MW PV facility is that the visual environment surrounding the site, especially within a 1 - 3km radius, may be visually impacted during the anticipated operational lifespan of the facility (i.e., a minimum of 25 years).

In order to better understand the visual impacts associated with the proposed development on receptor locations in the surrounding areas, a visual contrast assessment has been undertaken. This is done in order to quantify the degree of visual contrast or change that would be caused by the proposed ash disposal facility at certain key observation locations.

Empirical research indicates that the visibility of a PV facility and hence the severity of visual impact, decreases as the distance between the observer and the tower increases. The landscape type, through which the development crosses, can be mitigated through the topographical or vegetative measures.

Visual receptors within 1 km from the alignment are most likely to experience the highest degree of visual intrusion, hence contributing to the severity of the visual impact. This is considered as the zone of highest visibility after which the degree of visual intrusion decreases rapidly at distances further away.

7.6.1. DFFE Screening Tool Results

According to the DFFE screening tool drawn for the KTE project the Landscape (Solar) Theme was indicated to be **Very High** as seen in Table 12 however after extensive work on site and with desktop analysis it was found that the site is extensively isolated. Taking into consideration the topography, lack of visual resources, the visual receptors, sense of place and the scope of work proposed for the site (Construction and operation of a Solar Facility) it is confirmed that the site in fact has a Low to Medium sensitivity depending on the mitigation measures which will be implemented by the developer as recommended in Section 7.5.

It is therefore the opinion of the specialist that **the anticipated visual impact is not considered to be a fatal flawed, considering the low incidence of visual receptors occurring within the region resulting in a Low sensitivity rating.**

Table 12: DFFE Screening Tool Table Results

Theme	Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
Agriculture Theme			X	
Animal Species Theme		X		
Aquatic Biodiversity Theme	X			
Archaeological and Cultural Heritage Theme		X		
Avian Theme				X
Civil Aviation (Solar PV) Theme				X
Defence Theme				X
Landscape (Solar) Theme	X			
Paleontology Theme		X		
Plant Species Theme				X
RFI Theme	X			
Terrestrial Biodiversity Theme	X			

The following is a summary of impacts remaining, assuming mitigation as recommended, is exercised:

- During construction, there may be a noticeable increase in heavy vehicles utilising the roads to the development site that may cause, at the very least, a visual nuisance to other road users and landowners in the area. Construction activities may potentially result in low, temporary visual impact that may be mitigated to **low**.

- The PV Facility is expected to have a **moderate** visual impact on observers travelling along the secondary roads. Some homesteads and other visual receptors are found in the area. The impacts may be contained to **Low** significance if the proposed impact mitigation measures are implemented.

- The anticipated visual impact resulting from the construction of on-site ancillary infrastructure is likely to be of **low** significance both before and after mitigation.

- The anticipated visual impact of the proposed PV Development on the regional visual quality, and by implication, on the sense of place, is difficult to quantify, but is generally expected to be of **low** significance. This is due to the relatively low viewer incidence within close proximity to the proposed development site.

- The anticipated cumulative visual impact of the proposed PV development is expected to be of **low** significance.

Given the relatively featureless nature of the study area, the only sensitive visual features are the drainage courses, neighbouring farmsteads, and roads, which are some distance away. Heritage features, documented by other specialists, may have visual significance. Other local features in the landscape, such as the existing Substation, power lines and the R27 line are visual intrusions that have already altered the landscape character of the area. The anticipated visual impacts listed above (i.e., post mitigation impacts) range from **moderate** to **low** significance.

<u>Anticipated visual impacts on sensitive visual receptors (if and where present) in close proximity to the proposed facility are not considered to be fatal flawed.</u>

Considering all factors, it is recommended that the development of the facility as proposed be supported; subject to the implementation of the recommended mitigation measures (**Section 7.4.**) and management programme (**Section 9.**).

Table 13: Intensity of impact of the proposed Project

High	Moderate	Low	Negligible
No areas	Additional PV development areas and the Traversing Road.	Farmsteads and farming infrastructure around the Project site, The R27.	The remainder of the study area including most of the open areas and farms
Major loss of or alteration to key elements / features / characteristics of the baseline in the immediate vicinity of the site. i.e., Pre-development landscape or view and / or introduction of elements considered to be uncharacteristic when set within the attributes of the receiving landscape. **High scenic quality impacts would result.**	Partial loss of or alteration to key elements / features / characteristics of the baseline. i.e., Pre-developmentlandscape or view and / or introduction of elements that may be prominent but may not necessarily be substantially problematic when set within the attributes of the receiving landscape. **Moderate scenic quality impacts would result**	Minor loss of or alteration to key elements / features / characteristics of the baseline. i.e., Pre-development landscape or view and / or introduction of elements that may not be problematic when set within the attributes of the receiving landscape. **Low scenic quality impacts would result.**	Very minor loss or alteration to key elements / features / characteristics of the baseline. i.e., Pre-developmentlandscape or view and / or introduction of elementsthat is not problematic with the surrounding landscape approximating the 'no change' situation. **Negligible scenic quality impacts would result.**

8. CONCLUSION

Key visual management actions include locating the substation and other buildings, as well as construction camps, in an unobtrusive position in the landscape away from public roads. The arid landscape is particularly fragile and therefore new access roads and disturbance generally should be kept to a minimum for both the proposed SEF and connecting power line. **There are no fatal flaws from a visual perspective arising from the proposed project** and given the marginal nature of agriculture in the area, the renewable energy project is probably an inherently suitable land use that should receive authorisation, provided the mitigations are implemented.

The proposed SEF and connecting powerlines are in a remote and arid part of the Northern Cape, with no particular visual or scenic features. The only potential receptors are users of the Gravel Route, the farmstead on the property and several surrounding farmsteads, all more than 6km away, some of which are in a view shadow. The proposed SEF and powerline would therefore have very low visibility.

The proposed Solar PV facility utilises a renewable source of energy to generate power. It does not emit any harmful by-products or pollutants and is not negatively associated with health risks to observers. It is therefore perceived to be accepted in a more favourable light by visual receptors.

The facility has a generally unfamiliar novel and futuristic design that invokes a curiosity factor not generally present with other conventional power generating plants, to the effect that people may actually visit the area to see the facility. A number of mitigation measures have been proposed (Section 9), which, if implemented and maintained, will reduce the significance of certain visual impacts associated with the proposed facility.

The Project will alter the landscape's appearance. The study areas have moderate scenic quality in the subregion, and sensitive viewing areas and landscape types have been identified and mapped, indicating potential Project sensitivity. Site landscape is moderate.

Visual impacts will be caused by activities associated with the Kotulo Tsatsi Energy PV3 Solar Energy Facility Project. The significance of visual impact is based on the worst-case scenario. This scenario assumes that all facilities along with the associated grid infrastructure and sub-stations would be constructed at the same time. At the time of writing there was no evidence to the contrary. This assumption is also based on the nature of the visual impact and the fact that receptors would experience all facilities in the same visual envelope from their respective locations or as they travel along adjacent roads.

Visual impacts that would potentially result from Project activities are likely to be moderately adverse, long-term, and will most likely cause loss of landscape and visual resources. If mitigation is undertaken as recommended, it is concluded that the significance of anticipated visual impacts will remain at acceptable levels. As such, the facility and the proposed ancillary infrastructure would be considered to be acceptable from a visual perspective.

The cause of these anticipated visual impacts would be:

- Construction Phase:
    - Removal of vegetation, the building of access roads, earthworks, and exposure of earth to establish the areas to be developed.
    - Physical presence of construction camps and the movement of construction vehicles within the site and along local roads.
    - Generation of dust by construction activities.
- Operational Phase
    - Reduction in the rural sense of place for the study area.
    - Light pollution.
- Decommissioning Phase
    - Physical presence of the activities associated with removing the structures and rehabilitating the site.

9. MITIGATION AND MANAGEMENT MEASURES

In considering mitigation measures three rules are considered - the measures should be feasible (economically), effective (how long will it take to implement and what provision is made for management / maintenance), and acceptable (within the framework of the existing landscape and land use policies for the area). To address these, the following principles have been established:

- Mitigation measures should be designed to suit the existing landscape character and needs of the locality.
- They should respect and build upon landscape distinctiveness.
- It should be recognized that many mitigation measures, especially the establishment of planted screens and rehabilitation, are not immediately effective.

The primary visual impact, namely the appearance of the Solar PV facility is not possible to mitigate. The functional design of the PV panels cannot be changed in order to reduce visual impacts. Mitigation is however possible if the recommended general actions are followed.

9.1. Preparatory Works and Construction Concerns

Mitigation of visual impacts associated with the construction phase, albeit temporary, would entail proper planning, management, and rehabilitation of the construction site. Recommended mitigation measures include the following:

- Ensure that vegetation is not unnecessarily cleared or removed during the construction period.
- Reduce the construction period through careful logistical planning and productive implementation of resources.
- Plan the placement of lay-down areas and any potential temporary construction camps in order to minimise vegetation clearing (i.e., in already disturbed areas) wherever possible.
- Restrict the activities and movement of construction workers and vehicles to the immediate construction site and existing access roads.
- Ensure that rubble, litter, and disused construction materials are appropriately stored (if not removed daily) and then disposed regularly at licensed waste facilities.
- Reduce and control construction dust through the use of approved dust suppression techniques as and when required (i.e., whenever dust becomes apparent).
- Restrict construction activities to daylight hours in order to negate or reduce the visual impacts associated with lighting.
- Rehabilitate all disturbed areas, construction areas, roads, slopes, etc. immediately after the completion of construction works. If necessary, an ecologist should be consulted to assist or give input into rehabilitation specifications.
- With the preparation of the portions of land onto which activities will take place the minimum amount of existing vegetation and topsoil should be removed.
- Ensure, wherever possible, natural indigenous vegetation is retained and incorporated into the site rehabilitation.
- All topsoil that occurs within the proposed footprint of an activity must be removed and stockpiled for later use. The construction contract must include the stripping and stockpiling of topsoil. Topsoil would be used later during the rehabilitation phase of disturbed areas. The presence of degraded areas and disused construction roads, which are not rehabilitated, will increase the overall visual impact.
- Specifications with regards to the placement of construction camps, as well as a site plan of the construction camp, indicating waste areas, storage areas, and placement of ablution facilities should be included in the EMPr. These areas should either be screened or positioned in areas where they would be less visible from human settlements and main roads.
- Construction activities should be limited to between 08:00 and 17:00 or in conjunction with the ECO.
- Adopt responsible construction practices aimed at strictly containing the construction / establishment activities to specifically demarcated areas.
- Building or waste material discarded should be undertaken at an authorised location, which should not be within any sensitive areas.

9.2. Earthworks

- Earthworks should be executed in such a way that only the footprint and a small 'construction buffer zone' around the proposed activities are exposed. In all other areas, the naturally occurring vegetation should be retained, especially along the periphery of the sites.
- All cut and fill slopes (if any) and areas affected by construction work should be progressively top soiled and re-vegetated as soon as possible.
- Any soil must be exposed for the minimum time possible once cleared of vegetation to avoid prolonged exposure to wind and water erosion and to minimise dust generation.

9.3. Landscaping and Ecological Approach

- It is recommended that the existing vegetation cover be maintained / established in all areas outside of the actual development footprint, both during construction and operation of the proposed facility. This will minimise visual impact as a result of cleared areas, power line servitudes and areas denuded of vegetation.
- Where new vegetation is proposed to be introduced to the site, an ecological approach to rehabilitation as opposed to a horticultural approach should be adopted. For example, communities of indigenous plants will enhance biodiversity, a desirable outcome for the area. This approach can significantly reduce long-term costs as less maintenance would be required over conventional landscaping methods as well as the introduced landscape being more sustainable.
- Progressive rehabilitation of all construction areas should be carried out immediately after they have been established.
- Undertake planting of screening vegetation along the eastern and southern boundaries of the Project sites.

9.4. Mounting Structures and Associated Infrastructure

- Paint the mounting structures with colours that reflect and compliment the colours of the surrounding landscape.
- Ensure the perimeter fence is of a 'see through' variety and that its colour blends with the environment.

9.5. Good housekeeping

- "Housekeeping" procedures should be developed for the Project to ensure that the Project site and lands adjacent to the Project site are kept clean of debris, garbage, graffiti, fugitive trash, or waste generated onsite; procedures should extend to control "track out" of dirt on vehicles leaving the active construction site and controlling sediment in stormwater runoff
- During construction, temporary fences surrounding the material storage yards and laydown areas should be covered with 'shack' cloth (khaki coloured).
- Operating facilities should be actively maintained during operation.

9.6. Operational Phase

- During operation, the maintenance of the PV panels, ancillary structures and infrastructure will ensure that the facility does not degrade, preventing aggravation of the visual impact. Roads must be maintained to forego erosion and to suppress dust, and rehabilitated areas must be monitored for rehabilitation failure. Remedial actions must be implemented as and when required. Once the facility has exhausted its life span, the main facility and all associated infrastructure not required for the post rehabilitation use of the site should be removed and all disturbed areas appropriately rehabilitated. An ecologist should be consulted to give input into rehabilitation specifications. All rehabilitated areas should be monitored for at least a year following decommissioning, and remedial actions implemented as and when required. Where sensitive visual receptors are likely affected, it is recommended that the developer enter into negotiations regarding the potential screening of visual impacts, either at the receptor site or along the perimeter of the facility. This may entail the planting of vegetation or the construction of landscaped berms or screens.

9.7. Lighting

Light pollution is largely the result of bad lighting design, which allows artificial light to shine outward and upward into the sky, where it is not wanted, instead of focusing the light downward, where it is needed. Ill- designed lighting washes out the darkness of the night sky and radically alters the light levels in rural areas where light sources shine as 'beacons' against the dark sky and are generally not wanted.

Of all the pollutions faced, light pollution is perhaps the most easily remedied. Simple changes in lighting design and installation yield immediate changes in the amount of light spilled into the atmosphere. The following are measures that must be considered in the lighting design of the Project, particularly at the management and service platforms:

Mitigation measures include the following:

- Shielding the sources of light by physical barriers (walls, vegetation, or the structure itself);
- Limiting mounting heights of lighting fixtures, or alternatively using footlights or bollard level lights;
- Making use of downward directional lighting fixtures;
- Making use of minimum lumen or wattage in fixtures;
- Making use of down-lighters, or shielded fixtures;
- Making use of Low-Pressure Sodium lighting or other types of low impact lighting.
- Making use of motion detectors on security lighting. This will allow the site to remain in relative darkness, until lighting is required for security or maintenance purposes.

In terms of ancillary infrastructure, it is recommended that access roads and other on-site infrastructure be planned so that the clearing of vegetation is minimised. Consolidate infrastructure as much as possible and make use of already disturbed areas rather than pristine sites, wherever possible. Mitigation of lighting impacts includes the pro-active design, planning and specification lighting for the facility. The correct specification and placement of lighting and light fixtures for the proposed Solar PV facility and ancillary infrastructure will go far to contain rather than spread the light.

9.8. Branding and Marketing

The applicants may wish to give consideration, where appropriate, to the development and installation of viewing areas, interpretation panels, visitor, or educational facilities as part of the development proposal. This may appeal to tourists visiting the area who may be curious about renewable energy projects.

9.9. Management Programme

The following management plan tables aim to summarise the key findings of the visual impact report and suggest possible management actions in order to mitigate the potential visual impacts. Refer to the tables below.

Table 14: Management programme – Planning.

OBJECTIVE: The mitigation and possible negation of visual impacts associated with the planning of the proposed PV facility.

Project Component/s	The solar PV facility and ancillary infrastructure (i.e., PV panels, access roads, transformers, security lighting, workshop, power line, etc.).	
Potential Impact	Primary visual impact of the facility due to the presence of the PV panels and associated infrastructure as well as the visual impact of lighting at night.	
Activity/Risk Source	The viewing of the above mentioned by observers on or near the site (i.e., within 1km of the site) as well as within the region.	
Mitigation: Target/Objective	Optimal planning of infrastructure to minimise the visual impact.	
Mitigation: Action/control	**Responsibility**	**Timeframe**
Plan the placement of laydown areas and temporary construction equipment camps in order to minimise vegetation clearing (i.e., in already disturbed areas) wherever possible.	Project proponent / contractor	Early in the planning phase.
Retain and maintain natural vegetation (if present) immediately adjacent to the development footprint.	Project proponent/ design consultant	Early in the planning phase.
Make use of existing roads wherever possible and plan the layout and construction of roads and	Project proponent/ design consultant	Early in the planning phase.

infrastructure with due cognisance of the topography to limit cut and fill requirements.		
Plan all roads, ancillary buildings, and ancillary infrastructure in such a way that clearing of vegetation is minimised. Consolidate infrastructure and make use of already disturbed sites rather than undisturbed areas.	Project proponent/ design consultant	Early in the planning phase.
Consult a lighting engineer in the design and planning of lighting to ensure the correct specification and placement of lighting and light fixtures for the PV Facility and the ancillary infrastructure. The following is recommended: ○ Shield the sources of light by physical barriers (walls, vegetation, or the structure itself). ○ Limit mounting heights of fixtures or use footlights or bollard lights. ○ Make use of minimum lumen or wattage in fixtures. ○ Making use of down-lighters or shielded fixtures. ○ Make use of Low-Pressure Sodium lighting or other low impact lighting. ○ Make use of motion detectors on security lighting, so allowing the site to remain in darkness until lighting is required for security or maintenance purposes.	Project proponent / design consultant	Early in the planning phase.

Performance Indicator	Minimal exposure (limited or no complaints from I&APs) of ancillary infrastructure and lighting at night to observers on or near the site (i.e., within 3km) and within the region.
Monitoring	Monitor the resolution of complaints on an ongoing basis (i.e., during all phases of the project).

Table 15: Management programme – Construction.

OBJECTIVE: The mitigation and possible negation of visual impacts associated with the construction of the proposed Kotulo Tsatsi Energy PV3 Solar Energy Facility

Project Component/s	Construction site and activities
Potential Impact	Visual impact of general construction activities, and the potential scarring of the landscape due to vegetation clearing and resulting erosion.
Activity/Risk Source	The viewing of the above mentioned by observers on or near the site.
Mitigation: Target/Objective	Minimal visual intrusion by construction activities and intact vegetation cover outside of immediate construction work areas.

Mitigation: Action/control	**Responsibility**	**Timeframe**
Ensure that vegetation cover adjacent to the development footprint (if present) is not unnecessarily removed during the construction phase, where possible.	Project proponent / contractor	Early in the construction phase.
Reduce the construction phase through careful logistical planning and productive implementation of resources wherever possible.	Project proponent / contractor	Early in the construction phase.
Restrict the activities and movement of construction workers and vehicles to the immediate construction site and existing access roads.	Project proponent / contractor	Throughout the construction phase.
Ensure that rubble, litter, and disused construction materials are appropriately stored (if not removed	Project proponent / contractor	Throughout the construction phase.

daily) and then disposed regularly at licensed waste facilities.		
Reduce and control construction dust through the use of approved dust suppression techniques as and when required (i.e., whenever dust becomes apparent).	Project proponent / contractor	Throughout the construction phase.
Restrict construction activities to daylight hours in order to negate or reduce the visual impacts associated with lighting, where possible.	Project proponent / contractor	Throughout the construction phase.
Rehabilitate all disturbed areas (if present/if required) immediately after the completion of construction works.	Project proponent / contractor	Throughout and at the end of the construction phase.
Performance Indicator	Vegetation cover on and in the vicinity of the site is intact (i.e., full cover as per natural vegetation present within the environment) with no evidence of degradation or erosion.	
Monitoring	Monitoring of vegetation clearing during construction (by contractor as part of construction contract). Monitoring of rehabilitated areas quarterly for at least a year following the end of construction (by contractor as part of construction contract).	

Table 16: Management programme – Operation.

OBJECTIVE: The mitigation and possible negation of visual impacts associated with the operation of the proposed Kotulo Tsatsi Energy PV3 Solar Energy Facility

Project Component/s	The solar PV facility and ancillary infrastructure (i.e., PV panels, access roads, workshop, etc.).	
Potential Impact	Visual impact of facility degradation and vegetation rehabilitation failure.	
Activity/Risk Source	The viewing of the above mentioned by observers on or near the site.	
Mitigation: Target/Objective	Well maintained and neat facility.	
Mitigation: Action/control	**Responsibility**	**Timeframe**
If specific sensitive visual receptors are identified during operation, investigate screening at the receptor site.	Project proponent / operator	Throughout the operation phase.
Investigate the potential to screen the PV facility from the secondary road (located within 1km of the facility) with planted vegetation cover or solid fencing, where possible/if required.	Project proponent / operator	Throughout the operation phase.
Maintain the general appearance of the facility as a whole, including the PV panels, servitudes, and the ancillary structures.	Project proponent / operator	Throughout the operation phase.
Maintain roads and servitudes to forego erosion and to suppress dust.	Project proponent / operator	Throughout the operation phase.
Monitor rehabilitated areas and implement remedial action as and when required.	Project proponent / operator	Throughout the operation phase.
Investigate and implement (should it be required) the potential to screen visual impacts at affected receptor sites.	Project proponent / operator	Throughout the operation phase.
Performance Indicator	Well maintained and neat facility with intact vegetation on and in the vicinity of the facility.	
Monitoring	Monitoring of the entire site on an ongoing basis (by operator).	

Table 17: Management programme – Decommissioning.

OBJECTIVE: The mitigation and possible negation of visual impacts associated with the decommissioning of the proposed Kotulo Tsatsi Energy PV3 Solar Energy Facility

Project Component/s	The solar PV facility and ancillary infrastructure (i.e., PV panels, access roads, workshop, transformers, etc.).	
Potential Impact	Visual impact of residual visual scarring and vegetation rehabilitation failure.	
Activity/Risk Source	The viewing of the above mentioned by observers on or near the site.	
Mitigation: Target/Objective	Only the infrastructure required for post decommissioning use of the site retained and rehabilitated vegetation in all disturbed areas.	
Mitigation: Action/control	**Responsibility**	**Timeframe**
Remove infrastructure not required for the post-decommissioning use of the site.	Project proponent / operator	During the decommissioning phase.
Rehabilitate access roads and servitudes not required for the post-decommissioning use of the site. If necessary, an ecologist should be consulted to give input into rehabilitation specifications.	Project proponent / operator	During the decommissioning phase.
Monitor rehabilitated areas quarterly for at least a year following decommissioning and implement remedial action as and when required.	Project proponent / operator	Post decommissioning.
Performance Indicator	Vegetation cover on and in the vicinity of the site is intact (i.e., full cover as per natural vegetation within the environment) with no evidence of degradation or erosion.	
Monitoring	Monitoring of rehabilitated areas quarterly for at least a year following decommissioning.	

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