VISUAL IMPACT ASSESSMENT

300 MW PHOTOVOLTAIC ELECTRICITY GENERATION FACILITY ON PORTION 6 OF THE FARM OLYVEN KOLK NO 187, DIVISION KENHARDT

Prepared for:
Solar Energy Land cc

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EXECUTIVE SUMMARY

This visual impact assessment is carried out for the Applicant, Solar Energy Land cc who will be responsible for the development of the activity, namely a Photo-Voltaic Electricity Generation facility on portion 6 of the farm Olyven Kolk no 187, Division Kenhardt, Northern Cape Province.

The facility will cover approximately 520ha of the 728ha land unit and it will include the photovoltaic arrays and two substations, as well as a new 132Kv line that will follow the route of an existing powerline that will be relocated. At present the site is used for the grazing of sheep and is uninhabited and not developed with any structures.

The prime objective of this study is to establish the nature and extent of the visual impact of the proposed activity on the receiving environment with receptors. Principles and concepts as well as triggers and key issues are taken into account with the assessment of the nature of the visual impact. Several criteria are used to determine the nature and extent of the visual impact like visibility, visual exposure, visual sensitivity of both the activity as well as the receptors, visual absorption capacity and visual intrusion. The issues are categorised in order to ascertain the degree of impact.

The nature of the receiving environment must also be analysed and possible receptors identified. In this case the landscape around the site has a uniform character consisting of gently undulating plains with no prominent topographical features, shallow drainage valleys and flat ridges. The elevation difference noticed is only about 30m. From a sub-regional perspective a distinct viewshed cannot be defined with consequence that the facility will be alternately visible and hidden from view depending on the location of the viewpoint in the landscape. No views of the facility will be possible beyond ±10km from the site, with the only significant views thereof restricted to relative short distance of ±5km along the bypassing public road.

The landscape has a typical rural farmland character of peaceful tranquillity, uninterrupted openness and isolation, simply organized by minimal farming infrastructure. The Aries substation and associated transmission lines though, dominates the landscape and along with a recently constructed Photo-Voltaic Electricity Generation facility directly to the west of the Aries substation, sets a precedent for large scale human intervention in the area and lowers the potential intensity of the visual impact considerably.

The sense of place within the surrounding area will be significantly altered; however, a new sense of place will be created which will represent South Africa's attempts to address the challenges of climate change in a responsible and sustainable manner. The visual impacts will therefore be experienced by many, including many who are sensitive to environmental issues, as being positive.

The visual impact is measured against the impact assessment criteria and the threshold of significance determined. The summary criteria like extent, duration, intensity, probability and significance are considered important information in order to evaluate the impact.

To conclude, management actions like avoidance, mitigation and rehabilitation are also proposed in order to reduce any visual impact.

A review as well as conclusions is made. **The visual impact is assessed to be of moderate significance with mitigation.** The reasons for this are mainly the nature of the activity (low level) as well as the shape of the view catchment area and the fact that most receptors will be restricted to the Pofadder – Kenhardt road. The implication of this situation is that views from the road will in any case be of short duration (travellers). Furthermore, during the operational phase, activities on-site will be minimal and will only include maintenance and security. Any mitigation measures as proposed will ensure that the impact will be reduced even further.

As no significant visual or aesthetic issues are present, the authors of this report recommend that approval for the proposal be granted, subject thereto that the proposed mitigation measures be implemented.

The analysis is visually illustrated by means of maps, plans, photographs and drawings inserted in the Annexures A to J.

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1. INTRODUCTION

Solar Energy Land cc proposes the establishment of a 300 MW Photovoltaic electricity generation facility and associated infrastructure in the district of Kenhardt.

The authors of this report were approached by Solar Energy Land cc to prepare a Visual Impact Assessment as part of the EIA process associated with the project.

The Visual Assessment will be compiled as per the criteria, definitions and terminology as set out in the reference document: Oberholzer, B. 2005: ***Guideline for involving Visual & Aesthetic Specialists in EIA processes***: Edition 1. CSIR Report No ENV-S-C 2005 053 F. Republic of South Africa, Provincial Government of the Western Cape, Department of Environmental Affairs & Development Planning, Cape Town.

The guidelines issued by the Provincial Government of the Western Cape are used as no similar guidelines are available for the Northern Cape Province.

1.1 Background

The proposed project is located on portion 6 of the farm Olyvenkolk no 187, Division Kenhardt, in the Northern Cape Province, within the Municipality of Kai! Garib.

The proposed site for the PV facility would occupy approximately 520ha of land currently used for grazing of sheep. Farm buildings are located to the south of the proposed site, on a separate land unit (3/187). The surrounding land uses are primarily agricultural, consisting of small stock farming (sheep), as well as the Aries substation and associated powerlines which feed into it. A Photovoltaic electricity generation facility was recently constructed to the west and directly adjacent to Aries substation.

1.2 Terms of reference

The authors were appointed to conduct Visual Impact Assessment. The specific objectives of this report will be to:

- Identify issues related to visual resources raised during a site inspection.
- Describe the receiving environment and visual characteristics of the site.
- Describe the proposed Photovoltaic Facility, inclusive of the spatial dimensions thereof.
- Establish the viewshed, view corridors, important viewpoints and sensitive receptors, generally based on topographical information and a site inspection.
- Identify potential visual impacts, inclusive of lighting impacts at night, using established rating criteria, inter alia based on viewshed mapping and photographic montages.
- Visual impact assessment rating based on viewshed mapping and photographic montages.

- Provide recommendations to mitigate/reduce the visual impact of the development if required.

1.3 Methodology

The method followed to produce this report has been to:

- Collect and review existing information, inclusive of the Scoping Report.
- Undertake a field survey on 2 August 2018; during which:
  - the potential visibility of the proposed facility was determined,
  - a photographic survey of the surrounding and immediate landscape was conducted, and
  - the sensitive landscape and visual receptors within the spatial context and zone of influence of the site was identified.
  - Weather conditions were clear, and visibility was good.
- Undertake mapping exercises to establish the scenic character, extent of visibility, visual exposure to viewpoints and visual sensitivity of the site.
- Prepare panoramic photomontages of the proposed development site as viewed from the critical viewpoints.
- Evaluate the potential impacts based on a synthesis of the following criteria: nature of impact, extent, duration, intensity, probability and significance.
- Propose and recommend appropriate mitigation measures.

1.4 Assumptions and limitations

- Information on the extent of the project has been obtained from the Scoping Report dated July 2018, prepared by Eco Impact Legal Consulting (Pty) Ltd.
- It is assumed that the information provided by others is correct. Information needed to execute the study was acquired from other consultants as well as during the environmental site investigation. No uncertainties therefore exist. The level of assessment and approach used for this visual impact can be described as complete. Therefore this comprehensive visual investigation will provide sufficient information to all parties involved to get a clear vision and understanding of the nature of this particular visual impact.
- The report relies on topographical and visual information form a combination of 1:50 000 top cadastral maps, aerial photographs and GIS data and Google Earth viewshed mapping.
- The proposed location of the site is determined by the following factors, namely solar availability, proximity to a grid connection point and availability of land. As the project site meets these specific criteria and taking into consideration that connectivity to the grid is a critical factor to the overall feasibility of the project,

alternative locations are not identified and assessed. The visual assessment therefore only assesses the single proposal as included in the EIA.

1.5 Statement of independence

The report has been prepared by Martin Langenhoven of Planscape.

Martin Langenhoven is a registered Professional Planner with the South African Council for Planners[1] who holds an Honours Degree in Geography (urban / economic geography and GIS) and a Master's Degree in Town and Regional Planning (including urban design). He has 18 years of experience working for a District Municipality where he evaluated, reviewed and commented on development applications, inclusive of visual impact assessments, in the Western Cape.

Visual Impact Assessments for 2 similar facilities on adjoining properties were previously completed in conjunction with Piet Groenewald Landscape architect.

The authors hereby declare that we have no conflicts of interest related to the work of this report. Specifically, we declare that we have no personal financial interest in the property and/or development proposal being assessed and that we have no personal or financial connections to the developers or financiers of the development other than the fees paid for conducting the assessment.

1.6 Principles and Concepts

Visual, scenic and cultural components of the environment can be seen as a resource which has a value to people, the society and the economy of the area. In addition, this resource may have a scarcity value, be easily degraded, and is usually not replaceable. These resources are by their nature difficult to assess and quantify. To overcome these difficulties, the following principles are considered with this visual study: It must be logic, holistic, transparent and consistent.

The following concepts are also considered with this visual input of the EIA process:

- The full range of visual, aesthetic, cultural and spiritual aspects of the environment contribute to the sense of place of the area.
- The consideration of the nature of the natural and cultural landscape and their inter-relatedness.
- The identification of all scenic resources, protected areas and sites of special interest and their relative importance in the area.
- Understanding the landscape processes, namely landform, vegetation and settlement patterns which give the landscape its particular character and scenic attributes.
- The inclusion of both quantitative criteria such as visibility, as well as qualitative criteria such as aesthetic value in the assessment.
- The visual input can be used as an integral part of the project planning and design process in order to improve the quality of the development.

[1]Registration number A/048/2007

1.7 Triggers and Key Issues

Triggers for specialist input are determined by the characteristics of the activity as well as the receiving environment which indicate that aesthetics and visibility are likely to be key issues and may require a visual assessment. In many cases, although not in this instance, requests from I&AP's trigger such an investigation.

Environments vary in respect of visual sensitivity and activities in respect of intensity. In this particular case, the nature of the receiving environment as well as the nature of the activity, the triggers are restricted to only a few characteristics.

Several categories of development in respect of intensity are identified. These vary from Category 1 (lowest intensity) like nature reserves, camping, nature related recreation, to Category 5 (highest Intensity) like high density residential, retail, industrial, mining development.

Because of the nature of the activity it can be categorised as belonging to Category 4 which includes light industry and medium-scale infrastructure. The receiving environment can be considered of low scenic significance. As a result of these characteristics, the visual impact expected, will be moderate to low.

1.8 Scope of Specialist Input

- Identifying issues
  The visual issues are identified during the site investigation and also as a result of comments received. Several questions must therefore be answered:
  - Are issues raised, valid?
  - Is sufficient information available to predict significance of impacts?
  - Any additional issues to be considered?
  - Can impacts be avoided?
  - Any potentially significant issues?

- Space boundaries
  The space boundary for the visual input depends on the extent of the view catchment area, namely the zone of visual influence of the project. The boundary depends on the visibility of the proposed activity and includes all receptors in the receiving environment.

- Development alternatives
  Initially, during the planning process, the design and location alternatives are considered. The chosen alternative includes the location, layout, circulation and structures.

- Addressing effects
  Potentially significant direct, indirect and cumulative impacts of the proposed activity must be considered:
  - Conceptualisation of possible cause-effect pathways resulting from the proposed development.
  - An understanding of current and future proposals, plans, projects and activities in the same area.

- An awareness of other threats or trends that could affect the landscape of the area in which the development is proposed.
- An understanding of the likely resilience and status of affected landscapes and visual resources.
- An understanding of broader strategic goals or targets for the area that would be affected by the proposed activity.

Direct effects will most probably be of more importance than indirect effects occurring later as well as cumulative effects. Therefore, visual impacts caused by structures will be of primary importance and thus attention to structural design needs special attention.

- The appropriate approach
  Visual assessments become more critical where the receiving environment involves wilderness and protected landscapes and where the activities include high category developments. Therefore the approach and method for visual input relates to the degree of sensitivity of the landscape and the degree of density and volume of the activity. In this particular case, the receiving environment is of low scenic significance and the activity is a Category 4 development, already mentioned. Although the development is classified in a relative high category, the nature of the receiving environment causes the impact to be most probably minimal. This assumption can be further justified by the fact that all viewpoints will be located at low levels (road). The low elevated structures (solar arrays) will also be constructed at ground level with the result that no high obtrusive structural elements will be visible on this rather flat landscape.

2 THE PROPOSED PROJECT

2.1 Location

The proposed site for the PV facility is located approximately 37km south-west of the town of Kenhardt which is the nearest urban settlement (see annexure A). The property on which the site is located is accessible via a public gravel road between Kenhardt and Pofadder. Pofadder is located ±150km to the west.

The road is aligned with the northern boundary of the property and is the facility at its closest point, located approximately ±30m thereof.

2.2 Project description

The proposed facility is planned to bid into the Department of Energy's Renewable Energy Independent Power Producers Procurement (REIPPP) Programme with the aim of delivering the generated power the Eskom national electricity grid and aiding into the diversification of the country's energy supply.

2.2.1 Current land-use

The property is currently zoned for agricultural purposes and is used for the grazing of sheep as part of a farming unit that includes various other land units which surrounds it.

The property is not inhabited or developed and no buildings and / or dwellings occur. The original farmstead is located to the south of the site on an adjoining land unit and outside the development footprint. These buildings are not occupied and are only occasionally used by the farmer who leases the land.

2.2.2 Construction phase

The proposed Photovoltaic Electricity Generation Facility will have generating capacity of approximately 300MW with a total footprint of approximately 520ha and comprises of the following elements which potentially have a visual implication:

- Arrays of photovoltaic panels with a capacity of up to 300MW.
- The photovoltaic array / panels are mounted on pedestals not exceeding a height of 2 meters from the natural ground level.
- The panels are arranged in blocks each with its own converter unit and step-up transformer.
- Electricity from the step-up transformers will feed to a central point of connection consisting of switch gear and protection infrastructure.
- Electricity generated is fed via the central point of connection to a new 132Kv transmission line which is connected to substation with the necessary infrastructure, which will feed the electricity into the Aries substation.
- The array will be fixed at an angle to face in a northern direction. The arrays will thus face towards the public road located on average ±70m to the north of the site.
- A 5m wide gravel road will surround each block and will be used to service and maintain the infrastructure. A 4m wide gravel road will give direct access to the public road.
- Construction workers will not be housed on the site, but in temporary structures located ±2.5km to the west, on land previously used as a construction camp during the construction of the Shisen railway line. Materials and workshops to be housed in temporary containers that will be removed from the site.
- A security fence will be erected around the facility.
- Security lighting may be installed.

Attached find as annexure B the layout of the facility. Annexure C includes photographs of similar infrastructure as will be developed on the site.

2.2.3 Operational phase

- Following the construction phase the site will be commissioned and solar energy will be harnessed.
- Electricity generated is fed via an 132Kv transmission line that will follow the route of an existing powerline that will be relocated, to the Aries substation. It also follows the same route as transmission lines which will be erected on behalf of approved photovoltaic facilities located on adjoining land to west (3/187, 8/187 and 12/178) as well as for a facility applied for under a separate application on land to the north (7/187).
- It is anticipated that the operational phase is a fairly passive process with minimal human activity present on site. Activity will be restricted to maintenance, and security operations and will involve limited use of vehicles.
- The operational phase is estimated to last ±25 years, that being the lifespan of the photovoltaic infrastructure.

3 RECEIVING ENVIRONMENT

3.1 Description of site and scenic resources

This section describes the existing visual environment that will be affected by the proposed photovoltaic facility. It involves the identification of landscape types, landscape character and sense of place, based on landforms, topography, land cover and land use patterns.

3.1.1 Landscape types

Landscape types are generic classifications of landscape character and may occur anywhere where the same combinations of physical landscape attributes such as soils, landform, vegetation and settlement pattern can be found.

The landscape around the site has a uniform character consisting of gently undulating plains with no prominent topographical features and homogeneous vegetative cover. The landscape is characterized by various seasonal / dry streambed and small gullies that feed into it.

3.1.2 Topography

The landscape surrounding the development site, from a sub-regional perspective, lacks any prominent topographical features with elevations of between 900 to 930m above mean sea level for many kilometres around the site. The landscape does not include any prominent koppies or definable ridgelines from where the proposed facility will significantly be visible. The highest point (965m amsl) is a ridgeline located ±10km to the south which is only accessible by the owners of the land (see annexure D).

From a more local perspective the only elevated area (940m amsl) of note is around the Aries substation which is located ±7.5km to the west.

The land on which the photovoltaic arrays will be located has nothern facing slope with an average slope of 0.8% – 1.5%.

3.1.3 Land cover

The site is surrounded by land which has not been transformed by agricultural activity. Vegetation cover consists of a mixture of grass and small shrubs with no screening potential. Small stands of trees only occur where it has been planted for example at the Olyvenkolk farmstead or near watering holes.

As the region is arid with sparse vegetation the colour of the landscape is primarily determined by the colour of rocks and sands during the dry season and vegetation during the winter.

3.1.4 Settlement pattern

There are no settlements within the visual catchment of the proposed site. Thus the human landscape pattern is derived from linear farm boundaries, angular junctions of property fences, gravel farm roads and the odd windmill suppling water to livestock.

The only farmstead located within the visual catchment is the Olyvenkolk farmstead ±2500m to the west. The farmstead is uninhabited and is only occasionally used by the farmer who leases the land.

The closest urban settlement, Kenhardt is located approximately 30km to the north east of the site.

3.1.5 Views and view corridors

As the site is located in an undulating plain with no prominent topographical features, it has expansive views in all directions. The site is thus not enclosed by natural features and can a definite viewshed not be defined.

Although the site will be partially and completely visible from some of the elevated points in the landscape, it is only visible for the general public from a section of the Kenhardt – Pofadder gravel road. Except for this road, no other view corridors exist in the landscape.

The road (R27) between Kenhardt and Brandvlei is situated 15km to the south. The site is not visible from this road.

Significant views of the proposed facility will primarily be from the bypassing road as well as limited viewpoints around the site to which only the relevant land owners have access. As distance is a limiting factor to visibility, it is anticipated that the site will not be visible beyond ±10km.

3.1.6 Sense of place / Landscape character

Sense of place it is a subjective feeling or perception held by people to describe the character or quality of a geographic place and involve natural features, patterns of human settlement and land-use and social relationships.

From a sub-regional perspective, the area has a typical rural farmland character of peaceful tranquillity, uninterrupted openness and isolation, simply organized by minimal farming infrastructure.

Simple farm buildings, windmills, dams, fences and other farming infrastructure are sparsely dotted throughout the region.

From a local perspective, although the area where the proposed facility will be developed conform to the general sense of place, the area around the site has considerably been impacted on by human interference in the form of extensive "industrial" visual elements. The Aries substation and various transmission lines that feed into it, dominates the skyline, as well as a recently constructed solar facility, influence the sense of tranquillity and isolation (see annexure E).

4 VISUAL IMPACT ASSESSMENT OF THE PROPOSED FACILITY[2]

4.1 Potential impacts

Possible visual impacts of the activity are identified and assessed in respect of the receptors. This means that the likely consequences of impacts, the severity and those receptors affected by these impacts will be identified and analysed. The potentially direct impacts are predicted, assessed and evaluated. The evaluation of significance is linked to thresholds of significance. In this particular case the visual impact may be significant for the receiving site, but beyond the site boundaries, the impact may not be significant because of vast distances and the fact that the proposed development will not be visible from the larger environment.

The visual simulation will compare the view with, and without the proposed development as seen from the most important view points and by receptors along the road. It is necessary to include both quantitative criteria like viewing distances as well as qualitative criteria such as sense of place when assessing the visual impact. The assessment relies on the evaluation of a wide range of considerations, both objective and subjective, including the context of the proposed development within the surrounding area.

[2] The facility assessed includes the solar arrays, substation and new powerline.

4.2 Impact assessment criteria

In this case the visual impact does not constitute a potential flaw, meaning an impact that has a "no-go" implication for the project. It does not lead to non-compliance with Acts, By-laws and adopted policies related to visual pollution, scenic routes, special areas or proclaimed heritage sites. It also does not lead to non-compliance in respect of any records of decision.

In order to aid decision-making, the assessment and reporting of possible impacts require consistency in the interpretation of visual impact assessment criteria. The proposed activity is assessed against these criteria. Thereafter it will also be assessed against the summary criteria.

The assessment of the impact significance needs to consider the predicted impact of the activity in the light of the vision for the area, rather than in terms of the impact on the current baseline conditions. This means that the visual impact is of lower significance if the activity is located within an area earmarked for lower sensitivity land-use (grazing), than if the activity falls within an area of high conservation quality. In this particular case, the activity is located within an environment of low conservation quality.

4.3 Visual receptors

Visual receptors are defined as "individuals and / or defined groups of people who have the potential to be affected by the proposal".

The main linear and point receptors / viewpoints that have been identified, as well as existing infrastructure in the area is indicated in annexure F, and include:

- Residents of the area i.e. local farmers.
- ESKOM staff working at Aries substation and maintaining distribution lines.
- Staff working at the existing solar facility located to the west of Aries substation.
- Transnet personnel working along the Sishen – Saldanha railway line.
- Tourists / visitors to the region.

4.4 Zone of visual influence

Zone of visual influence:
This means the visibility of the activity and includes the area from which the activity will be visible and vice versa, namely the view catchment area. The visibility is determined by screening effects of vegetation and possible structures as well as the number of receptors.

Rating	Description
High visibility	The facility will be visible in its entirety from a large area extending over several square kilometres.
Moderate visibility	The facility will partly be visible from an intermediate area extending over several hectares.
Low visibility	The facility will be partially or intermittently visible from a small area.

As the site is located in an undulating plain with no prominent topographical features, it has expansive views in all directions. The site is not enclosed by natural features and can a definite view catchment area from a sub-regional perspective not be defined.

Due to the lack of prominent topographical features in the landscape, the facility may become visible from many points within the landscape. There will also be as many points within the landscape from where the facility will not be visible.

From a more local perspective, the area that can be seen from the site (viewpoint 7), or from where the site can be seen, is fairly small, largely restricted to properties located to the north which is registered in the name of one land owner, the developer of the PV facility (see Annexure G)

The only noteworthy zone from where the solar arrays will be visible is along a ±5km stretch of the bypassing public road, located on the northern boundary of the application property. The powerline will be visible for the whole stretch of the road, from the site, up to Aries substation.

Viewshed from the 6 identified viewpoints on which the analysis is based, are attached as annexure H.

VISUAL INFLUANCE	Construction phase	Operational phase	Night
Development with no mitigation.	Moderate to high	Moderate to high	Moderate to low
Development with mitigation.	Moderate	Moderate	Low

4.5 Visual absorption capacity

Visual absorption capacity:
This means the potential capacity of the landscape to conceal the proposed development, including topography, vegetation and structures.

Rating	Description
High	The landscape can visually absorb medium to large changes in character.
Moderate	The landscape can visually absorb small to medium sized changes to the landscape.
Low	The landscape is very sensitive to any alterations in it visual character.

The visual absorption capacity of the landscape depends on the density and distribution of similar developments in the area as well as the similarity between existing and the new land-use to be introduced. Other factors that may influence the visual absorption capacity include the colour, texture and topography of the landscape. The distance between the observer and the proposed development also plays an important role as the foreground act as a visual buffer and distraction from the development itself.

The visual absorption capacity of the facility from a local perspective is low as it is sited directly alongside the road.

From a sub-regional perspective though, absorption capacity of the facility is moderate as the facility will be absorbed in the landscape as a result of the lack of prominent topographical features and gentle undulations of the vast surrounding plains.

VISUAL ABSORTION CAPACITY	Construction phase	Operational phase	Night
Development with no mitigation.	Low	Low	Low
Development with mitigation.	Moderate	Moderate - Low	Moderate - High

4.6 Receptor sensitivity

Receptors sensitivity:
This means the level of visual impact which is considered acceptable by the specific type of receptors.

Rating	Description
Low	Viewers who momentarily view and experience the facility.
Moderate	Viewers who occasionally are visually exposed to the facility.
High	Viewers with a prolonged / sustained visual exposure to the facility. Viewers who appreciate the quality of the landscape and visit it for enjoyment purposes.

No inhabited farmsteads will directly be exposed to the facility and the Kenhardt – Pofadder route is not considered to be a route regularly frequented by tourists visiting the Kenhardt region. The overall number of potential viewers is small and their exposure to the visual impact will be temporary as they pass through the region. As permanent residents in the region grow accustomed to the presence of the facility, their sensitivity will reduce over time.

ESKOM and TRANSNET employees, as well as employees at the solar facility located to the west of Aries substation on the other hand are probably desensitised to the potential visual impact as they experience on a regular basis, large scale electricity infrastructure within the rural landscapes i.e. transmission lines, substations and other related infrastructure.

RECEPTOR SENSITIVITY	Receptor	Construction phase	Operational phase	Night
Development with no mitigation.	Residents	Moderate - High	Moderate - High	Moderate
	Tourists	High	High	High
	ESKOM, TRANSNET and other staff	Low - Moderate	Low - Moderate	Low - Moderate
Development with mitigation.	Residents	Moderate	Moderate	Low
	Tourists	Moderate - High	Moderate - High	Moderate - High
	ESKOM, TRANSNET and other staff	Low	Low	Low

4.7 Visual exposure

Visual exposure: Visual exposure is based on distance from the activity to selected viewpoints.	
Rating	**Description**
Zero	Not visible by the viewer.
Low	Not particularly noticeable by the viewer.
Moderate	Recognisable by the viewer.
High	Dominant or clearly visible by the viewer.

Visual exposure diminishes over distance i.e. the closer the receptor is to the facility, the higher the level of visual exposure will be and vice versa.

Four viewpoints (see annexure F) were identified and assessed, namely:

- Viewpoint 1 is located ±6km to the east of the site.
- Viewpoints 2 and 3 is located along the road that pass the site.
- Viewpoint 4 is located ±1.5km west from the site.
- Viewpoint 5 is located ±7km to the west of the site close to Aries substation.
- Viewpoint 6 is located along the railway line that pass the site to the south.

From viewpoints 2, 3 and 6 the development would be particularly noticeable to the viewer, whereas from viewpoint 4 the facility would indeed be recognisable. The site is barely visible from viewpoints 1 as it is obscured by a ridgeline on the eastern boundary of the property.

The site should be visible from viewpoint 5, but due to the distance, it would not be discernible. New transmission lines that will be positioned alongside existing transmission lines will be most prominently visible from viewpoints 4 and 5 (see annexures I).

VISUAL EXPOSURE	**Viewpoint**	**Construction phase**	**Operational phase**	**Night**
Development with no mitigation.	1	Zero	Zero	Zero
	2	High	High	Moderate
	3	High	High	Moderate
	4	Moderate	Moderate - High	Moderate
	5	Low	Low - Moderate	Low
	6	High	High	Moderate
Development with mitigation.	1	Zero	Zero	Zero
	2	Moderate - High	Moderate - High	Moderate
	3	Moderate - High	Moderate - High	Moderate
	4	Moderate - Low	Moderate - Low	Low
	5	Low	Low	Low
	6	Moderate - Low	Moderate - Low	Moderate

4.8 Visual intrusion

Visual intrusion: This means the level of compatibility of the activity with particular qualities of the area or its sense of place. The compatibility of land uses and natural features play a role in visual intrusion.	
Rating	**Description**
High	Results in a noticeable change or is discordant with the surroundings.
Moderate	Partially fits into the surroundings, but clearly noticeable.
Low	Minimal change or blends in well with the surroundings.

Although the facility differs considerably from the existing visual character of the area, the level of visual intrusion is mitigated by the fact that observers (travellers along the bypassing road) will only see the facility for a stretch of ±5km.

The facility will not be the first similar facility to be introduced into the landscape as at least 4 others, to the knowledge of the authors, have been authorised in the area, of which one has been built. Photovoltaic facilities are not alien to, and are typically located within agricultural / rural landscapes.

VISUAL INTRUSION	**Construction phase**	**Operational phase**	**Night**
Development with no mitigation.	Moderate - High	Moderate - High	High
Development with mitigation.	Moderate	Moderate	Moderate

4.9 Extent of impact

Extent of visual impact: This is the spatial or geographical areas of influence of visual impacts which may vary in area from local, to regional, to national or international.	
Rating	**Description**
Site-related	Extending only as far as the activity.
Local	Affecting the immediate surroundings.
Sub regional	Affecting a portion of a larger region.
Regional	Affecting a large regional area.
National	Affecting large parts of the country.
International	Affecting areas across national boundaries.

The facility is located in a gently undulating plain with visibility extending beyond the immediate surroundings of the site. The visibility extent of visual impact will influence a sub-regional area as significant views of the facility will not extend beyond ±10km. It is not anticipated that the facility will be visible at a distance of more than 10km from the site.

Although new transmission lines are proposed, these will be positioned alongside existing transmission lines and will thus add to an existing visual state and not introduce a new visual element in the landscape.

EXTENT	Construction phase	Operational phase	Night
No development	-	-	-
Development	Sub regional	Sub regional	Sub regional

4.10 Duration of impact

Duration of visual impact:
This means the expected duration of the visual impact which may only be during construction phase, provision of screening vegetation, lifespan of the activity or in the case where time will not mitigate the visual impact.

Rating	Description
Short term	0 – 3 years
Medium term	3 – 15 years
Long term	More than 15 years
Permanent	The impact is irreversible

Once implemented the infrastructure will remain on the land for the duration of the 20 to 30-year life expectancy of the infrastructure. On decommissioning of the facility all infrastructure can be removed and the land returned to its original visual state.

DURATION	Construction phase	Operational phase
Development	Short term	Long term

4.11 Probability of impact

Probability of visual impact:
Meaning the degree of possibility of the visual impact occurring which is usually determined by the nature of activity and sensitivity of the receptors and preventive measures taken.

Rating	Description
Improbable	Possibility of impact occurring is very low.
Probable	Distinct possibility that impact will occur.
Highly probable	Most likely that impact will occur.
Definite	The impact will occur.

It is assessed that it is most likely that the facility will be implemented on authorisation. The rating is based on the fact that other authorisations, i.e. rezoning, still need to be issued.

PROBABILITY	Construction phase	Operational phase
Development	Highly probable	Highly probable

4.12 Intensity of impact

Intensity of visual impact: This means the extent of the impact on environmental and cultural resources within the viewshed or view catchment area.	
Rating	**Description**
Low	The visual character of the area will negligibly change.
Moderate	The visual character of the area will be subject to change but not in an unacceptable way.
High	The visual character of the area will severely be changed.

The intensity of the visual impact as perceived form the view corridor and viewpoints, the bypassing public road, is assessed as, depending on the distance from the facility, ranging from medium to high.

As indicated in annexure G the facility is primarily visible for a stretch of 5km along the public road.

INTENSITY	**Construction phase**		**Operational phase**		**Night**	
	Distance from site					
	1-5km	5-10km	1-5km	5-10km	1-5km	5-10km
Development with no mitigation	Moderate - High	Low - Moderate	High	Moderate	High	Moderate
Development with mitigation	Moderate	Low	Moderate - High	Low - Moderate	Moderate	Low - Moderate

4.13 Overall visual impact significance

The overall significance of the visual impacts can be derived through a synthesis of the aspects produced in terms of their duration, intensity, extent and probability and be described as:

Low	Where it will not have an influence on the authority decision.
Medium	Where it should have an influence on the authority decision and in the case of negative impacts requires management actions to avoid or mitigate the impacts.
High	Where it would influence the authority decision regardless of any possible mitigation.

Although the impact will be permanent of nature, will definitely occur, is of sub regional extent and will have a moderate intensity, it is overall of **moderate significance** and will require that management actions be implemented to mitigate the impacts.

4.14 Cumulative impacts

Renewable energy facilities tend to locate, due to economic factors[3], as close as possible to existing electricity infrastructure into which it feeds the power it generates. As Aries substation and the transmission lines that feed into it are major infrastructure connected to the national electricity grid, it can thus be expected that renewable energy facilities will locate around it.

The facility that is the subject to this report is one of 5 photovoltaic electricity generation projects in the immediate vicinity of Aries substation, known to the authors, of which 3 has already been authorised and one built.

If all 5 projects were to be implemented the intensity of the visual impact, from a local perspective would be higher as the visual character of a larger area will be affected. The various solar arrays and powerlines will intermittently be visible, if the area is approached from the east, from the eastern boundary of portions 6 and 7, up to Aries substation; a 13km stretch of road (see annexure J).

From a sub-regional perspective though, the 5 facilities impact on the same viewshed and will the visual impact not be significantly enlarged.

These possible future activities will however, consist of the same structural components, with similar visual characteristics and therefore, with similar visual impacts as the present activity. The nature of this future cumulative visual impact will have a horizontal, rather than a vertical characteristic.

From a visual perspective it would be preferable to locate all similar visual impacts within sight of the substation rather than affecting more distant areas within the landscape.

5 MITIGATION MEASURES

When considering mitigation measures to reduce the visual impact, the following should be considered.

Mitigation measures should be:

- Economically feasible;
- Effective (time allowed for implementation and provision of management and maintenance); and
- Visually acceptable (within the context of the existing landscape).

To address these measures the following principles should be considered:

- Mitigation should be planned to fit into the existing landscape character or to enhance it.
- It should respect and build upon landscape distinctiveness;
- Mitigation should primarily aim to blend the proposed development into its surroundings and generally reduce its visibility; and

[3]Mainly the cost of providing infrastructure i.e. transmission lines and substation.

- It should be recognized that some mitigation measures will not be effective immediately.

The following mitigation measures are proposed:

General mitigation measures throughout the life expectancy of the facility
• Signage related to the facility should be discrete and confined to the entrance gates. • No other corporate or advertising signs should be permitted.
• All structures should be kept as small and low as technically possible.
• All painted surfaces are to use earth tones chosen for its ability to blend into the background.
• Security fencing should be as transparent as possible. • The fence should not be visually dominant over the solar arrays. • The use of razor wire should be avoided.
• Screen planting in the form of tree lines should not be considered. • Only in exceptional circumstances should vegetation screening be considered in clumps around structures to mimic farmsteads found in the region.
• Security lighting must be kept to the absolute minimum and be confined to only those sections of the facility that are necessary to be illuminated. • No external up-lighting or flood-lighting of any part of the facility must be allowed. • External, inclusive of perimeter security lighting must be by means of shielded down-lighters, minimizing light pollution beyond the extent of the area to be lit.
• Transmission lines to Aries substation should follow as far as technically possible the path of the existing power line. • Underground cabling should be installed where possible.
Construction mitigation measures
• Flattening and grading of the site should be kept to the minimum. • The natural profile and shape of the site is to be maintained.
• Provision should be made for the rehabilitation of areas damaged by construction activities.
• Measures should be implemented to prevent possible soils erosion.
• An attempt must be made to control dust generated during the construction phase.
• Litter and waste disposal, inclusive of construction rubble, must be controlled.
• Fires, inclusive of burning of waste, should not be allowed on site.
• If possible, laydown areas, storage of building materials and other off-site construction activities, should be accommodated at the Olyvenkolk farmstead or other low lying, visually inconspicuous area.

6 CONCLUSIONS

The result of the visual impact assessment is indicative of a Best Practicable Environmental Option. It will ensure avoidance and minimisation of drastic and obtrusive visual intrusion in this rural area.

The nature and degree of visual impact of the proposed activity within the receiving environment during the construction phase, operational phase as well as during the night varies in respect of the criteria used. The construction phase is of relative short term and during the night far less receptors are of importance. The most important phase in respect of assessment of visual impact is therefore during the long term operational phase.

The visual impact during the Operational phase is shown to be **moderate**, mainly because of the following:

- Visibility :
  The facility will be partly visible from an intermediate area. The greatest visual impact of the solar array is restricted to a relative short distance of ±5km along the bypassing public road.
  With no mitigation: Moderate - High
  With mitigation: Moderate.

- Visual Absorption Capacity:
  The landscape can visually absorb only small to medium size changes.
  With no mitigation: Low (Low means worst)
  With mitigation: Low - Moderate.

- Receptor sensitivity:
  Facility is occasionally visually noticeable by viewers. No tourism facilities exist in the region. The are no inhabited farmsteads which will directly be exposed to the facility. ESKOM and TRANSNET employees, as well as employees at the solar facility located to the west of Aries substation are probably desensitised to the potential visual impact.
  With no mitigation: Moderate – High
  With mitigation: Moderate.

- Visual exposure:
  Facility is recognisable by viewer if in close proximity thereto. The proposed facility maintains a very low profile and follows the natural lay of the land and is from a sub-regional perspective not particularly visible.
  With no mitigation: Moderate - High
  With mitigation: Moderate.

- Visual intrusion:
  Facility fits only partially into surroundings. The Aries substation and associated transmission lines, as well as other similar facilities authorized in the direct vicinity of the proposal, sets a precedent for the development of similar activities in the area.
  With no mitigation: Moderate – High
  With mitigation: Moderate.

- Extent of visual impact:
  Facility is of sub regional importance.
  Affecting a portion of a larger region of homogenous character.

- Duration of impact:
  Facility duration more than 15 years
  Long term duration.

- Probability of impact:
  Most likely that visual impact will occur
  Highly probable.

- Intensity of impact:
  The visual change in character is acceptable. No unique visual resources will be impacted on.
  With no mitigation: Moderate – High
  With mitigation: Low – Moderate.

- Overall visual impact significance:

  Taking the above-mentioned criteria into consideration, the following overall result in respect of the cumulative significance of the visual impact is reached, measured against the visual assessment criteria:

Visual Impact	Low	Low - Moderate	Moderate	Moderate - High	High
Without mitigation	1	0	0	4	1
With mitigation	0	1	4	1	0

  Although numeric values are not always a precise indication of the significance of visual impact, it nevertheless gives an indication of the relative significance of impact, especially in the case of comparisons of impacts, without and with mitigation. Values allocated to the different categories and number of appearances, show that visual impact in this case can be reduced by 30% if mitigation measures are applied.

  The significance of the visual impact can be classified as **MODERATE** on condition that the mitigation measures as specified are implemented. This conclusion is reached as a result of the positive effect mitigation has on all VIAC (visual impact assessment criteria).

  As no significant visual or aesthetic issues are present and the facility is not visible from the R27 between Brandvlei and Kenhardt , the authors of this report recommend that approval for the proposal be granted, subject thereto that the proposed mitigation measures be implemented.

7 REFFERENCES

Eco Impact Legal Consulting (Pty) Ltd, July 2018: Draft Scoping Report, Application for Environmental Authorisation, Government Notice Regulations 982, GNR 983, GNR 984 as amended, National Environmental Management Act 1998, 300MW Photovoltaic Electricity Generation Facility on Portion 6 of Farm 187, Olyvenkolk, Kenhardt District.

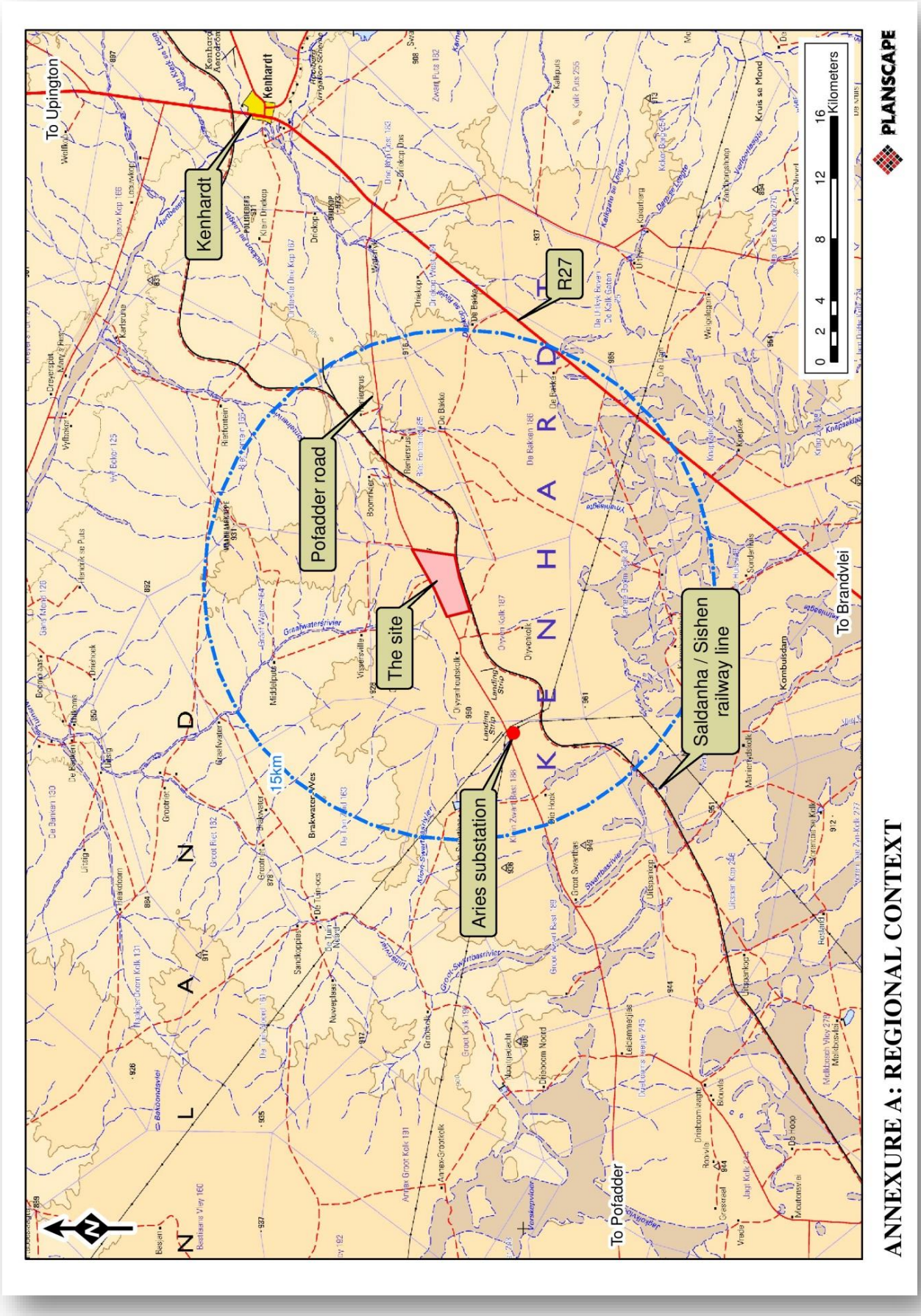
Oberholzer, B. 2005: Guideline for involving Visual & Aesthetic Specialists in EIA processes: Edition 1. CSIR Report No ENV-S-C 2005 053 F. Republic of South Africa, Provincial Government of the Western Cape, Department of Environmental Affairs & Development Planning, Cape Town.

Topographical Map 1:50 000: 2920BD Grootriet, Third Edition, 2003.

Topographical Map 1:250 000: 2920 Kenhardt, Fifth Edition, 2003.

ANNEXURE A

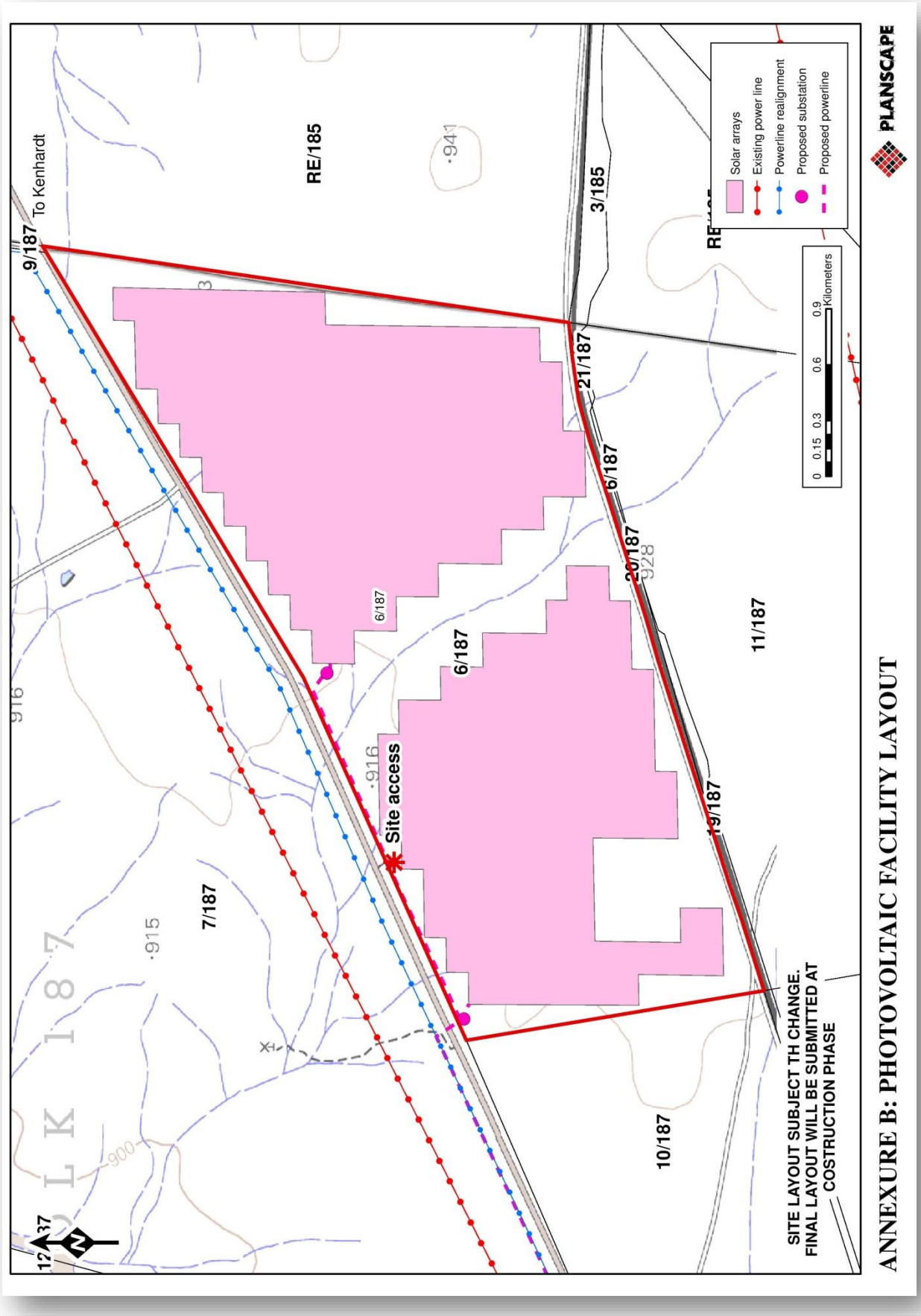
REGIONAL CONTEXT



ANNEXURE A: REGIONAL CONTEXT

ANNEXURE B

PHOTOVOLTAIC FACILITY LAYOUT


ANNEXURE B: PHOTOVOLTAIC FACILITY LAYOUT
PLANSCAPE
Solar arrays
Existing power line
Powerline realignment
Proposed substation
Proposed powerline
0 0.15 0.3 0.6 0.9 Kilometers
SITE LAYOUT SUBJECT TH CHANGE.
FINAL LAYOUT WILL BE SUBMITTED AT
COSTRUCTION PHASE
To Kenhardt
RE/185
3/185
9/187
21/187
6/187
20/187
19/187
11/187
10/187
7/187
Site access
916
915
928
941
900
N

ANNEXURE C

PHOTOGRAPHS OF SIMILAR FACILITIES

AND

DRAWINGS ILLUSTRATING SOLAR PANELS AND SUPORT STRUCTURE DIMENSIONS

Front view of solar panels

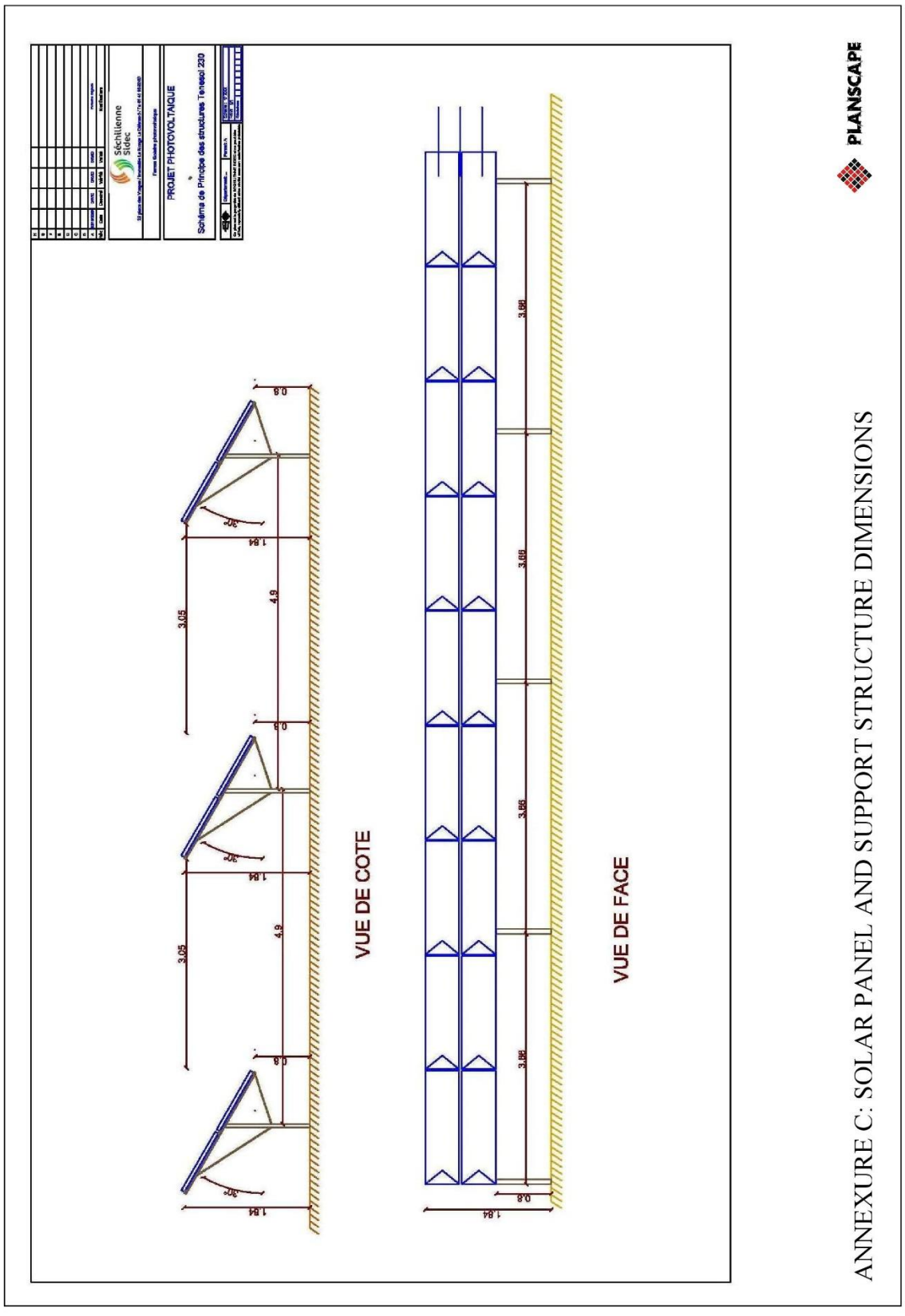
Back view of solar panels

Unobtrusive security fencing

Photovoltaic facility in an arid / rural setting

ANNEXURE C: PHOTOGRAPHS OF SIMILAR FACILITIES

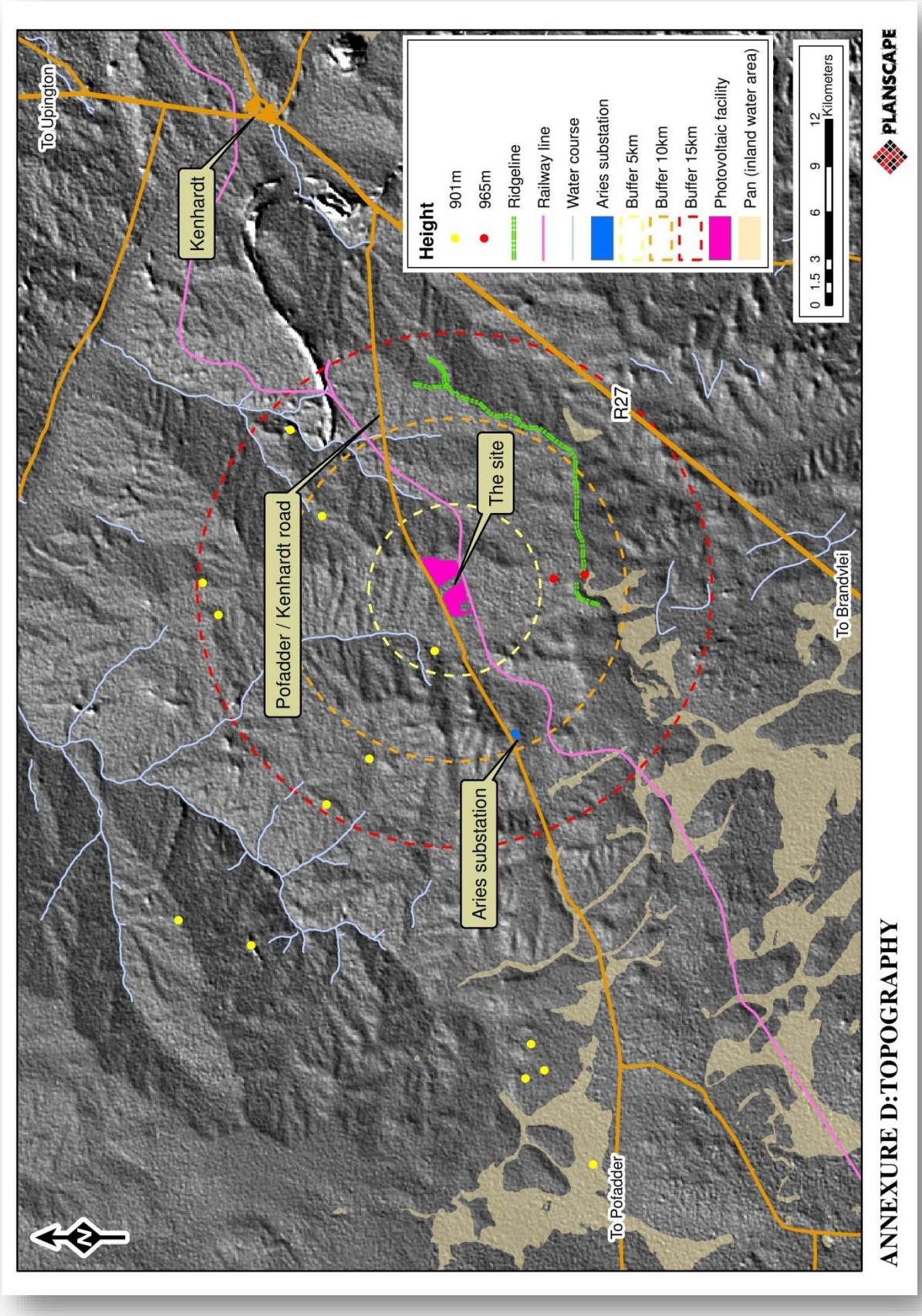
PLANSCAPE



ANNEXURE C: SOLAR PANEL AND SUPPORT STRUCTURE DIMENSIONS

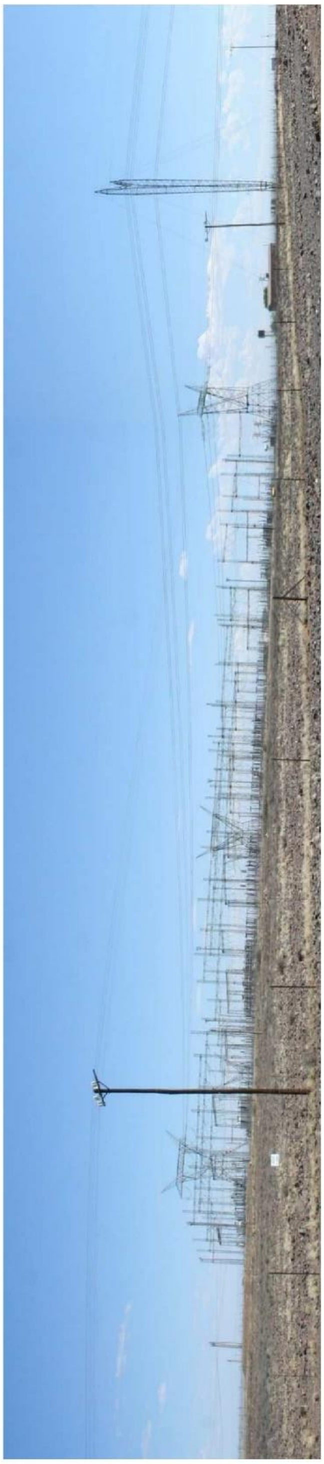
ANNEXURE D

TOPOGRAPHY


ANNEXURE D:TOPOGRAPHY
PLANSCAPE
To Upington
Kenhardt
Pofadder / Kenhardt road
The site
Aries substation
R27
To Brandvlei
To Pofadder
Height
901m
965m
Ridgeline
Railway line
Water course
Aries substation
Buffer 5km
Buffer 10km
Buffer 15km
Photovoltaic facility
Pan (inland water area)
0 1.5 3 6 9 12 Kilometers
N

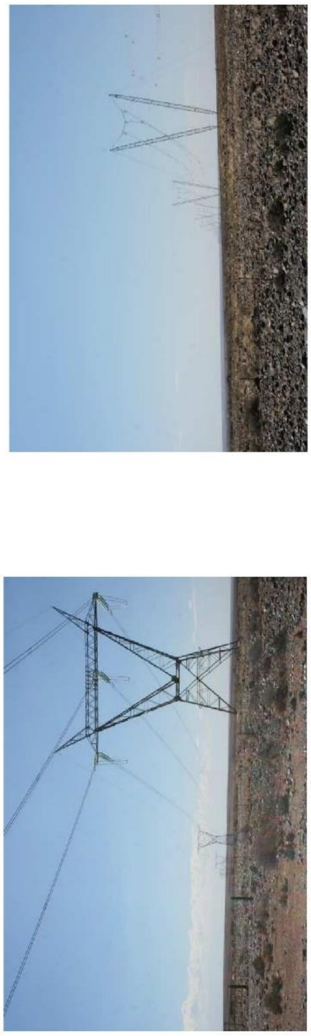
ANNEXURE E

PHOTOGRAPHS OF EXISTING ELECTRICITY INFRASTRUCTURE IN THE AREA



Aries Substation as seen from road.

Existing Photo-Voltaic Electricity Generation facility as seen from road, at a distance of ±50m.



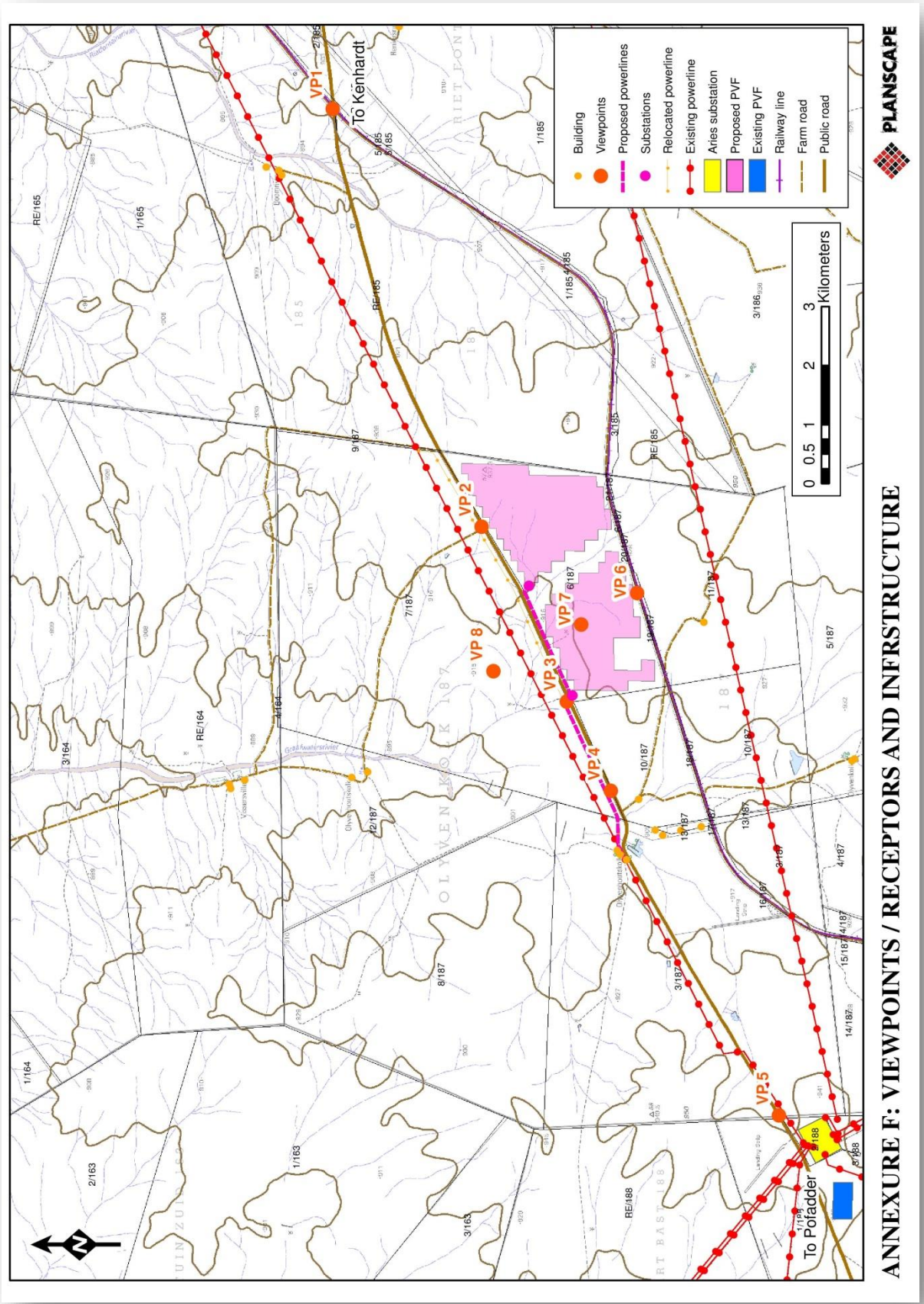
Existing powerlines feeding into the Aries substation.

ANNEXURE E: ELECTRISITY INFRASTRUCTURE IN THE AREA

PLANSCAPE

ANNEXURE F

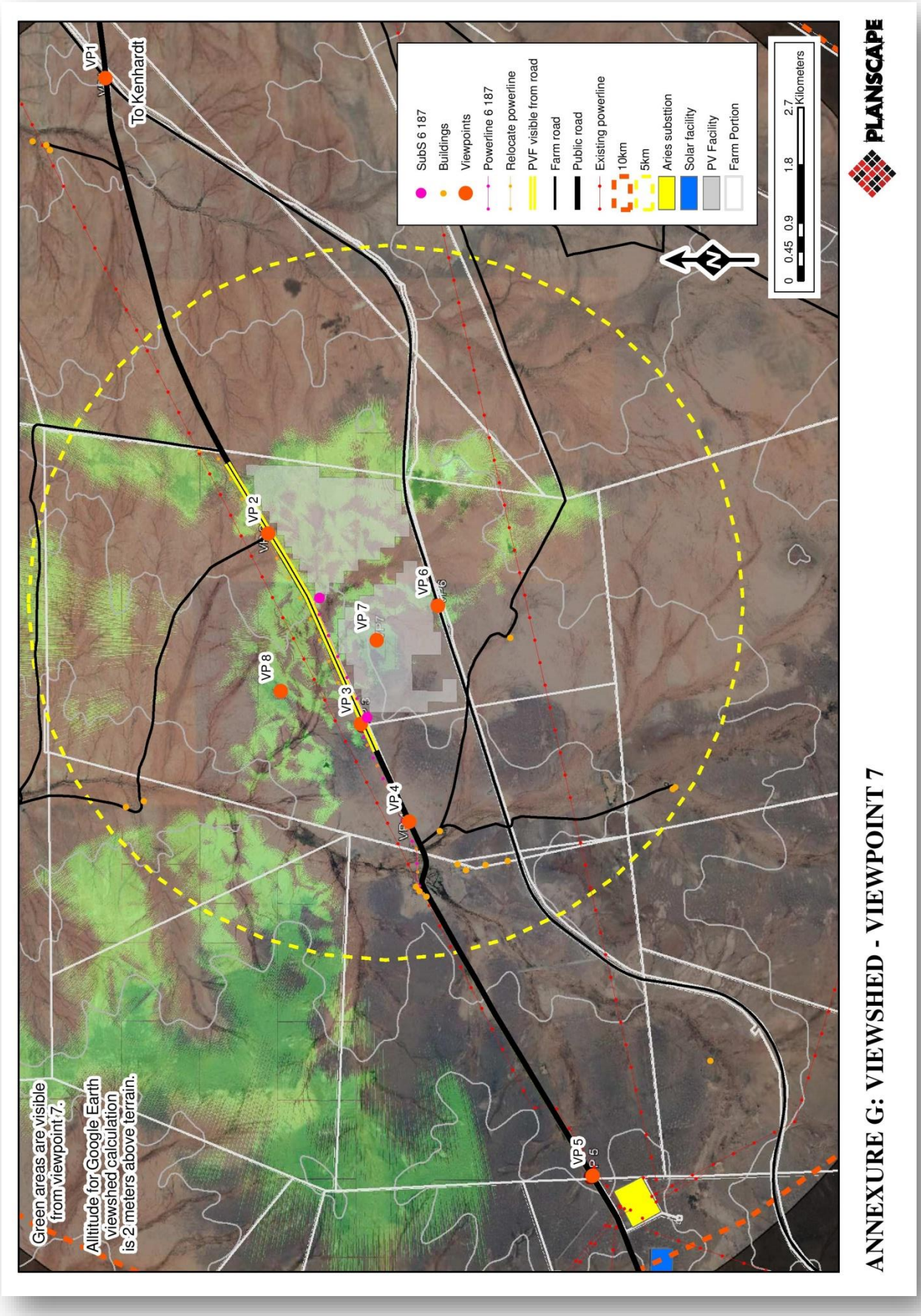
VIEWPOINTS / RECEPTORS AND INFRASTRUCTURE



ANNEXURE F: VIEWPOINTS / RECEPTORS AND INFRSTRUCTURE

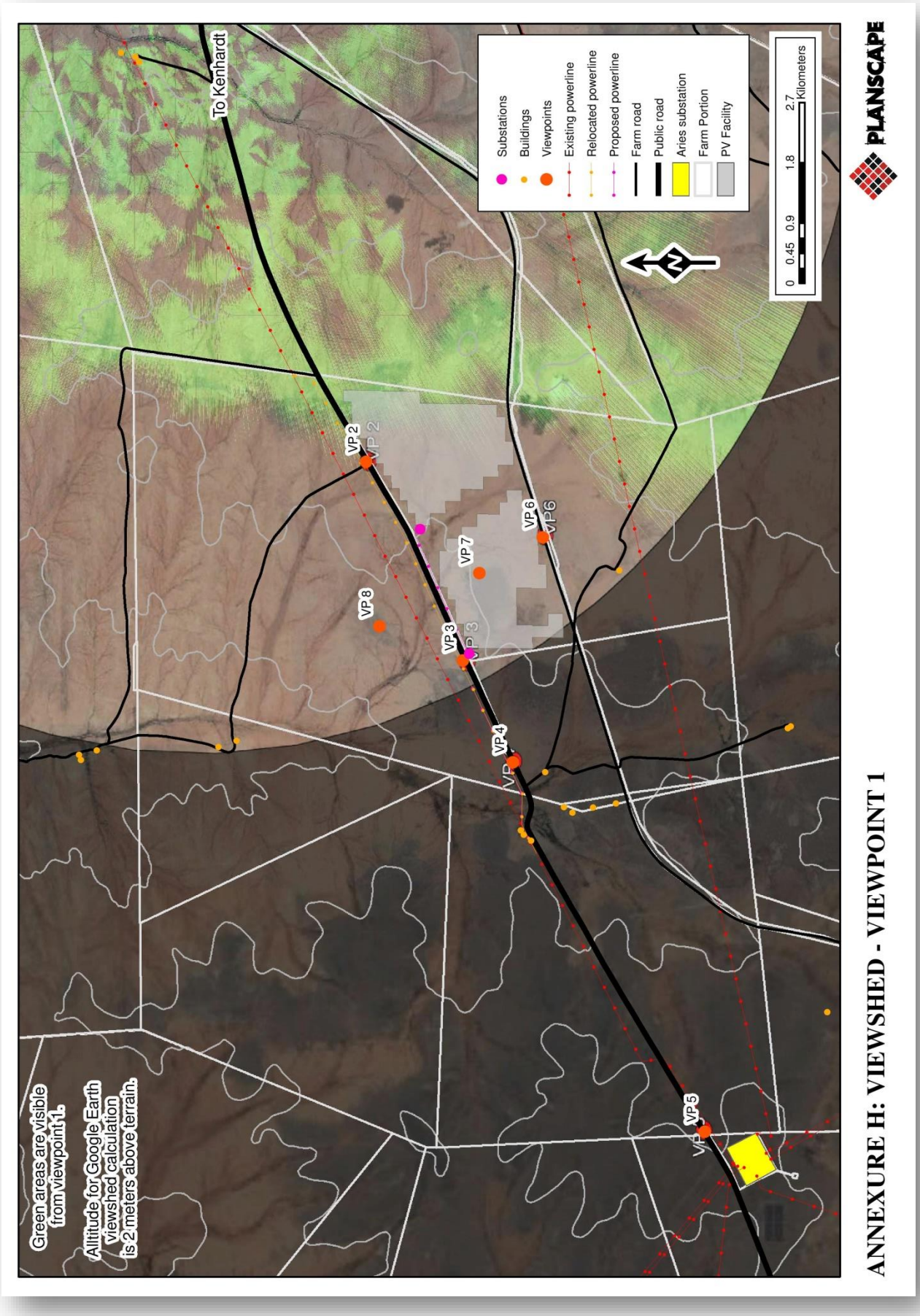
ANNEXURE G

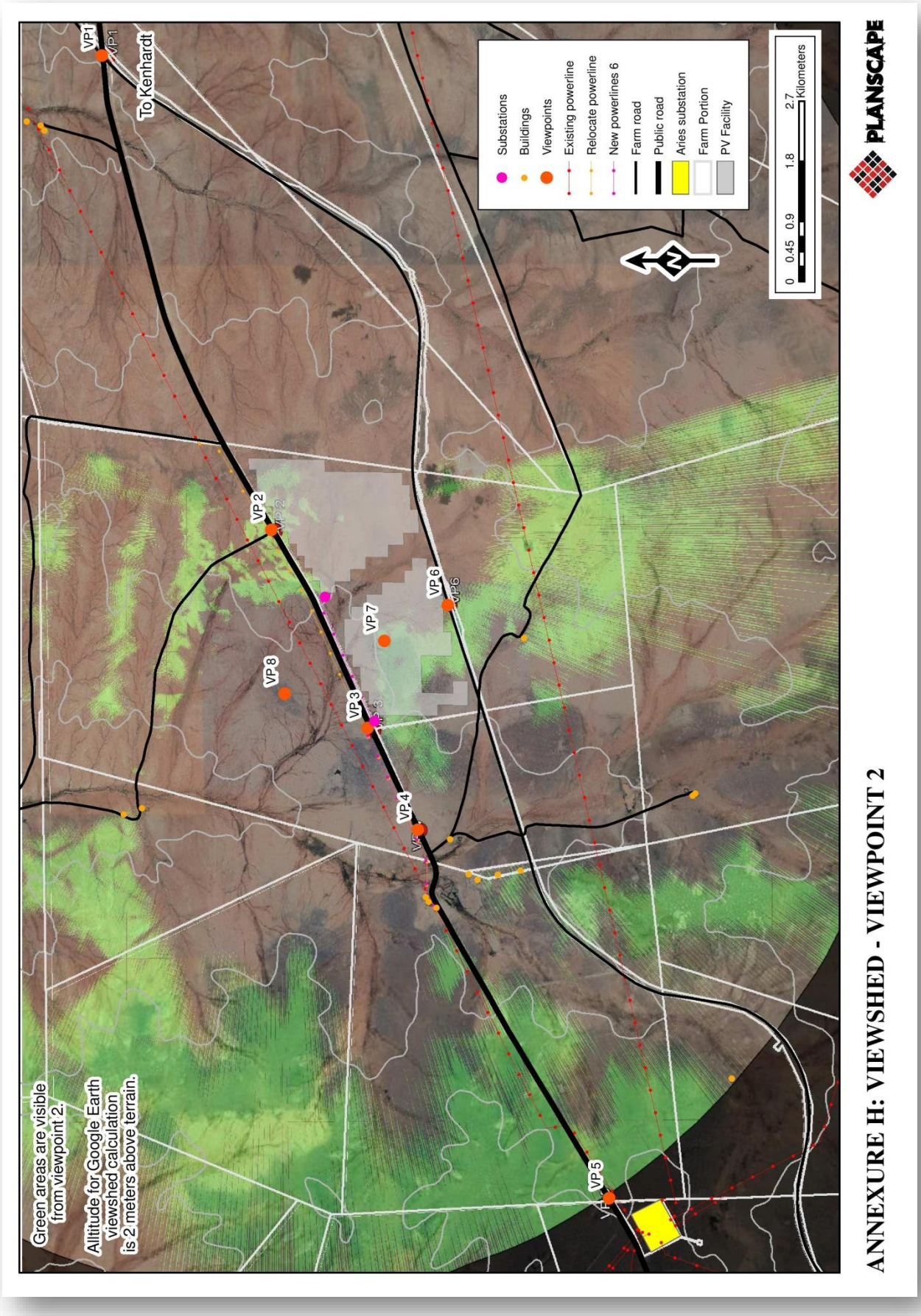
VIEWSHED FROM VIEWPOINT 7

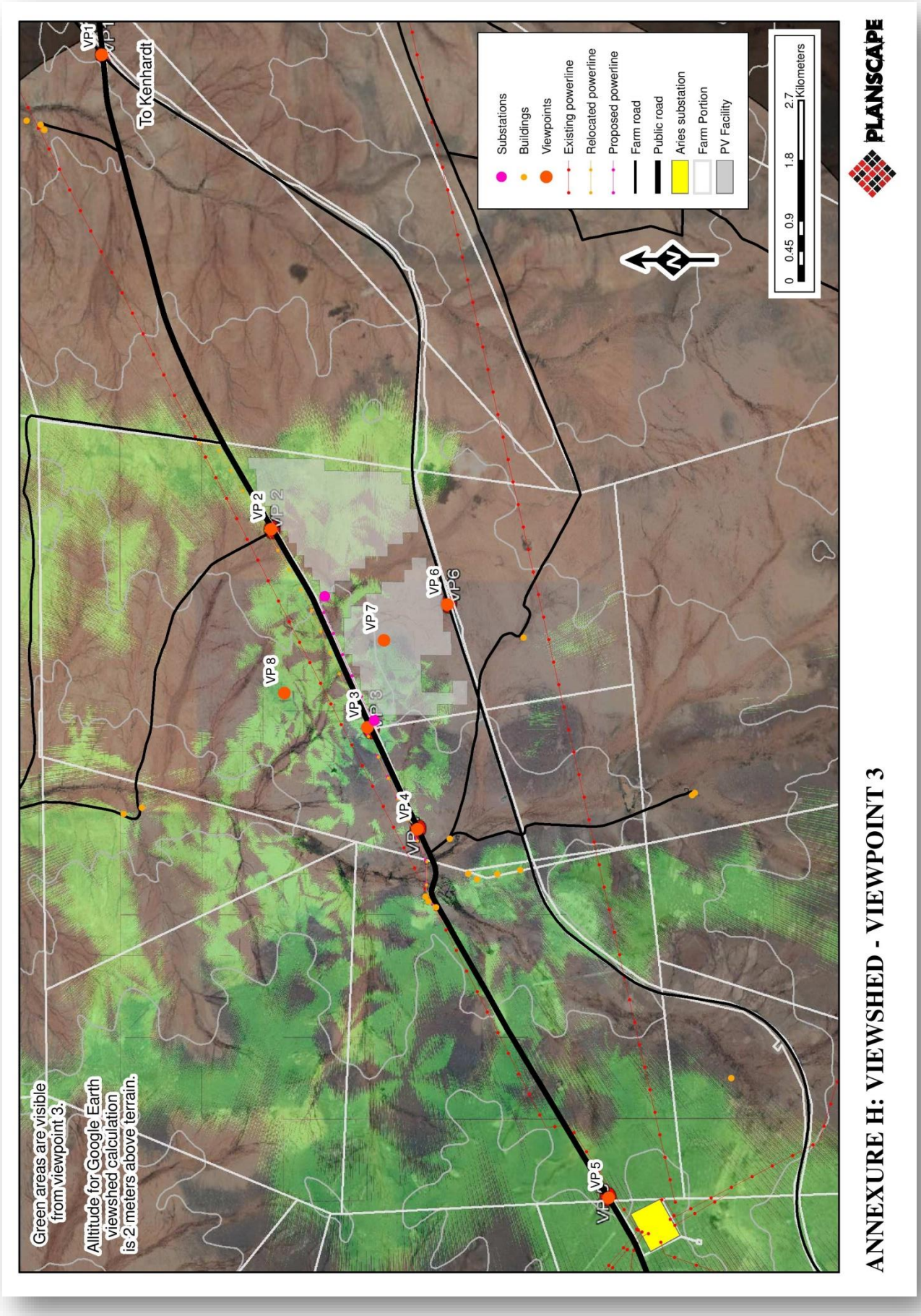

ANNEXURE G: VIEWSHED - VIEWPOINT 7
PLANSCAPE
To Kenhardt
VP 1
VP 2
VP 3
VP 4
VP 5
VP 6
VP 7
VP 8
SubS 6 187
Buildings
Viewpoints
Powerline 6 187
Relocate powerline
PVF visible from road
Farm road
Public road
Existing powerline
10km
5km
Aries substtion
Solar facility
PV Facility
Farm Portion
0 0.45 0.9 1.8 2.7 Kilometers
N
Green areas are visible from viewpoint 7.
Altitude for Google Earth viewshed calculation is 2 meters above terrain.

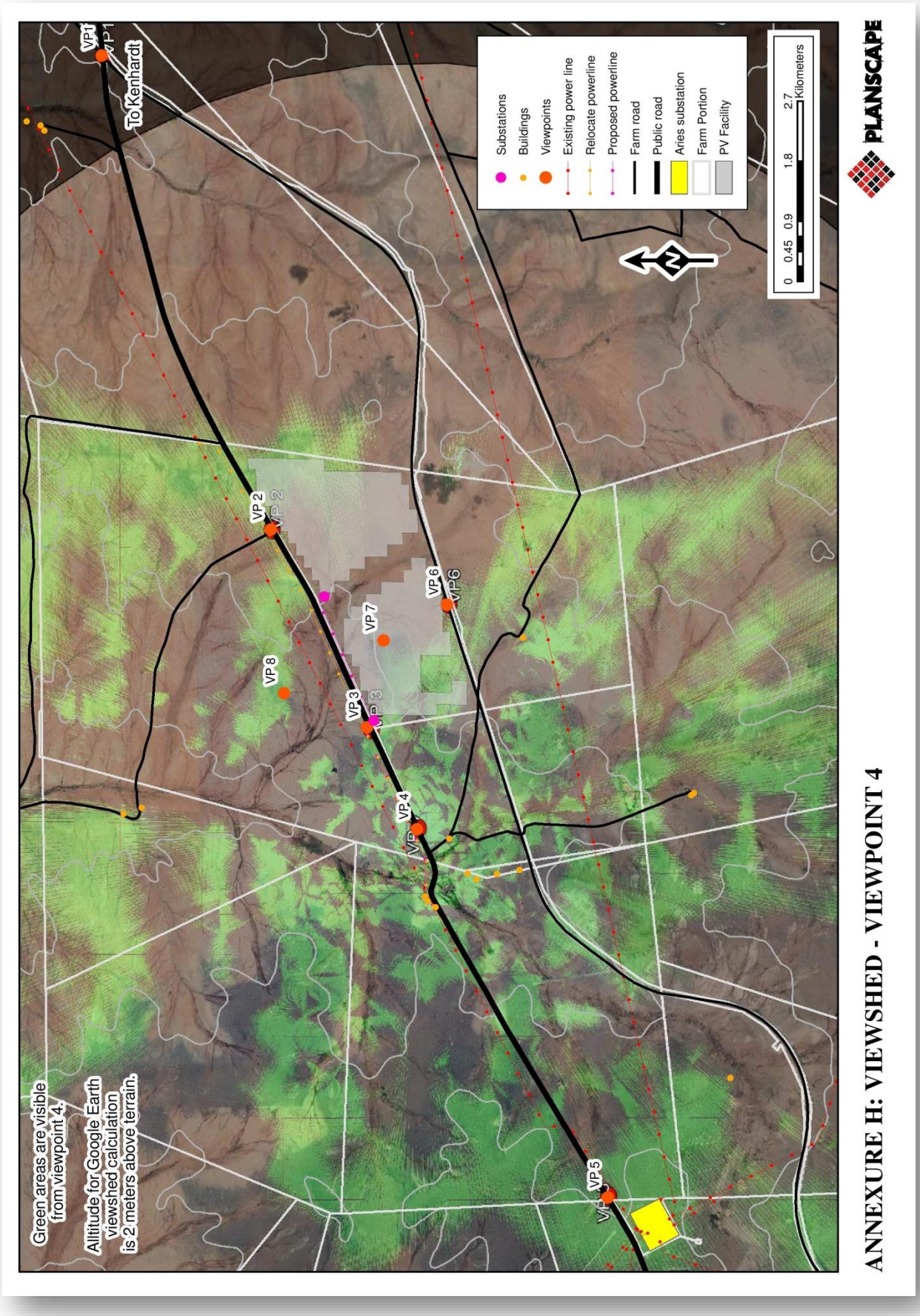
ANNEXURE H

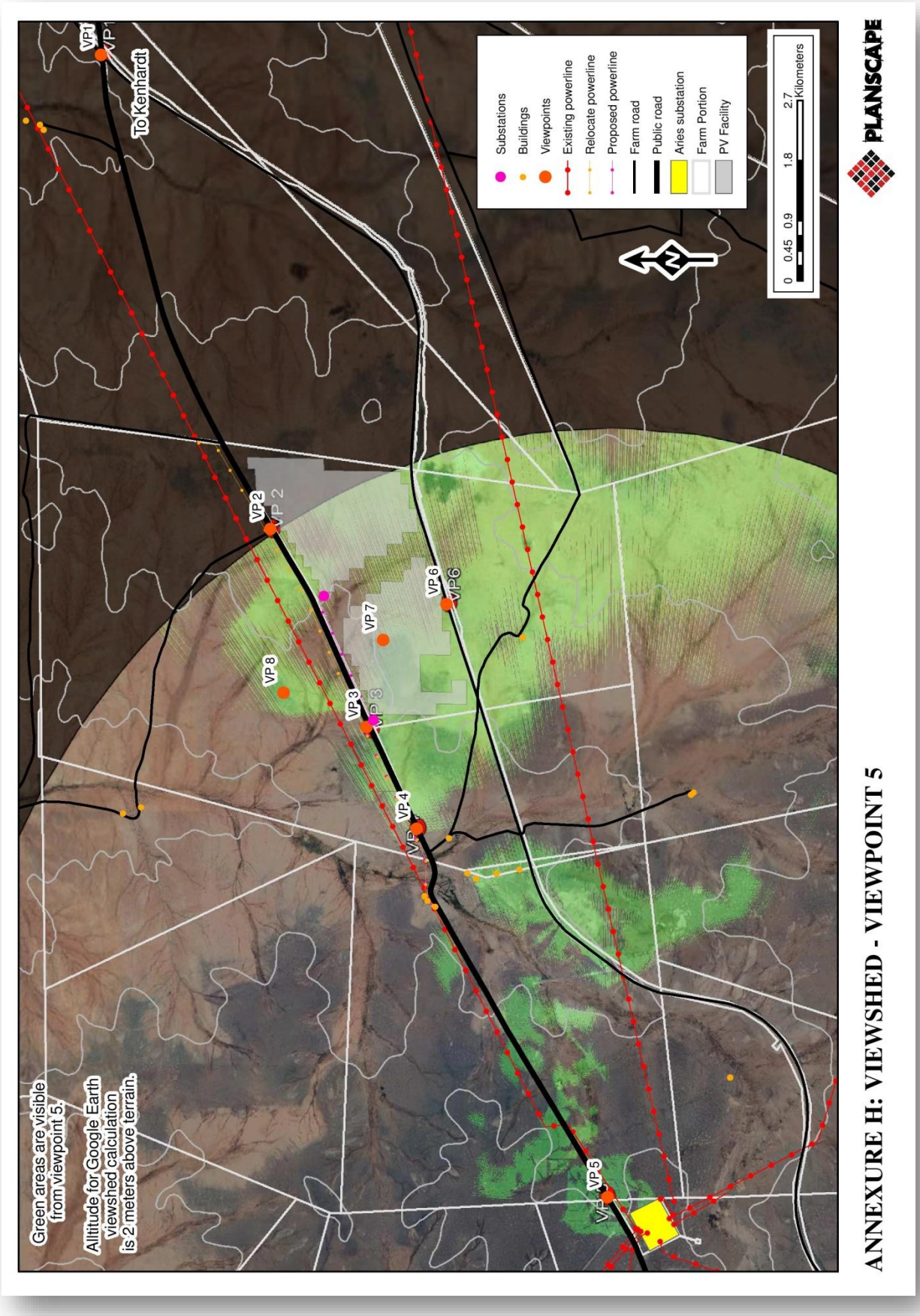
VIEWSHEDS
FROM
VIEWPOINTS 1 - 6

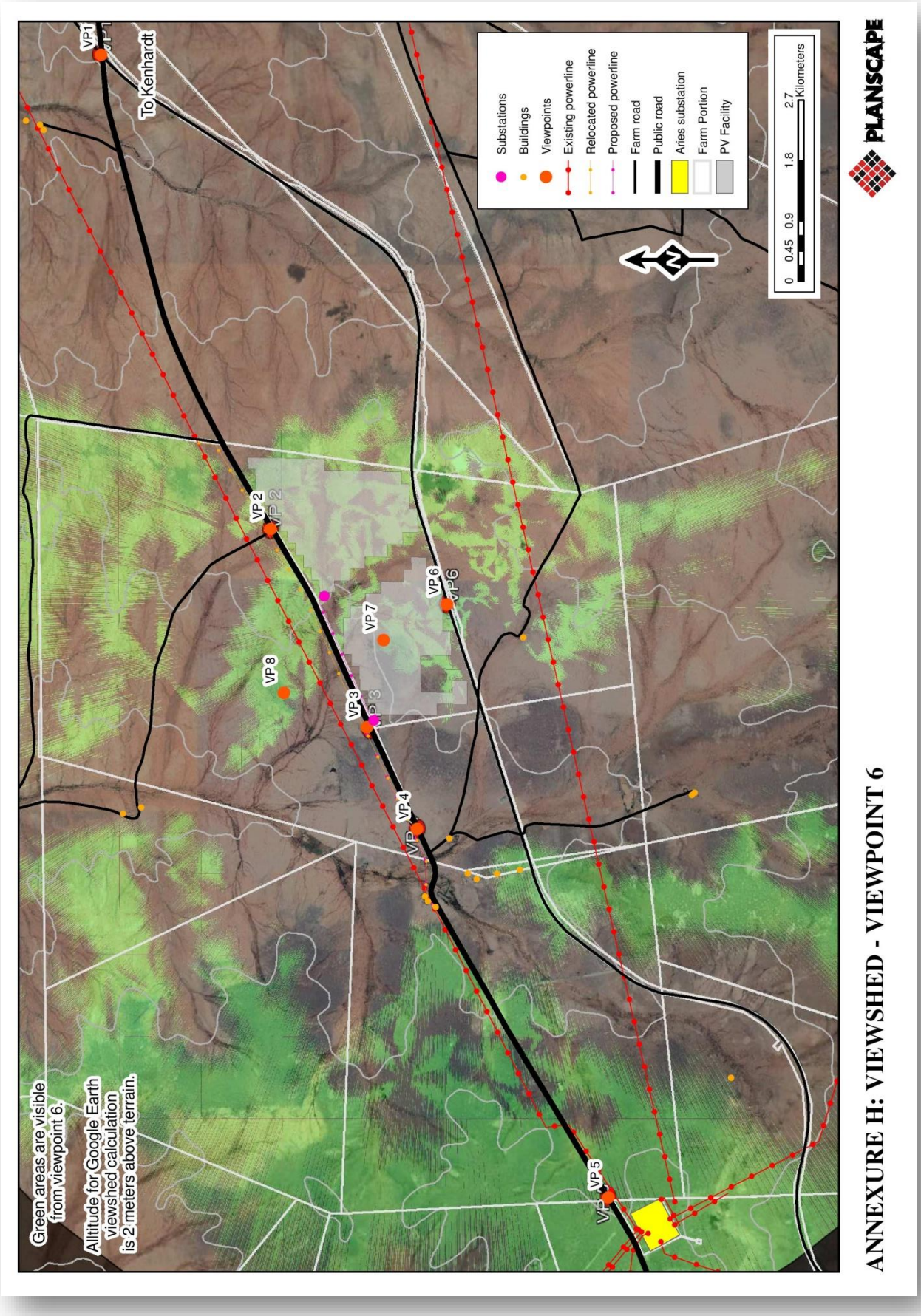

ANNEXURE H: VIEWSHED - VIEWPOINT 1
PLANSCAPE
To Kenhardt
Substations
Buildings
Viewpoints
Existing powerline
Relocated powerline
Proposed powerline
Farm road
Public road
Aries substation
Farm Portion
PV Facility
0 0.45 0.9 1.8 2.7 Kilometers
N
VP 1
VP 2
VP 3
VP 4
VP 5
VP 6
VP 7
VP 8
Green areas are visible from viewpoint 1.
Altitude for Google Earth viewshed calculation is 2 meters above terrain.


VP1
To Kenhardt
VP 2
VP 3
VP 4
VP 5
VP 6
VP 7
VP 8
Substations
Buildings
Viewpoints
Existing powerline
Relocate powerline
New powerlines 6
Farm road
Public road
Aries substation
Farm Portion
PV Facility
0 0.45 0.9 1.8 2.7 Kilometers
N
Green areas are visible from viewpoint 2.
Altitude for Google Earth viewshed calculation is 2 meters above terrain.
PLANSCAPE
ANNEXURE H: VIEWSHED - VIEWPOINT 2


ANNEXURE H: VIEWSHED - VIEWPOINT 3
PLANSCAPE
To Kenhardt
VP 1
VP 2
VP 3
VP 4
VP 5
VP 6
VP 7
VP 8
Substations
Buildings
Viewpoints
Existing powerline
Relocated powerline
Proposed powerline
Farm road
Public road
Aries substation
Farm Portion
PV Facility
0 0.45 0.9 1.8 2.7 Kilometers
N
Green areas are visible from viewpoint 3.
Altitude for Google Earth viewshed calculation is 2 meters above terrain.

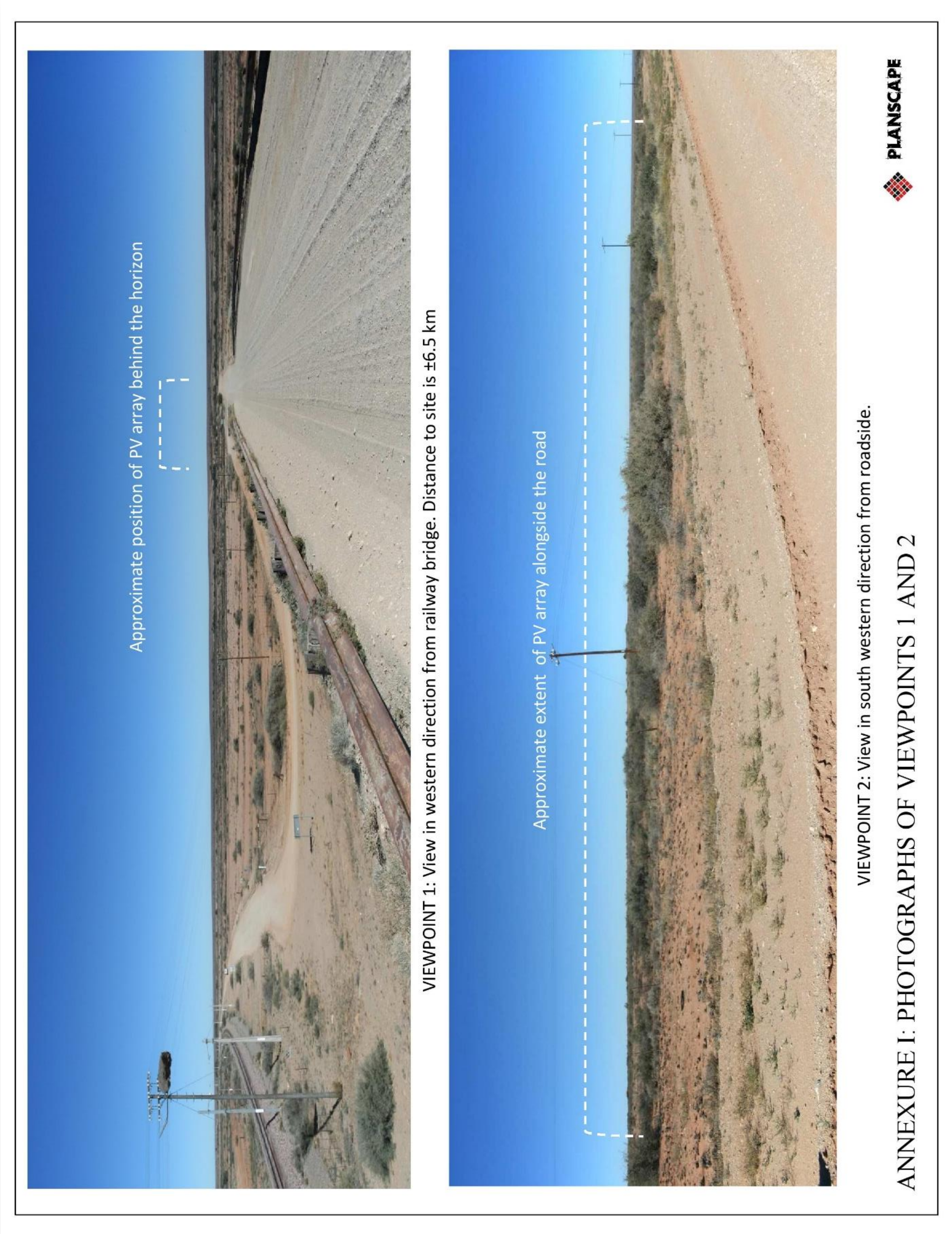

ANNEXURE H: VIEWSHED - VIEWPOINT 4
PLANSCAPE
To Kenhardt
VP 1
VP 2
VP 3
VP 4
VP 5
VP 6
VP 7
VP 8
Substations
Buildings
Viewpoints
Existing power line
Relocate powerline
Proposed powerline
Farm road
Public road
Aries substation
Farm Portion
PV Facility
0 0.45 0.9 1.8 2.7 Kilometers
N
Green areas are visible from viewpoint 4.
Alltitude for Google Earth viewshed calculation is 2 meters above terrain.

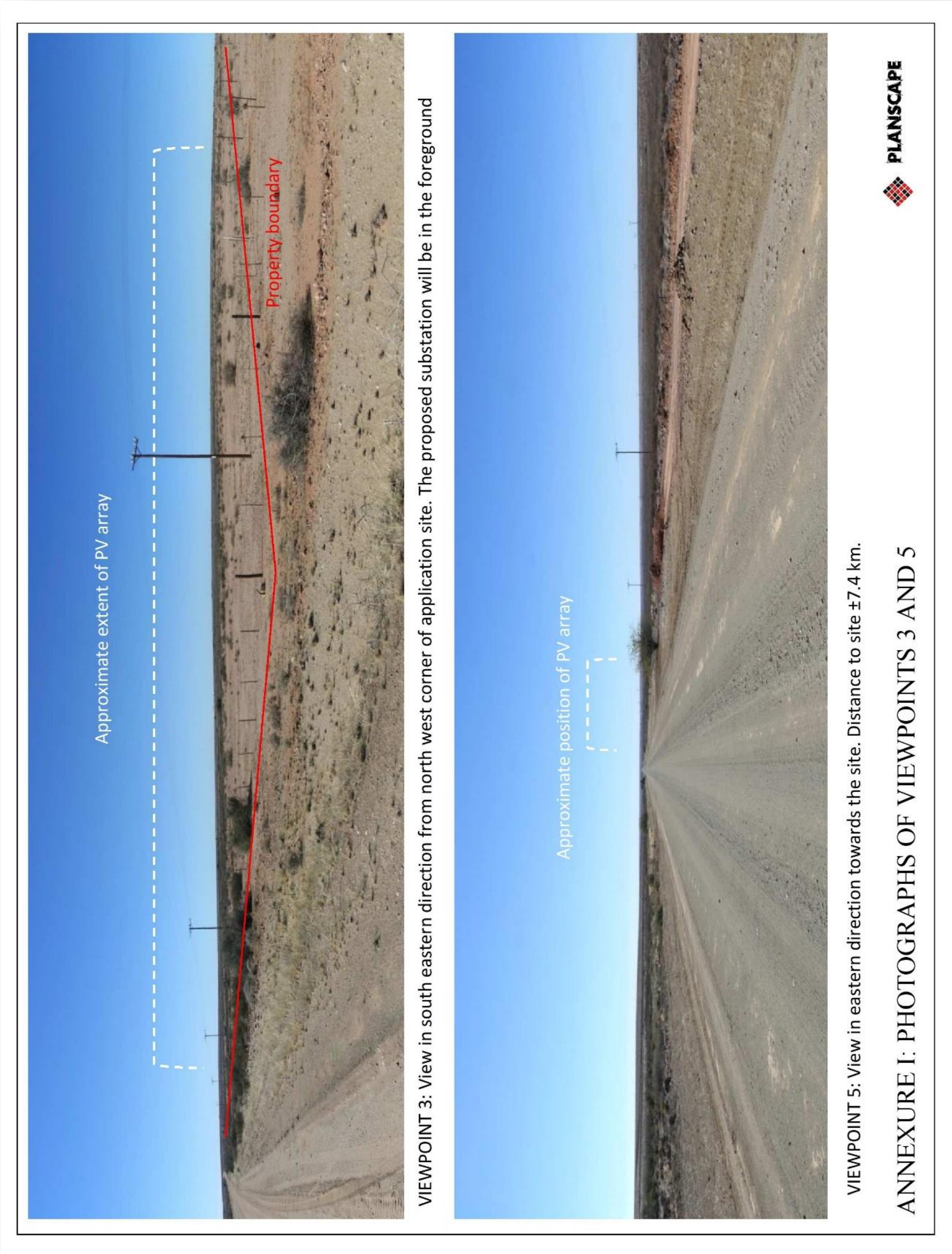

ANNEXURE H: VIEWSHED - VIEWPOINT 5
PLANSCAPE
To Kenhardt
VP 1
VP 2
VP 3
VP 4
VP 5
VP 6
VP 7
VP 8
Substations
Buildings
Viewpoints
Existing powerline
Relocate powerline
Proposed powerline
Farm road
Public road
Aries substation
Farm Portion
PV Facility
0 0.45 0.9 1.8 2.7 Kilometers
N
Green areas are visible from viewpoint 5.
Altitude for Google Earth viewshed calculation is 2 meters above terrain.


ANNEXURE H: VIEWSHED - VIEWPOINT 6
PLANSCAPE
To Kenhardt
VP1
VP 2
VP 3
VP 4
VP 5
VP 6
VP 7
VP 8
Green areas are visible from viewpoint 6.
Altitude for Google Earth viewshed calculation is 2 meters above terrain.
Substations
Buildings
Viewpoints
Existing powerline
Relocated powerline
Proposed powerline
Farm road
Public road
Aries substation
Farm Portion
PV Facility
0 0.45 0.9 1.8 2.7 Kilometers
N

ANNEXURE I

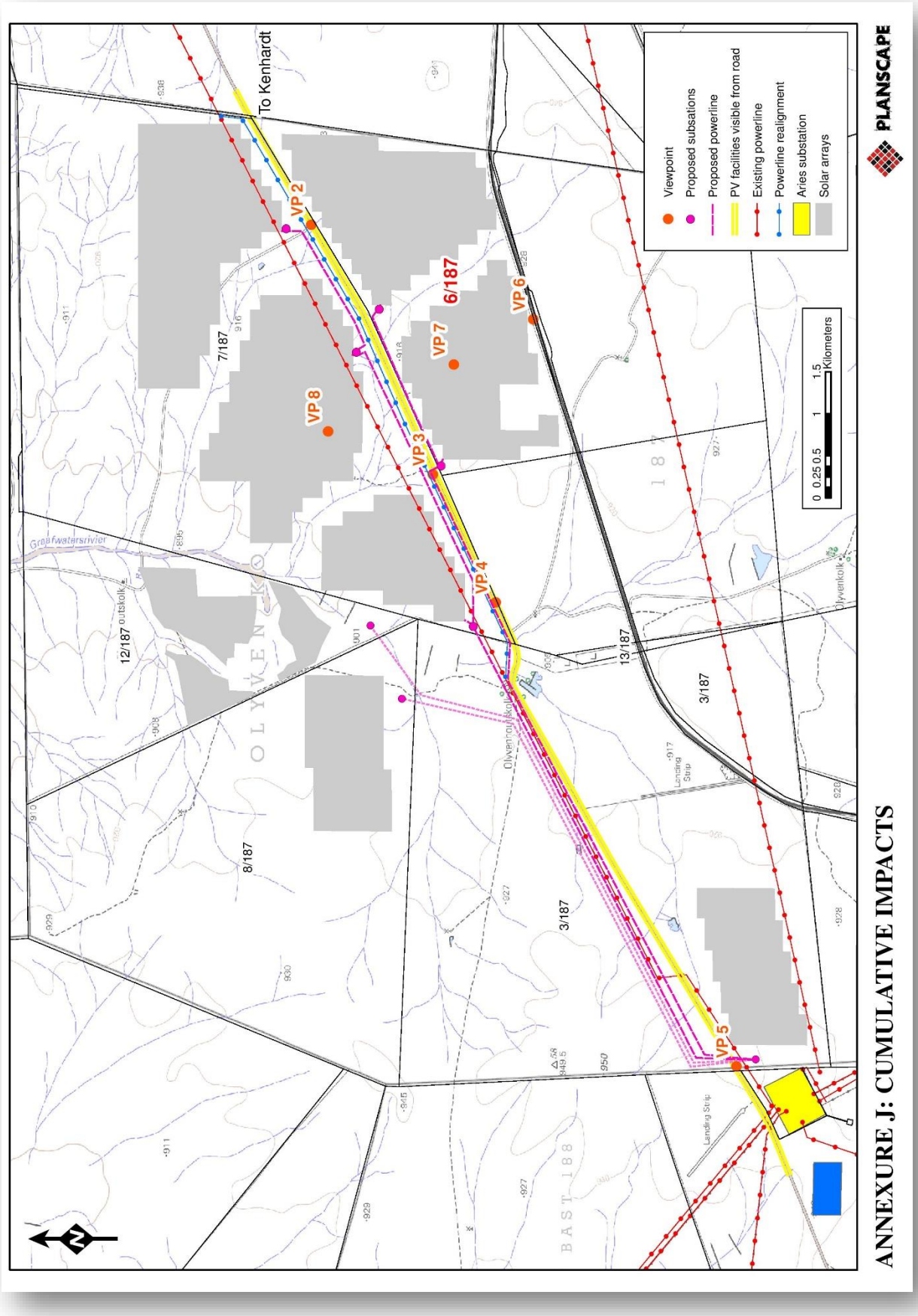
PHOTOGRAPHS FROM VIEVPOINTS


Approximate position of PV array behind the horizon
VIEWPOINT 1: View in western direction from railway bridge. Distance to site is ±6.5 km
Approximate extent of PV array alongside the road
VIEWPOINT 2: View in south western direction from roadside.
ANNEXURE I: PHOTOGRAPHS OF VIEWPOINTS 1 AND 2
PLANSCAPE


Approximate extent of PV array
Property boundary
VIEWPOINT 3: View in south eastern direction from north west corner of application site. The proposed substation will be in the foreground
Approximate position of PV array
VIEWPOINT 5: View in eastern direction towards the site. Distance to site ±7.4 km.
ANNEXURE I: PHOTOGRAPHS OF VIEWPOINTS 3 AND 5
PLANSCAPE

ANNEXURE J

CUMULATIVE IMPACT


ANNEXURE J: CUMULATIVE IMPACTS
PLANSCAPE
To Kenhardt
VP 2
VP 3
VP 4
VP 5
VP 6
VP 7
VP 8
6/187
7/187
8/187
12/187
13/187
3/187
Viewpoint
Proposed subsations
Proposed powerline
PV facilities visible from road
Existing powerline
Powerline realignment
Aries substation
Solar arrays
0 0.25 0.5 1 1.5 Kilometers
Graafwatersrivier
OLYVENKOLK
BAST 188
Landing Strip
N