PROPOSED LIMESTONE PHOTOVOLTIC 1 SOLAR ENERGY FACILITY, NORTHERN CAPE PROVINCE

VISUAL IMPACT ASSESSMENT

Produced for:

AGV Projects (Pty) Ltd

On behalf of:

Savannah Environmental (Pty) Ltd
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- APRIL 2023 -

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DECLARATION

I, **Lourens du Plessis**, as an independent consultant who compiled this Visual Impact Assessment, declare that it correctly reflects the findings made at the time of the report's compilation. I further declare that I, act as an independent consultant in terms of the following:

- Do not have any financial interest in the undertaking of the activity, other than remuneration for the work performed in terms of the National Environmental Management Act, 1998 (Act107 of 1998);
- Undertake to disclose, to the competent authority, any material information that has or may have the potential to influence the decision of the competent authority or the objectivity of any report, plan or document required in terms of the National Environmental Management Act,1998 (Act 107 of 1998);
- Based on information provided to me by the project proponent, and in addition to information obtained during the course of this study, will present the results and conclusion within the associated document to the best of my professional judgement.

____

Lourens du Plessis
Professional GISc Practitioner

1. STUDY APPROACH

1.1. Qualification and experience of the practitioner

Lourens du Plessis (t/a LOGIS) is a Professional Geographical Information Sciences (GISc) Practitioner registered with The South African Geomatics Council (SAGC), and specialises in Environmental GIS and Visual Impact Assessments (VIA).

Lourens has been involved in the application of Geographical Information Systems (GIS) in Environmental Planning and Management since 1990. He has extensive practical knowledge in spatial analysis, environmental modelling, and digital mapping, and applies this knowledge in various scientific fields and disciplines. His GIS expertise are often utilised in Environmental Impact Assessments, Environmental Management Frameworks, State of the Environment Reports, Environmental Management Plans, tourism development and environmental awareness projects.

He holds a BA degree in Geography and Anthropology from the University of Pretoria and worked at the GisLAB (Department of Landscape Architecture) from 1990 to 1997. He later became a member of the GisLAB and in 1997, when Q-Data Consulting acquired the GisLAB, worked for GIS Business Solutions for two years as project manager and senior consultant. In 1999 he joined MetroGIS (Pty) Ltd as director and equal partner until December 2015. From January 2016 he worked for SMEC South Africa (Pty) Ltd as a technical specialist until he went independent and began trading as LOGIS in April 2017.

Lourens has received various awards for his work over the past two decades, including EPPIC Awards for ENPAT, a Q-Data Consulting Performance Award and two ESRI (Environmental Systems Research Institute) awards for Most Analytical and Best Cartographic Maps, at Annual International ESRI User Conferences. He is a co-author of the ENPAT atlas and has had several of his maps published in various tourism, educational and environmental publications.

He is familiar with the "Guidelines for Involving Visual and Aesthetic Specialists in EIA Processes" (Provincial Government of the Western Cape: Department of Environmental Affairs and Development Planning) and utilises the principles and recommendations stated therein to successfully undertake visual impact assessments.

1.2. Information Base

This assessment was based on information from the following sources:

- Topographical maps and GIS generated data were sourced from the Surveyor General, Surveys and Mapping in Mowbray, Cape Town;
- Chief Directorate National (CDN) Geo-Spatial Information, varying dates. *1:50 000 Topographical Maps and Data.*
- DFFE, 2018/2020. *National Land-cover Database 2018/2020 (NLC2018/2020).*
- DFFE, 2022. *South African Protected Areas Database (SAPAD_OR_2022_Q2).*
- JAXA, 2021. Earth Observation Research Centre. *ALOS Global Digital Surface Model (AW3D30).*
- Google Earth Pro. *Up to date and recent satellite images.*
- Professional judgement based on experience gained from similar projects;
- Literature research on similar projects;
- Procedures for the Assessment and Minimum Criteria for Reporting on identified Environmental Themes in terms of Sections 24(5)(a) and (h) and 44 of NEMA

Quality of the above information bases are rated as Good.

1.3. Assumptions and limitations

To prepare this Report, LoGis utilised only the documents and information provided by Savannah or any third parties directed to provide information and documents by Savannah. LoGis has not consulted any other documents or information in relation to this Report, except where otherwise indicated. The findings, recommendations and conclusions given in this report are based on the author's best scientific and professional knowledge, as well as, the available information.

This report is based on survey and assessment techniques which are limited by time and budgetary constraints relevant to the type and level of investigation undertaken. LoGis and its staff reserve the right to modify aspects of the report including the recommendations if and when new information may become available from on-going research or further work in this field, or pertaining to this investigation.

This assessment was undertaken during the planning stage of the project and is based on information available at that time. It is assumed that all information regarding the project details provided by Savannah and the Applicant is correct and relevant to the proposed project. This Visual Impact Assessment and all associated mapping has been undertaken according to the worst-case scenario with the layout provided.

1.4. Legal framework

The following legislation and guidelines have been considered in the preparation of this report:

- **The National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA):** This report is in line with Appendix 6 of NEMA: Environmental Impact Assessment (EIA) Regulations (2014, as amended) which details the minimum requirements a specialist report must contain for an Environmental Impact Assessment.
- **Guideline for Involving Visual and Aesthetic Specialists in EIA Processes (DEADP, Provincial Government of the Western Cape, 2005):** This guideline was developed for use in the Western Cape, however in the absence of the development of any other guideline, this provides input for the preparation of visual specialist input into EIA processes. The guideline documents the requirements for visual impact assessment, typical issues that trigger the need for specialist visual input, the scope and extent of a visual assessment, information required, as well as the assessment ad reporting of visual impacts and management actions.
- **Screening Tool as per Regulation 16 (1)(v) of the Environmental Impact Assessment Regulations, 2014 as amended:** a Screening report was generated for this proposed project, whereby a visual impact assessment was identified as one of the specialist studies that would be required.

1.5. Level of confidence

Level of confidence[1] 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 project 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 the visual impact assessor is moderately experienced in this type of project and level of assessment.

[1] Adapted from Oberholzer (2005).

- 1: Limited information and knowledge is available of the project and the visual impact assessor has a low experience level in this type of project and level of assessment.

These values are applied as follows:

Table 1: Level of confidence

	Information on the project & experience of the practitioner			
Information on the study area		**3**	**2**	**1**
	3	9	6	3
	2	6	4	2
	1	3	2	1

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 Moderate to High:

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

1.6. Methodology

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 facility. 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.

Visual Impact Assessment (VIA)

The VIA will be 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 facility layout/position.

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

The VIA will consider potential cumulative visual impacts, or alternatively the potential to concentrate visual exposure/impact within the region (if applicable).

The following VIA-specific tasks have been undertaken:

- **Determine potential visual exposure**

The visibility or visual exposure of any structure or activity is the point of departure for the visual impact assessment. It stands to reason that if (or where) the proposed facility and associated infrastructure were not visible, no impact would occur.

The viewshed analyses of the proposed facility and the related infrastructure are based on a 30m SRTM digital terrain model of the study area.

The first step in determining the visual impact of the proposed facility is to identify the areas from which the structures would be visible. The type of structures, the dimensions, the extent of operations and their support infrastructure are taken into account.

- **Determine visual distance/observer proximity to the facility**

In order to refine the visual exposure of the facility on surrounding areas/receptors, the principle of reduced impact over distance is applied in order to determine the core area of visual influence for this type of structure.

Proximity radii for the proposed infrastructure are created in order to indicate the scale and viewing distance of the facility and to determine the prominence of the structures in relation to their environment.

The visual distance theory and the observer's proximity to the facility are closely related, and especially relevant, when considered from areas with a high viewer incidence and a predominantly negative visual perception of the proposed facility.

- **Determine viewer incidence/viewer perception (sensitive visual receptors)**

The next layer of information is the identification of areas of high viewer incidence (i.e. main roads, residential areas, settlements, etc.) that would be exposed to the project infrastructure.

This is done in order to focus the attention on areas where the perceived visual impact of the facility will be the highest and where the perception of affected observers will be negative.

Related to this dataset, is a land use character map, that further aids in identifying sensitive areas and possible critical features (i.e. tourist facilities, national parks, etc. – if applicable), that should be addressed.

- **Determine the visual absorption capacity (VAC) of the landscape**

This is the capacity of the receiving environment to absorb the potential visual impact of the proposed facility. The VAC is primarily a function of the vegetation, and will be high if the vegetation is tall, dense and continuous. Conversely, low growing sparse and patchy vegetation will have a low VAC.

The VAC would also be high where the environment can readily absorb the structure in terms of texture, colour, form and light / shade characteristics of the structure. On the other hand, the VAC for a structure contrasting markedly with one or more of the characteristics of the environment would be low.

The VAC also generally increases with distance, where discernible detail in visual characteristics of both environment and structure decreases.

- **Calculate the visual impact index**

The results of the above analyses are merged in order to determine the areas of likely visual impact and where the viewer perception would be negative. An area with short distance visual exposure to the proposed infrastructure, a high viewer incidence and a predominantly negative perception would therefore have a higher value (greater impact) on the index. This focusses the attention to the critical areas of potential impact and determines the potential **magnitude** of the visual impact.

Geographical Information Systems (GIS) software will be used to perform all the analyses and to overlay relevant geographical data sets in order to generate a visual impact index.

- **Determine impact significance**

The potential visual impacts are quantified in their respective geographical locations in order to determine the significance of the anticipated impact on identified receptors. Significance is determined as a function of extent, duration, magnitude (derived from the visual impact index) and probability. Potential cumulative and residual visual impacts are also addressed. The results of this section is displayed in impact tables and summarised in an impact statement.

- **Propose mitigation measures**

The preferred alternative (or a possible permutation of the alternatives) will be based on its potential to reduce the visual impact. Additional general mitigation measures will be proposed in terms of the planning, construction, operation and decommissioning phases of the project.

- **Reporting and map display**

All the data categories, used to calculate the visual impact index, and the results of the analyses will be displayed as maps in the accompanying report. The methodology of the analyses, the results of the visual impact assessment and the conclusion of the assessment will be addressed in this VIA report.

2. PROJECT DESCRIPTION

AGV Projects (Pty) Ltd proposes developing a commercial Photovoltaic (PV) Facility and associated infrastructure on a site located ~16km southeast of the town of Danielskuil and in the Northern Cape Province. The site is located within the Kgatelopele Local Municipality and the ZF Mgcawu District Municipality. The project site comprises the following farm portion:

- Portion 4 of the Farm Engeland 300

The Limestone PV1 facility will have a contracted capacity of up to 150MW maximum export capacity. A project site of 1842 ha and a preferred development area with an extent of ~250ha have been identified by AGV Projects (Pty) Ltd as technically suitable for the development of the Limestone PV1 facility. Environmental Site Establishment processes, including specialist field verification, were undertaken before the initiation of the EIA. The aim of the Environmental Site Establishment processes was to determine the suitability from an environmental and social perspective and identify areas that should be avoided in development planning. The pre-environmental screening was conducted by Savannah Environmental in the selection of a suitable site. The project is planned as part of a larger cluster of renewable energy projects, which includes another up to 150MW maximum export capacity PV Solar Energy Facility (Limestone PV2) located on the same property as Limestone PV1 and 360MW maximum export capacity Wind Energy Facility (Oryx WEF) also located near Danielskuil. The Limestone PV1 project site is proposed to accommodate the following infrastructure:

- PV modules mounted on either a single axis tracking & fixed structure, dependent on optimisation, technology available and cost.
- Inverters and transformers.
- Low voltage cabling between the PV modules to the inverters.
- Fence around the project development area with security and access control.
- Camera surveillance.
- Internet connection.
- 33kV cabling between the project components and the facility substation.
- 33/132kV onsite facility substation.
- Battery Energy Storage System (BESS) with a footprint of up to 6ha.
- Site offices and maintenance buildings, including workshop areas for maintenance and storage as well as parking for staff and visitors.
- Laydown/staging area on-site in front of mounting structures during installation. Temporary store area close to site entrance (Less than 2ha).
- Access roads (up to 6m wide) and internal distribution roads (up to 5m wide).
- Temporary concrete batching facility.
- Stormwater management infrastructure as required.

A summary of the details and dimensions of the planned infrastructure associated with the project is provided in Table 2.

Table 2: Details and dimensions of typical infrastructure required for the Limestone PV 1 solar energy facility

Infrastructure	Footprint and dimensions

Panel Height	+/- 2.2m
Technology	Use of fixed-tilt and single-axis tracking.
Contracted Capacity	Up to 150MW maximum export capacity
Area occupied by the on-site facility substation	up to 0.75ha
Capacity of on-site facility substation	33kV/132kV
Cabling between the PV array and the onsite substation	The cabling will be in underground trenches and operate at a voltage of up to 33kV.
Extent of areas required for laydown of materials, equipment etc.	Less than 2ha
Access and internal roads	Existing roads will be used as far as possible. Existing gravel roads can be utilized for site access (width of up to 6m). Upgrading of existing roads or new roads will be required. New internal access roads required (width of up 5m), same for construction and operation. Internal access roads will be gravel/hard surfaced.
Temporary infrastructure	Temporary store area close to site entrance (Less than 2ha).

The Limestone PV1 facility is proposed in response to the identified objectives of the national and provincial government and local and district municipalities to develop renewable energy facilities for power generation purposes. The developer intends to submit a bid in terms of a regulated power purchase procurement process (e.g., REIPPPP) to evacuate the generated power into the national grid. This will aid in the diversification and stabilisation of the country's electricity supply, in line with the objectives of the Integrated Resource Plan (IRP) with the Limestone PV 1 Facility set to inject up to 150MW maximum export capacity into the national grid.

From a regional perspective, the area within the Northern Cape identified for the project is considered favourable for the development of a commercial PV facility due to the low environmental sensitivity of the identified site, excellent solar resource, and availability of land on which the development can take place. There is also potential for evacuating the power to the national grid via a direct grid connection at the Olien MTS (Main Transmission Substation) which is adjacent to the proposed site.

The proposed properties identified for the PV facility and associated infrastructure are indicated on the maps within this report. Sample images of similar PV technology and Battery Energy Storage System (BESS) facilities are provided below.

Figure 1: Photovoltaic (PV) solar panels. (Photo: SunPower Solar Power Plant- Prieska)

Figure 2: Aerial view of PV arrays. (Photo: Scatec Solar South Africa)

Figure 3: Aerial view of a BESS (Photo: Power Engineering International)

Figure 4: Close up view of a BESS (Photo: Greenbiz.com)

3. SCOPE OF WORK

This report is the Visual Impact Assessment (VIA) of the proposed **Limestone PV 1 Facility** as described above.

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.

The study area for the visual assessment encompasses a geographical area and includes a minimum 6km buffer zone (area of potential visual influence) from the proposed project site.

The study area includes the Olien and Trewill switching stations, numerous high voltage powerlines, sections of the R358 regional road, The Great Pan and a number of farm dwellings or homesteads.

Anticipated issues related to the potential visual impact of the proposed PV Facility include the following:

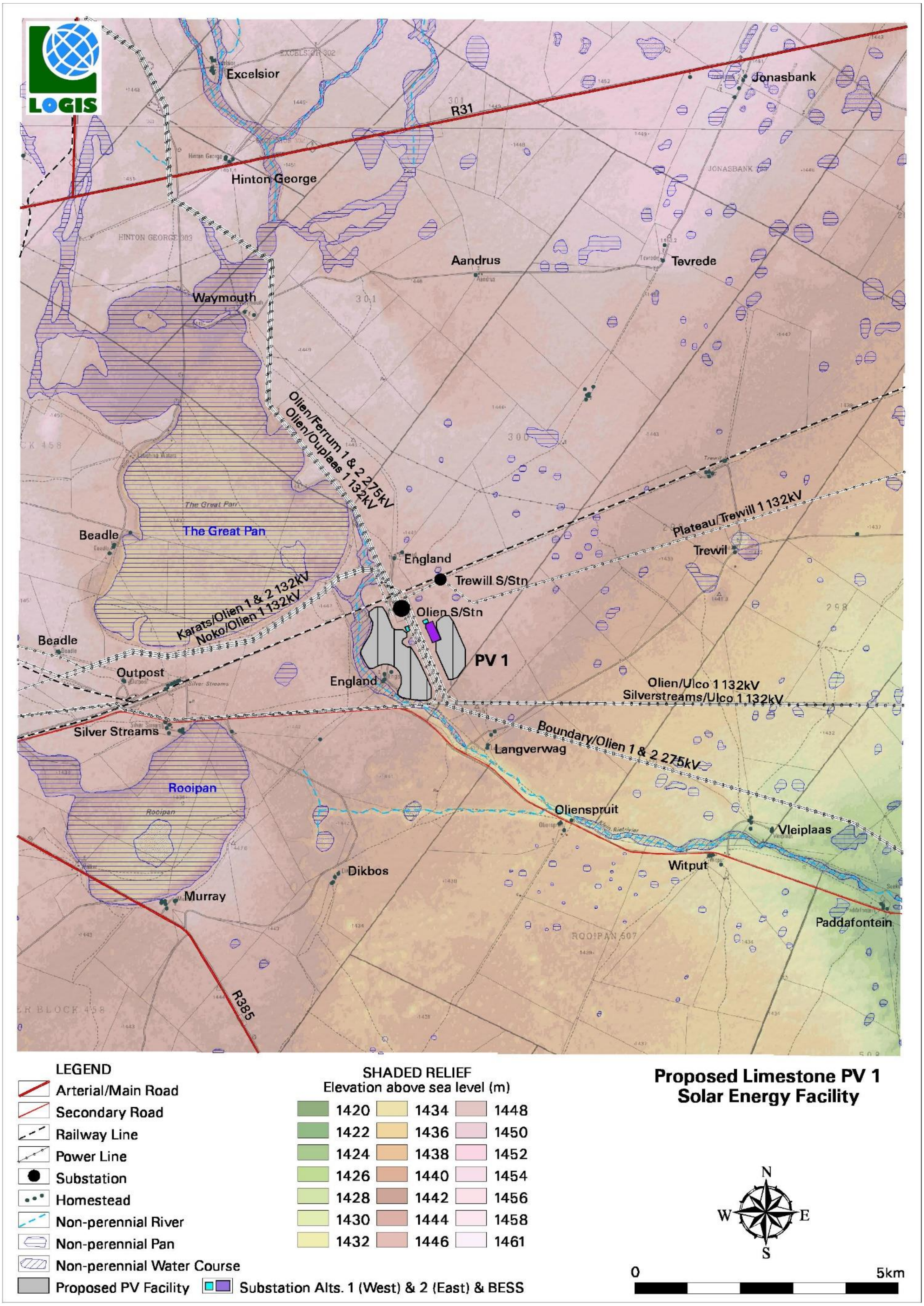
- The visibility of the facility to, and potential visual impact on, observers travelling along the national, arterial or secondary roads within the study area.
- The visibility of the facility to, and visual impact on residents of homesteads within the study area.
- The potential visual impact of the facility on the visual character or sense of place of the region.
- The potential visual impact of the facility on tourist routes or tourist destinations (if present).
- The potential visual impact of the construction of ancillary infrastructure (i.e. substations) on observers in close proximity to the facility.
- The visual absorption capacity of the natural vegetation (if applicable).
- Potential cumulative visual impacts (or consolidation of visual impacts), with specific reference to the placement of the PV facility within an area where various solar energy generation applications have been authorised, or are still being assessed.
- The potential visual impact of operational, safety and security lighting of the facility at night on observers residing in close proximity of the facility.
- Potential visual impact of solar glint and glare as a visual distraction and possible air/road travel hazard.
- Potential visual impact of solar glint and glare on static ground-based receptors (residents of homesteads) in close proximity to the PV facility.
- Potential visual impacts associated with the construction phase.
- The potential to mitigate visual impacts and inform the design process.

It is envisaged that the issues listed above may constitute a visual impact at a local and/or regional scale.

4. THE AFFECTED ENVIRONMENT

The proposed Limestone PV 1 Facility and associated infrastructure is located approximately 16km south-east of the town of Danielskuil and 9 Km east of Lime Acres within the Kgatelopele Local Municipality and the ZF Mgcawu District Municipality. Regionally, the study area is located about 52km south east of Postmasburg, 96 km south of Kuruman and about 65km north west of Delspoorthoop within the Northern Cape Province.

The study area occurs on land that ranges in elevation from approximately 1424m above sea level in the Great Pan and Rooipan in the west to 1454m a.s.l on the site itself and areas to the north and south west. The terrain surrounding the proposed property is generally flat. Two (2) pans, the Great Pan and Rooipan are located to the west of the proposed site, and there are numerous non-perennial pans present in the broader area. See **Map 1** for the shaded relief/topography map of the study area.



Map 1: Shaded relief

The study area is sparsely populated with 7.5 people per km^2 within the local municipality. In addition to Lime Acres, a number of isolated homesteads occur throughout the study area. Some of these include:

- England[2]
- Langverwag
- Oliensspruit
- Dikkbos
- Murray
- Aandrus
- Tevrede

Access to the site is from a secondary road via the R385. Rail infrastructure is prominent in the area, with the Transnet Cape Corridor Freight railway line running from north east to south bisects the proposed site. This railway line is along heavy-haul railway line that connects mines between Warrenton in the North-East to Cape Town in the South. It is used primarily to transport commodities such as iron ore, manganese and lime and does not carry passengers.

Figure 5: Access to the site via the secondary road

[2] The names listed below are of the homestead or farm dwelling as indicated on the SA 1: 50 000 topographical maps and do not refer to the registered farm name.

Other industrial infrastructure within the study area includes numerous existing high voltage lines that traverse the site:

- Olien/Ferrum 1 and 2 275 kV
- Olien/Ouplaas 1 132 kV
- Plateau/Trewill 1 132 kV
- Karats/Olien 1 and 2 132 kV
- Noko/Olien 1 132 kV
- Olien/Ulco 1 132 kV
- Silverstreams/Ulco 1 132 kV
- Boundary/Olien 1 and 2 275 kV

All of these lines above congregate at the Olien substation which is located near the Limestone PV 1 facility. The Trewill substation is located just east of the Olien substation.

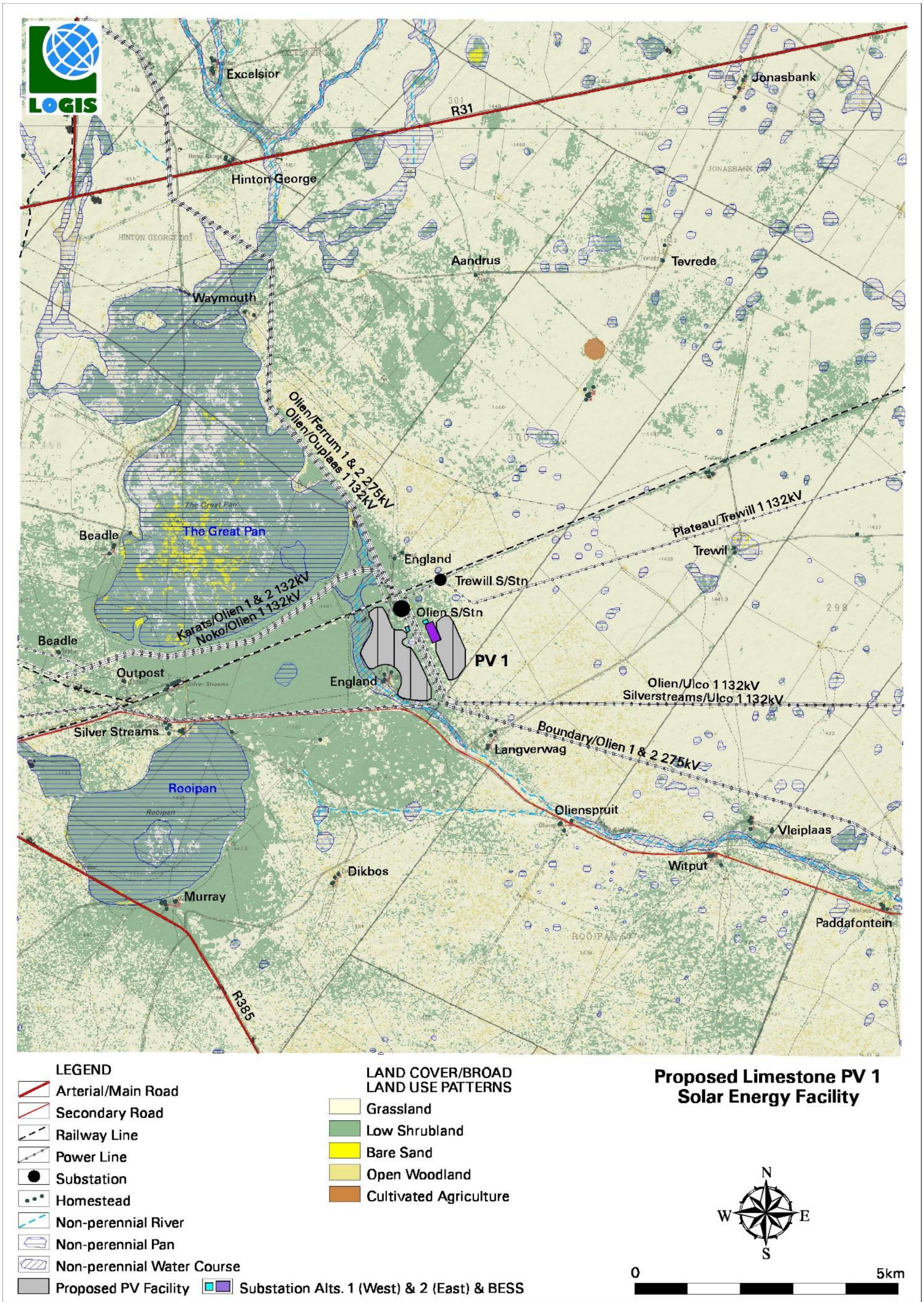
Figure 6: Various powerline infrastructure

The climate within the region is semi-arid, with the study area receiving approximately 200 mm of rainfall per annum. Land cover is primarily low *shrubland* concentrated more to the west and south west, and grassland found to the east with scattered areas of open woodland. Refer to **Map 2.**

The greater landscape of the study area is characterised by wide-open spaces and very limited development. It should however be noted that there are a few of authorised (and current)/ proposed renewable energy applications within the study area and the greater region, that may change the landscape to some degree in the future. There are no formally protected or conservation areas within the study area. [3]

There are no tourist routes or protected areas found within the study area.

[3] Sources: DEAT (ENPAT Northern Cape), NBI (Vegetation Map of South Africa, Lesotho and Swaziland), NLC2018 (ARC/CSIR), REEA_OR_2021_Q1 and SAPAD2021 (DFFE), Wikipedia.



Map 2: Land cover/ broad land use patterns in the study area

5. RESULTS

5.1. Site Sensitivity

The Screening Tool generated from DFFE shows that the site for the proposed Limestone 1 PV facility contains sensitivities ranging from medium to very high owing to the fact that the site is located within 250 m of a river/wetland.

In order to determine the overall visual sensitivity of the proposed sites in the absence of any mitigation, the following matrix was utilized:

Table 3: Matrix to determine overall visual sensitivity for Limestone PV 1 Facility

Sensitive Receptor	Very High Sensitivity (4)	High Sensitivity (3)	Moderate Sensitivity (2)	Low Sensitivity (1)
Topographic features incl mountain ridges	Within 250 m	Within 250-500 m	Within 500m – 1 Km	>1 Km
Steep slopes	Slopes with more than 1:4	Slopes between 1:4 and 1:10	-	-
Major rivers, water bodies, perennial rivers and wetlands with scenic value	Within 250 m	Within 250-500 m	Within 500 m – 1 Km	>1 Km
Coastal zone	Within 1 Km	Within 1-2 Km	Within 2-3 Km	>3 Km
Protected area: National Parks	Within 2 Km	Within 2-4 Km	Within 4-6 Km	>6 Km
Protected areas: Nature Reserves	Within 1 Km	Within 1-2 Km	Within 2-3 Km	>3 Km
Private reserves and game farms	Within 500 m	Within 500m- 1 Km	Within 1-2 Km	>2 Km
Cultural landscape	On the site itself	Within 500 m	Within 500 m – 1 Km	>1 Km
Heritage Sites Grades I, ii and iii	On the site itself	Within 500 m	Within 500 m – 1 Km	>1 Km
Towns and Villages	Within 500 m	Within 500m- 1 Km	Within 1-2 Km	>2 Km
Home/farmsteads	Within 500 m	Within 500m- 1 Km	Within 1-2 Km	>2 Km
National Roads	Within 500 m	Within 500m- 1 Km	Within 1-2 Km	>2 Km
Provincial/arterial roads	Within 1 Km	Within 1-3 Km	Within 3-6 Km	>6 Km
Scenic routes	Within 500 m	Within 500m- 1 Km	Within 1-2 Km	>2 Km
Passenger rail lines	Within 250 m	Within 250 – 500 m	Within 500 m – 1 Km	>1 Km
Located with Renewable energy development zone	No	-	-	Yes
VAC	Low VAC	Moderate VAC	High VAC	Very High VAC
Visual Quality	Natural environment intact with no built infrastructure	Natural environment intact with limited built infrastructure	Natural environment somewhat intact with fair amount of built infrastructure	Built infrastructure is dominant with little to no natural environment remaining

Presence of existing infrastructure	Absent	Very low densities	Present in moderate quantities	High densities
Total	**Moderate (33)**			

Overall visual sensitivity rating:

- Low (0-19)
- Moderate (20-38)
- High (39-57)
- Very High (58-76)

5.2. Potential visual exposure

The result of the viewshed analysis for the proposed Limestone PV 1 Facility is shown on the map below (**Map 3**). The viewshed analysis was undertaken from a representative number of vantage points within the development footprint at an offset of 5m above 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 facility.

Map 3 also indicates proximity radii from the development footprint in order to show the viewing distance (scale of observation) of the facility in relation to its surrounds.

The viewshed analysis includes the effect of vegetation cover and existing structures on the exposure of the proposed infrastructure.

The homesteads and roads expected to be visually influenced are listed below. The identification of these homesteads or farm dwellings are based on their locations as per the SA 1: 50 000 topographical maps[4]. Should a homestead / residence / institution not be listed in terms of the SA 1: 50 000 topographical maps, then it is assumed that the impacts will be similar to the other identified residences within the same proximity radii. It should also be noted that this section of the report focusses only on the potential visual exposure at varying distances and it does not yet refer to visual impact significance or any correlation thereto. The following is evident from the viewshed analyses:

The following is evident from the viewshed analyses:

0 – 1km

The PV facility may be highly visible within a core area of a 1km radius of the proposed development. Small pockets of visually screened areas lie to the south. There are a two residences/farmsteads known as England located within this zone. However, the one England farmstead is located within the proposed development footprint and will be used as a site office for the proposed project.

Additionally, a small section of a secondary road is located within this zone in the south, south west. It is anticipated that the proposed PV facility will be highly visible from this portion of road.

1 – 3km

Visual exposure within this zone, while still highly concentrated, does become fragmented with a large visually screened area to the north west over The Great Pan. Potential sensitive visual receptors include residents of Langverwag and users of the secondary road. Other than these receptors, the rest of the visually exposed areas fall within vacant land and open space.

3 - 6km

[4] The names listed here are of the homestead or farm dwelling as indicated on the SA 1: 50 000 topographical maps and do not refer to the registered farm name.

Within a 3 – 6km radius, the visual exposure is more scattered and interrupted due to the undulating nature of the topography with visually screened areas to the south west over the Rooipan and to the north. Most of this zone falls within vacant open space but the following farm/homesteads may be impacted upon:

- Oliensspruit
- Witput
- Dikbos
- Murray
- Silverstreams
- Outpost
- Beadle
- Unknown residences

A secondary road is also located within this zone, however only small portions may be visually exposed and the intrusion will be fleeting.

> 6km

Beyond the 6 Km radius, the visual exposure is very scattered.

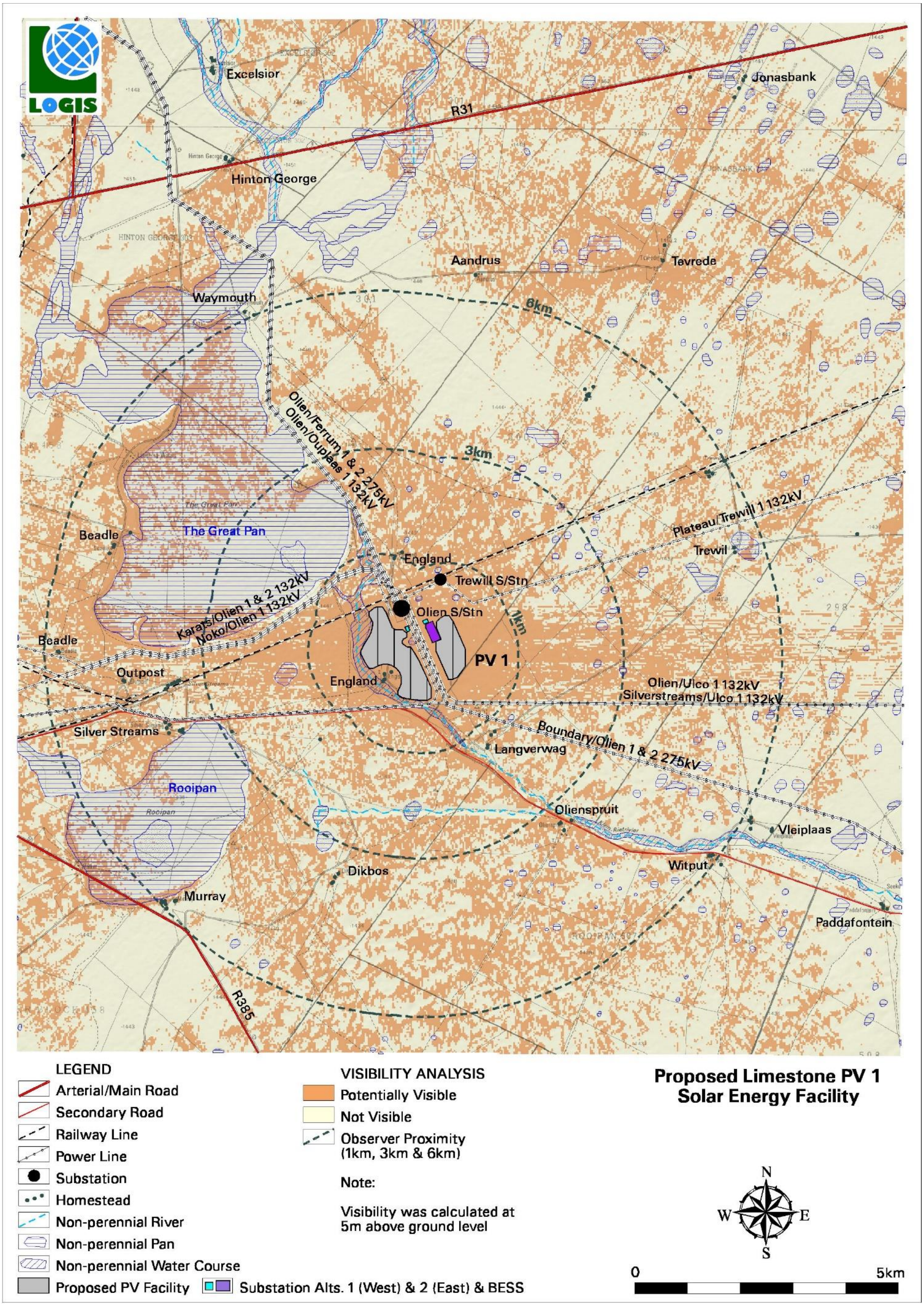
The potential sensitive visual receptors within this zone include residents of the following:

- Vleiplaas
- Paddafontein
- Tevrede
- Jonasbank
- Aandrus (Appears deserted)
- Hinton George (Appears deserted)
- Excelsior (Appears deserted)

It should be noted that 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.

Conclusion

In general terms it is envisaged that the structures, where visible from shorter distances (e.g. less than 1km and potentially up to 3km), and where sensitive visual receptors may find themselves within this zone, may constitute a high visual prominence, potentially resulting in a visual impact. This may include residents of the farm dwellings mentioned above, as well as observers travelling along the roads in closer proximity to the facility. The incidence rate of sensitive visual receptors is however expected to be very low, due to the remote location of the proposed infrastructure and the low number of potential observers.



Map 3: Potential visual exposure (visibility analysis) for Limestone PV 1 Facility

5.3. Cumulative visual assessment

Cumulative visual impacts can be defined as the additional changes caused by a proposed development in conjunction with other similar developments or as the combined effect of a set of developments. In this case the 'development' would the proposed Limestone PV 1 Facility as seen in conjunction with Limestone PV 2 facility.

Cumulative visual impacts may be:

- Combined, where several PV facilities are within the observer's arc of vision at the same time;
- Successive, where the observer has to turn his or her head to see the various PV facilities; and
- Sequential, when the observer has to move to another viewpoint to see different developments, or different views of the same development (such as when travelling along a route).

The visual impact assessor is required (by the competent authority) to identify and quantify the cumulative visual impacts and to propose potential mitigating measures. This is often problematic as most regulatory bodies do not have specific rules, regulations or standards for completing a cumulative visual assessment, nor do they offer meaningful guidance regarding appropriate assessment methods. There are also not any authoritative thresholds or restrictions related to the capacity of certain landscapes to absorb the cumulative visual impacts of PV facilities.

To complicate matters even further, cumulative visual impact is not just the sum of the impacts of two developments. The combined effect of both may be much greater than the sum of the two individual effects, or even less.

The cumulative impact of the proposed solar PV and BESS infrastructure on the landscape and visual amenity is a product of:

- The distance between the PV facilities;
- The distance over which the structures are visible;
- The overall character of the landscape and its sensitivity to the structures;
- The siting and design of the facilities; and
- The way in which the landscape is experienced.

The specialist is required to conclude if the proposed development will result in any unacceptable loss of visual resource considering all the projects existing and proposed in the area.

For the purpose of this study, viewshed analyses were undertaken from both Limestone PV 1 and Limestone PV 2 facilities and specifically the anticipated frequency of visual exposure. Areas shaded orange are likely to be exposed to both of the facilities while areas shaded in yellow are likely to be exposed to 1 of the facilities. Authorised Renewable Energy Facilities (REFs) within a 40km radius of the proposed Limestone PV 1 and Limestone PV 2 facilities, are indicated on Map 5 but not included in the analyses as a result of their layouts not been available. Authorised REFs not included in this analysis but occurring in the study include, but not limited to the following:

- Arriesfontein Solar PV Facility, located approximately 12.5 km to the east
- Manlenox Renerewable Energy Generation, located approximately 12.5 Km to the east
- Danielskuil Solar PV Facility, located approximately 13 km to the north west
- Acwa Power Solar PV Facility, located approximately 25 km west

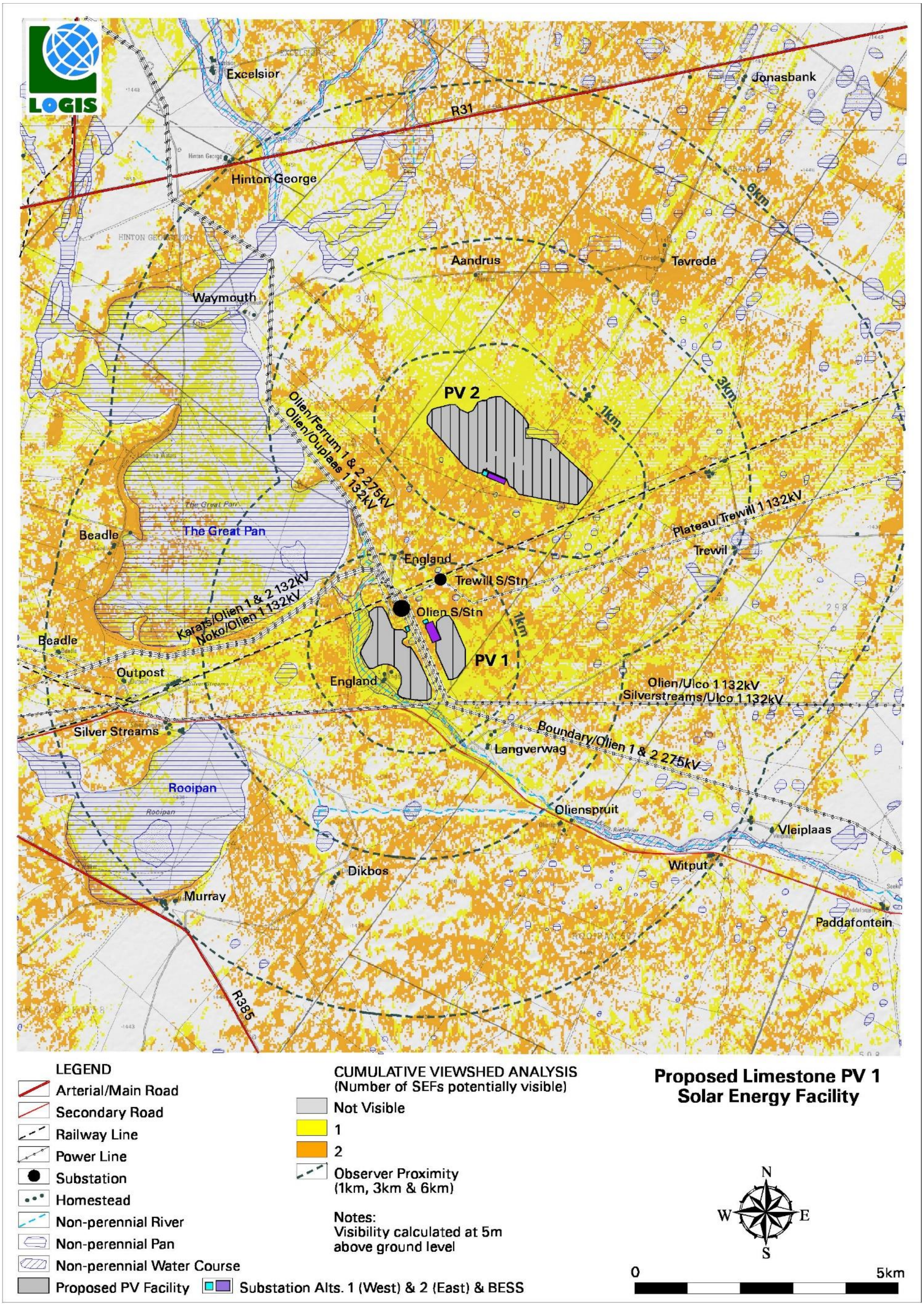
The cumulative viewshed analysis is displayed on Error! Reference source not found..

Conclusion

It is expected that the majority of the visually affected areas, especially between 1 and 6 Km will be exposed to both Limestone PV facilities. Within the site themselves, visual receptors will predominately only be exposed to a single facility.

It should be noted that the proposed Limestone PV facilities are not located within a Renewable Energy Development Zone (REDZ). REDZ concentrate renewable energy facilities within identified zones in an effort to prevent the scattered proliferation of renewable energy generation infrastructure beyond the REDZ and throughout the greater region.

However, there are a number of authorized renewable energy projects (namely concentrated solar power and photovoltaic) to the north west and east of the proposed Limestone PV Facilities. The proposed Limestone PV facilities will therefore certainly contribute to the increased cumulative visual impact of solar energy facilities within the region, outside of the REDZ. The cumulative visual impact of the Limestone PV facilities is ultimately expected to be of moderate to high significance due to their remote location, the location of other already approved REFs and the general low occurrence of potential sensitive visual receptors in the area.



Map 4: Cumulative viewshed analysis for the Limestone PV Facilities (PV 1 and 2)

Map 5: Approved renewable energy projects within 40 km

5.4. Visual distance / observer proximity to the PV facility

The proximity radii are based on the anticipated visual experience of the observer over varying distances. The distances are adjusted upwards for larger energy facilities/technologies (e.g. more extensive infrastructure associated with power plants) and downwards for smaller plants (e.g. smaller infrastructure associated with power plants with less generating capacity). This methodology was developed in the absence of any known and/or accepted standards for South African solar energy facilities.

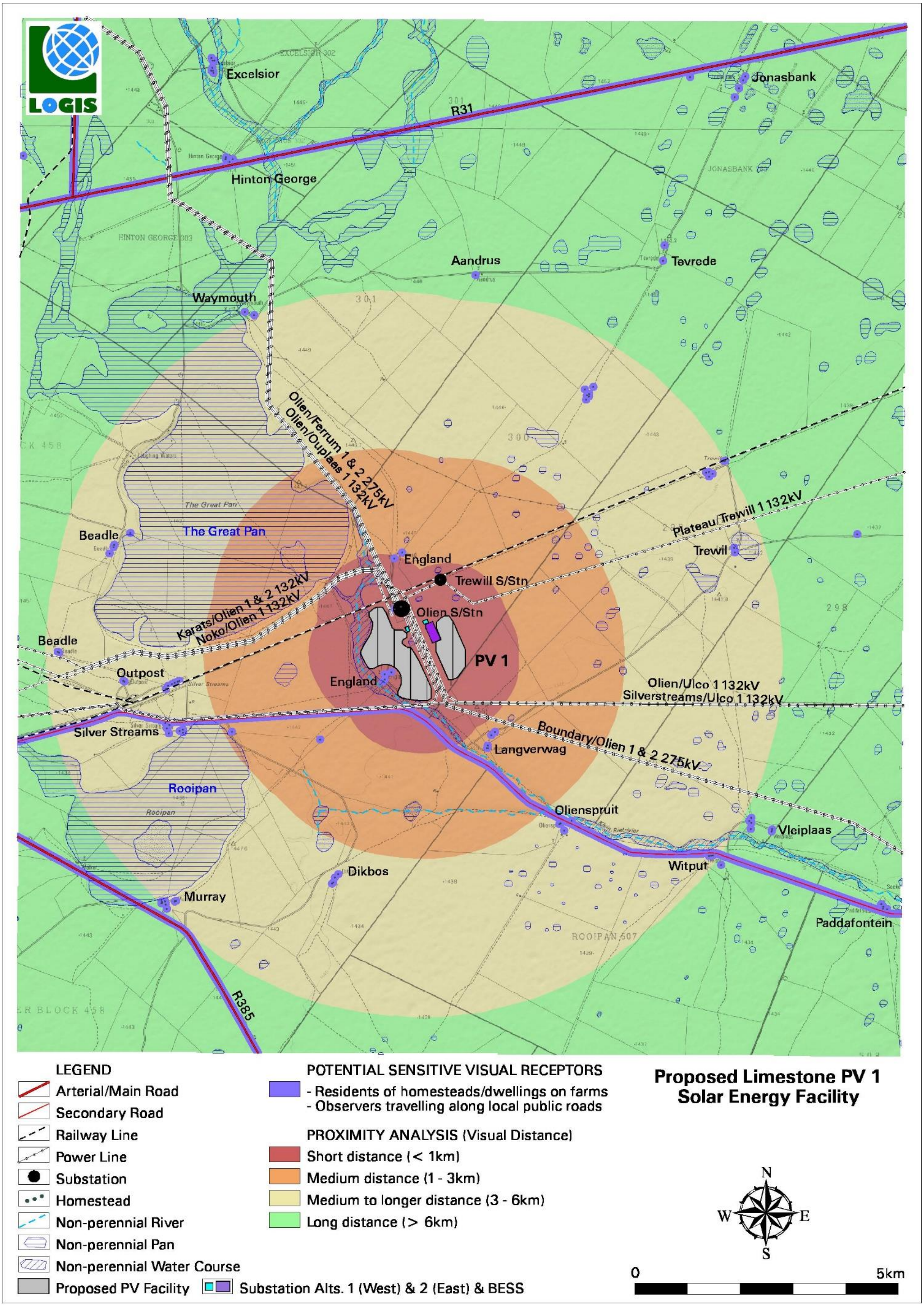
The principle of reduced impact over distance is applied in order to determine the core area of visual influence for these types of structures. It is envisaged that the nature of the structures and the predominantly rural and natural character of the study area would create a significant contrast that would make the facility visible and recognisable from greater distances.

The proximity radii for the proposed PV facility were created in order to indicate the scale and viewing distance of the facility and to determine the prominence of the structures in relation to their environment.

The proximity radii, based on the dimensions of the proposed development footprint are indicated on **Map 6**, and include the following:

- 0 - 1km. Very short distance view where the PV facility would dominate the frame of vision and constitute a very high visual prominence.
- 1 – 3km. Short distance view where the structures would be easily and comfortably visible and constitute a high visual prominence.
- 3 - 6km. Medium to longer distance view where the facility would become part of the visual environment, but would still be visible and recognisable. This zone constitutes a moderate visual prominence.
- > 6km. Long distance view of the facility where the structures are not expected to be immediately visible and not easily recognisable. This zone constitutes a lower visual prominence for the facility.

The visual distance theory and the observer's proximity to the facility are closely related, and especially relevant, when considered from areas with a high viewer incidence and a potentially negative visual perception of the proposed facility.



Map 6: Potential sensitive visual receptors and proximity analysis for Limestone PV 1

5.5. Viewer incidence / viewer perception

The number of observers and their perception of a structure determine the concept of visual impact. If there are no observers or if the visual perception of the structure is favourable to all the observers, there would be no visual impact.

It is necessary to identify areas of high viewer incidence and to classify certain areas according to the observer's visual sensitivity towards the proposed PV Facility. It would be impossible not to generalise the viewer incidence and sensitivity to some degree, as there are many variables when trying to determine the perception of the observer: regularity of sighting, cultural background, state of mind, purpose of sighting, etc. which would create a myriad of options.

Viewer incidence is calculated to be the highest along the public roads within the study area (various secondary roads). Travellers using these roads may be negatively impacted upon by visual exposure to the facility. Additional sensitive visual receptors are located at the farm residences (homesteads) throughout the study area. It is expected that the viewer's perception, unless the observer is associated with (or supportive of) the PV facility, would generally be negative.

Due to the remote location of the proposed Limestone PV 1 Facility and the ill populated nature of the receiving environment, there are only a limited number of potential sensitive visual receptors located within close proximity of the proposed facility. These potentially affected sensitive visual receptors are listed in **Section 5.2**. It is expected that these landowners may experience visual impacts ranging from moderate to high significance, depending on their proximity to the facility. Refer to **Map 6** for the location of the potential sensitive visual receptors discussed above.

The author (at the time of the compilation of this report) is not aware of any objections raised against the proposed Limestone PV 1 Facility.

5.6. Visual absorption capacity

Visual Absorption Capacity (VAC) is the capacity of the receiving environment to absorb the potential visual impact of the proposed development. VAC is primarily a function of the vegetation and will be high if the vegetation is tall, dense and continuous. Conversely, low growing sparse and patchy vegetation will have a low VAC. The VAC also generally increases with distance, where discernible detail in visual characteristics of both environment and development decreases.

The broader study areas land cover is primarily *low shrubland and grassland* which is defined as an area dominated by nearly continuous grasses often devoid of taller plants such as trees. Refer to **Figure 7**.

Figure 7: Grassland vegetation devoid of large trees- low VAC

It is clear that the natural vegetation within the study area has a low visual absorption capacity (VAC). Where planted trees occur, the VAC is higher. This may be a common occurrence at homesteads and settlements, but does not apply as a rule.

Overall, the Visual Absorption Capacity (VAC) of the receiving environment is low. In addition, the scale and form of the proposed PV structures mean that it is likely that the environment could potentially visually absorb them in terms of texture, colour, form and light/shade characteristics to some extent. Therefore, within this area the VAC will be taken into account.

Where homesteads and settlements occur, some more significant vegetation and trees may have been planted, which would contribute to the visual absorption capacity (i.e. shielding the observers from the facility). As this is not a consistent occurrence, however, VAC will not be taken into account for any of the homesteads or settlements, thus assuming a worst-case scenario in the impact assessment.

5.7. Visual impact index

The combined results of the visual exposure, viewer incidence/perception and visual distance of the proposed Limestone PV 1 Facility are displayed on **Map 7.** 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 in order to calculate the visual impact index.

The criteria (previously discussed in this report) which inform the visual impact index are:

- Visibility or visual exposure of the structures
- Observer proximity or visual distance from the structures

- The presence of sensitive visual receptors
- The perceived negative perception or objections to the structures (if applicable)
- The visual absorption capacity of the vegetation cover or built structures (if applicable)

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 focussing 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**[5] within a 1km radius of the proposed 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.

Magnitude of the potential visual impact

The PV facility may have a visual impact of **very high** magnitude on observers (within a 0-1km radius).

Residents of/visitors to:

- England (sites 1 and 3)

Observers travelling along the:

- Secondary road (site 2)

The PV Facility may have a visual impact of **high** magnitude on the following observers (1 – 3km radius):

Residents of/visitors to:

- Langverwag (site 4)

Observers travelling along the:

- Observers travelling along the secondary road

The PV facility may have a visual impact of **moderate** magnitude impact on the following observers located between a 3 – 6km radius of PV Facility:

Residents of/visitors to:

- Olienspruit (site 5)
- Witput (site 6)
- Dikbos (site 7)
- Murray (site 8)
- Silverstreams (site 9 and 10)
- Outpost (site 11)
- Beadle (sites 12 and 13)
- Unknown (sites 14 and 15)

Observers travelling along the:

[5] The names indicated on the map and listed below here are of the homestead or farm dwelling as indicated on the SA 1: 50 000 topographical maps and do not refer to the registered farm name. Should a homestead / residence / institution not be listed in terms of the SA 1: 50 000 topographical maps, then it is assumed that the impacts will be similar to the other identified residences within the same proximity radii.

- Secondary road

The PV facility may have a visual impact of **low** magnitude impact on the following observers located beyond the 6 km radius of the PV Facility:

Residents of/visitors to:

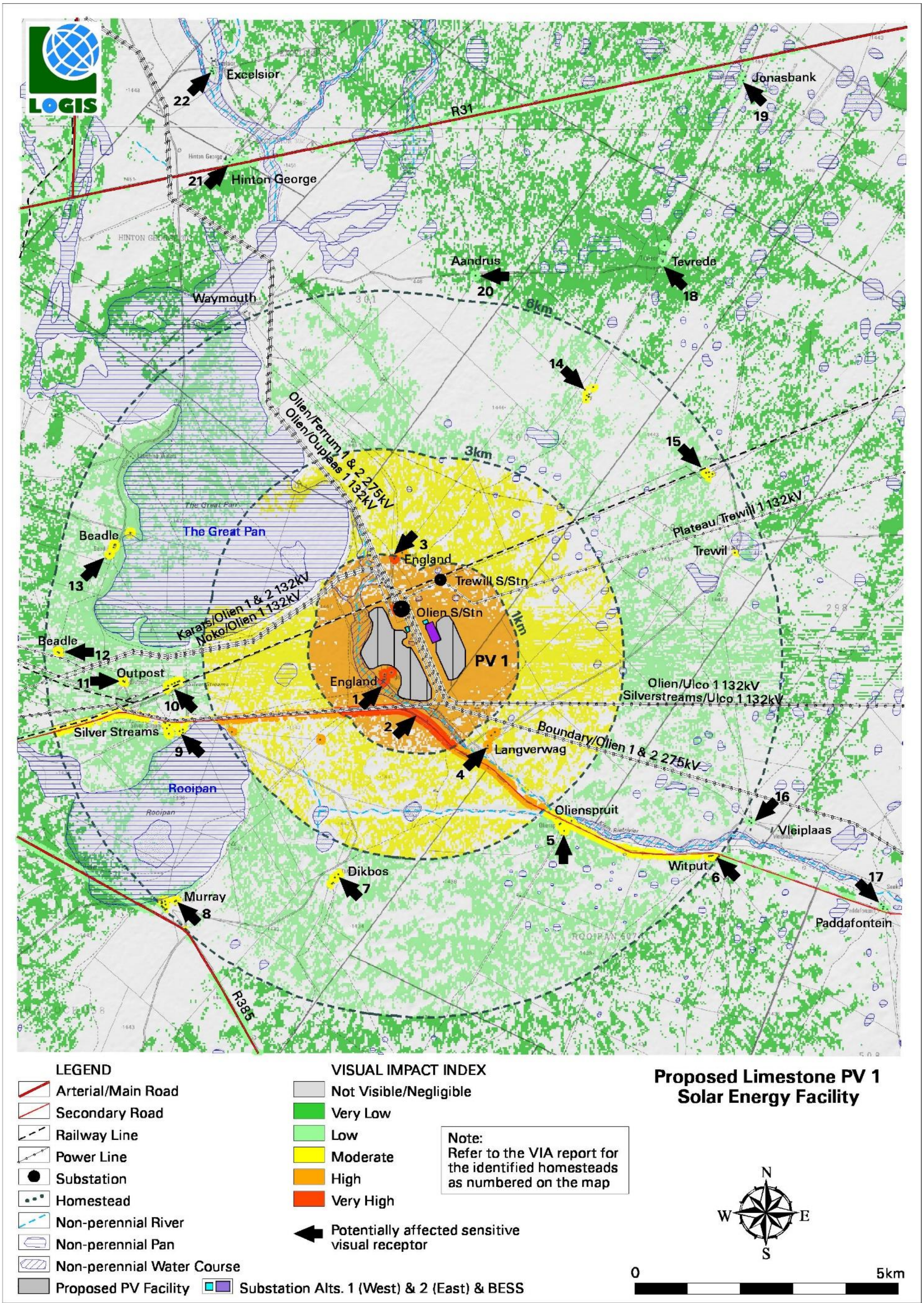
- Vleiplaas (site 16)
- Paddafontein (site 17)
- Tevrede (site 18)
- Jonasbank (site 19)
- Aandrus (site 20)
- Hinton George (site 21)
- Excelsior (site 22)

Observers travelling along the:

- Observers travelling along various secondary roads, the R385 and R31

Note: *Where any of the above-mentioned homesteads are derelict or deserted, the visual impact will be non-existent, until such time as it is inhabited again.*

Additionally, some, not all, of the sensitive visual receptors of farm- and homesteads listed above who could be affected visually by the proposed Limestone PV 1 Facility are in fact located on properties involved in either this project Limestone PV 2.



Map 7: Visual impact index for the proposed Limestone PV 1 Facility

6. VISUAL IMPACT ASSESSMENT

6.1. Impact rating methodology

The previous section of the report identified specific areas where likely visual impacts would occur. This section will attempt to quantify these potential visual impacts in their respective geographical locations and in terms of the identified issues (see **Section 3**) 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 infrastructure) and includes a table quantifying the potential visual impact according to the following criteria:

Extent – The distance the visual impact extends from the proposed development and to what extent it will have the highest impact. In the case of this type of development the extent of the visual impact is most likely to have a higher impact on receptors closer to the development and decrease as the distance increases[6]:

- Long distance (very low = 1)
- Medium to longer distance (low = 2)
- Short distance (medium = 3)
- Very short distance (high = 4)

Duration – The timeframe in both the construction and operational phase over which the effects of the impact will be felt:

- Very short (0-1 yrs. = 1)
- Short (2-5 yrs. = 2)
- Medium (5-15 yrs. = 3)
- Long (>15 yrs. = 4)
- Permanent (= 5)

Magnitude – The severity or size of the impact. This value is read off the Visual Impact Index maps. Where more than one value is applicable, the higher of these will be used as a worst-case scenario[7]:

- None (= 0)
- Minor (= 2)
- Low (= 4)
- Moderate (= 6)
- High (= 8)
- Very high (= 10)

Probability – The likelihood of the impact occurring:

- Very improbable (= 1) Less than 20% sure of the likelihood of an impact occurring
- Improbable (= 2) 20-40% sure of the likelihood of an impact occurring
- Probable (= 3) 40-60% sure of the likelihood of an impact occurring
- Highly probable (= 4) 60-80% sure of the likelihood of that impact occurring
- Definite (= 5) More than 80% sure of the likelihood of that impact occurring

Status - The perception of Interested and Affected Parties towards the proposed development:

- Positive
- Negative
- Neutral

[6] Long distance = > 6km. Medium to longer distance = 3 – 6km. Short distance = 1 – 3km. Very short distance = < 1km (refer to Section 6.3. Visual distance/observer proximity to the facility).

[7] 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.

Reversibility – The possibility of visual recovery of the impact following the decommissioning of the proposed development:

- Reversible (= 1)
- Recoverable (= 3)
- Irreversible (= 5)

Significance - 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.
- 30-60 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.

6.2. Direct Impacts

The direct visual impacts of the proposed Limestone PV 1 Facility are assessed as follows:

6.2.1. Construction Phase Impacts

During the construction period it is expected that any visual impact of concern on sensitive visual receptors within the study area will be temporary and limited to a short-term period (2-5 years). The below direct construction visual impacts of the proposed Limestone PV 1 Facility are assessed as follows:

6.2.1.1. Potential visual impact of construction activities on sensitive visual receptors in close proximity (within 1km) to the proposed PV facility.

During the construction period there will be an increase in heavy vehicles utilising the roads to the construction sites that may cause, at the very least, a visual nuisance to other road users and landowners in the area in close proximity (within 1km). Additionally, dust as a result of the construction activities and construction equipment (i.e. cranes), temporary laydown areas, construction camps, etc. may also be visible at the site, resulting in a visual impact occurring during construction.

Construction activities may potentially result in a **high** (significance rating = 64) temporary visual impact, that may be mitigated to **moderate** (significance rating = 42).

A mitigating factor in this scenario is the low number of receptors within the receiving environment.

Table 4: Visual impact of construction on sensitive visual receptors in close proximity to the proposed PV facility.

Nature of Impact: Visual impact of construction activities on sensitive visual receptors in close proximity to the proposed PV facility.		
	Without mitigation	***With mitigation***
Extent	Very Short distance **(4)**	Very Short distance **(4)**
Duration	Short term **(2)**	Short term **(2)**
Magnitude	Very high **(10)**	High **(8)**
Probability	Highly probable **(4)**	Probable **(3)**
Significance	High **(64)**	Moderate **(42)**

Status (positive or negative)	Negative	Negative
Reversibility	Reversible (1)	Reversible (1)
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation: <u>Planning:</u> ➢ Retain and maintain natural vegetation in all areas outside of the development footprint, but within the project site. <u>Construction:</u> ➢ Ensure that vegetation is not unnecessarily removed during the construction period. ➢ Plan the placement of laydown areas and temporary construction equipment camps in order to minimise vegetation clearing (i.e. in already disturbed areas) where 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 of 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 in order to reduce lighting impacts. ➢ Rehabilitate all disturbed areas immediately after the completion of construction works.		
Residual impacts: None, provided that rehabilitation works are carried out as required.		

6.2.2. Operational Phase Impacts

6.2.2.1. Potential visual impact on sensitive visual receptors located within a 1km radius of the PV Facility

The operation of the proposed PV facility is expected to have a **high** (significance rating = 72) visual impact that may be mitigated to **moderate** (significance rating = 42) on sensitive visual receptors within a 1km radius of the PV facility.

A mitigating factor in this scenario is the low number of receptors within the receiving environment.

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

Table 5: Visual impact on observers (residents and visitors) in close proximity to the proposed PV facility

Nature of Impact: Visual impact on observers (residents at homesteads and visitors/tourists) in close proximity (i.e. within 1km) to the PV facility		
	Without mitigation	***With mitigation***
Extent	Very Short distance **(4)**	Very Short distance **(4)**
Duration	Long term **(4)**	Long term **(4)**
Magnitude	Very high **(10)**	Moderate **(6)**
Probability	Highly probable **(4)**	Probable **(3)**
Significance	High **(72)**	Moderate **(42)**
Status (positive, neutral or negative)	Negative	Negative

Reversibility	Reversible (1)	Reversible (1)
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Generic best practise mitigation/management measures: Planning: ➢ Retain/re-establish and maintain natural vegetation in all areas outside of the development footprint/servitude, but within the project site. ➢ Consult adjacent landowners (if present) in order to inform them of the development and to identify any (valid) visual impact concerns. Operations: ➢ Maintain the general appearance of the facility as a whole. ➢ Retain/re-establish and maintain natural vegetation (if present) immediately adjacent to the development footprint, where possible. ➢ Investigate the potential to screen affected receptor sites (if applicable and located within 1km of the facility) with planted vegetation cover.		
Residual impacts: The visual impact will be removed after decommissioning, provided the facility infrastructure is removed and the area rehabilitated. Failing this, the visual impact will remain.		

6.2.2.2. Potential visual impact on sensitive visual receptors within the 1 – 3km radius

The operational facility could have a **moderate** visual impact (significance rating = 45) which may be mitigated to **low** (significance rating = 26) on residents/visitors to the homestead of Langverwag as well as observers travelling along the secondary road within 1 – 3km radius of the facility.

A mitigating factor in this scenario is the low occurrence of receptors within the receiving environment and that observers traveling along this road will only be exposed to the visual intrusion for a short period of time. This reduces the probability of this impact occurring.

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

Table 6: Visual impact of the proposed PV facility within 1 – 3km radius

Nature of Impact: Visual impact on observers travelling along the road and residents at the Langverwag homestead within a 1 – 3km radius of the facility		
	Without mitigation	***With mitigation***
Extent	Short distance **(3)**	Short distance **(3)**
Duration	Long term **(4)**	Long term **(4)**
Magnitude	High **(8)**	Moderate **(6)**
Probability	Probable **(3)**	Improbable **(2)**
Significance	Moderate **(45)**	Low **(26)**
Status (positive, neutral or negative)	Negative	Negative
Reversibility	Reversible (1)	Reversible (1)
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	

Generic best practise mitigation/management measures: <u>Planning:</u> ➢ Retain/re-establish and maintain natural vegetation in all areas outside of the development footprint/servitude, but within the project site. <u>Operations:</u> ➢ Maintain the general appearance of the facility as a whole. ➢ Retain/re-establish and maintain natural vegetation (if present) immediately adjacent to the development footprint, where possible. ➢ Investigate the potential to screen affected receptor sites (if applicable and located within 1-3km of the facility) with planted vegetation cover.
Residual impacts: The visual impact will be removed after decommissioning, provided the facility infrastructure is removed and the area rehabilitated. Failing this, the visual impact will remain.

6.2.2.3. Potential visual impact on sensitive visual receptors within the 3 – 6km radius

The operational facility could have a **moderate** visual impact (significance rating = 36) which may be mitigated to **low** (significance rating = 24) on residents/visitors to the various homesteads as well as observers travelling along the secondary road within 3 – 6km radius of the facility.

A mitigating factor in this scenario is the low occurrence of receptors within the receiving environment and that observers traveling along these roads will only be exposed to the visual intrusion for a short period of time. This reduces the probability of this impact occurring.

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

Table 7: Visual impact of the proposed PV facility within the 3 – 6 Km radius

Nature of Impact: Visual impact on observers travelling along the roads and residents at homesteads within a 3 – 6km radius of the facility		
	Without mitigation	***With mitigation***
Extent	Medium distance **(2)**	Medium distance **(2)**
Duration	Long term **(4)**	Long term **(4)**
Magnitude	Moderate **(6)**	Low **(4)**
Probability	Probable **(3)**	Improbable **(2)**
Significance	Moderate **(36)**	Low **(24)**
Status (positive, neutral or negative)	Negative	Negative
Reversibility	Reversible (1)	Reversible (1)
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Generic best practise mitigation/management measures: <u>Planning:</u> ➢ Retain/re-establish and maintain natural vegetation in all areas outside of the development footprint/servitude, but within the project site. <u>Operations:</u> ➢ Maintain the general appearance of the facility as a whole. ➢ Retain/re-establish and maintain natural vegetation (if present) immediately adjacent to the development footprint, where possible. ➢ Investigate the potential to screen affected receptor sites (if applicable and located within 1km of the facility) with planted vegetation cover.		

Residual impacts: The visual impact will be removed after decommissioning, provided the facility infrastructure is removed and the area rehabilitated. Failing this, the visual impact will remain.

6.2.2.4. Potential visual impact on sensitive visual receptors within the greater area (beyond 6km radius)

The operational facility could have a **low** visual impact (significance rating = 18) which may be mitigated to **low** (significance rating = 9) on residents/visitors to various homesteads as well as observers travelling along the various secondary roads, the R385 and R31 beyond the 6km radius of the facility.

A mitigating factor in this scenario is the low occurrence of receptors within the receiving environment and that observers traveling along these roads will only be exposed to the visual intrusion for a short period of time. This reduces the probability of this impact occurring.

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

Table 8: Visual impact of the proposed PV Facility within the greater area (beyond the 6 Km radius)

Nature of Impact: Visual impact on observers travelling along the roads, residents at homesteads and protected areas beyond the 6km radius of the facility		
	Without mitigation	***With mitigation***
Extent	Long distance **(1)**	Long distance **(1)**
Duration	Long term **(4)**	Long term **(4)**
Magnitude	Low **(4)**	Low **(4)**
Probability	Improbable **(2)**	Very improbable **(1)**
Significance	Low **(18)**	Low **(9)**
Status (positive, neutral or negative)	Negative	Negative
Reversibility	Reversible (1)	Reversible (1)
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Generic best practise mitigation/management measures: Planning: ➢ Retain/re-establish and maintain natural vegetation in all areas outside of the development footprint/servitude, but within the project site. Operations: ➢ Maintain the general appearance of the facility as a whole. ➢ Retain/re-establish and maintain natural vegetation (if present) immediately adjacent to the development footprint, where possible. ➢ Investigate the potential to screen affected receptor sites (if applicable and located within 1km of the facility) with planted vegetation cover.		
Residual impacts: The visual impact will be removed after decommissioning, provided the facility infrastructure is removed and the area rehabilitated. Failing this, the visual impact will remain.		

6.2.2.5. Potential visual impact of operational, safety and security lighting of the facility at night

The area immediately surrounding the proposed facility has a relatively low incidence of receptors and light sources, so light trespass and glare from the security and after-hours operational lighting for the facility will have some significance for visual receptors in the study area

Lighting impacts relate to the effects of glare and sky glow. The source of glare light is unshielded luminaries which emit light in all directions and which are visible over long distances.

Sky glow is the condition where the night sky is illuminated when light reflects off particles in the atmosphere such as moisture, dust or smog. The sky glow intensifies with the increase in the number of light sources. Each new light source, especially upwardly directed lighting, contribute to the increase in sky glow. It is possible that the PV facility may contribute to the effect of sky glow within the environment which is currently undeveloped.

Mitigation of direct lighting impacts and sky glow entails the pro-active design, planning and specification of lighting for the facility. The correct specification and placement of lighting and light fixtures for the facility and the ancillary infrastructure (e.g. workshop and storage facilities) will go far to contain rather than spread the light.

This anticipated lighting impact is likely to be of **Moderate** significance (rating = 60), and may be mitigated to **moderate** (rating = 39) especially within 0-3 km radius of the PV facility.

Table 9: Impact table summarising the significance of visual impact of lighting at night on visual receptors in close to proximity to the proposed PV facility

<table>
<tr><td colspan="3">Nature of Impact:
Visual impact of lighting at night on sensitive visual receptors.</td></tr>
<tr><td></td><td>No mitigation</td><td>Mitigation considered</td></tr>
<tr><td>Extent</td><td>Short/Medium (3)</td><td>Short/Medium (3)</td></tr>
<tr><td>Duration</td><td>Long term (4)</td><td>Long term (4)</td></tr>
<tr><td>Magnitude</td><td>High (8)</td><td>Moderate (6)</td></tr>
<tr><td>Probability</td><td>Highly probable (4)</td><td>Probable (3)</td></tr>
<tr><td>Significance</td><td>Moderate (60)</td><td>Moderate (39)</td></tr>
<tr><td>Status (positive or negative)</td><td>Negative</td><td>Negative</td></tr>
<tr><td>Reversibility</td><td>Reversible (1)</td><td>Reversible (1)</td></tr>
<tr><td>Irreplaceable loss of resources?</td><td>No</td><td>No</td></tr>
<tr><td>Can impacts be mitigated?</td><td colspan="2">Yes</td></tr>
<tr><td colspan="3">Mitigation:
<u>Planning & operation</u>:
➢ Shield the sources of light by physical barriers (walls, vegetation, or the structure itself).
➢ Limit mounting heights of lighting fixtures, or alternatively use foot-lights or bollard level lights.
➢ Make use of minimum lumen or wattage in fixtures.
➢ Make use of down-lighters, or shielded fixtures.
➢ Make use of Low Pressure Sodium lighting or other types of low impact lighting.
➢ Make 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.</td></tr>
<tr><td colspan="3">Cumulative impacts:
The light generated at night locally is very limited. The impact of the proposed Limestone PV facilities certainly will contribute to a local and regional increase in lighting impact.</td></tr>
<tr><td colspan="3">Residual impacts:
The visual impact will be removed after decommissioning, provided the facility and ancillary infrastructure is removed and the area rehabilitated. Failing this, the visual impact will remain.</td></tr>
</table>

6.2.2.6. Solar glint and glare

6.2.2.6.1. Potential visual impact of solar glint and glare as a visual distraction and possible rail/road travel hazard

Glint and glare occurs when the sun reflects off surfaces with specular (mirror-like) properties. Examples of these include glass windows, water bodies and potentially some solar energy generation technologies (e.g. parabolic troughs and CSP heliostats). Glint is generally of shorter duration and is described as "a momentary flash of bright light", whilst glare is the reflection of bright light for a longer duration.

The visual impact of glint and glare relates to the potential it has to negatively affect sensitive visual receptors in relative close proximity to the source (e.g. users of the secondary road), or aviation safety risk for pilots (especially where the source interferes with the approach angle to the runway). The Federal Aviation Administration (FAA) of the United States of America have researched glare as a hazard for aviation pilots on final approach and may prescribe specific glint and glare studies for solar energy facilities in close proximity to aerodromes (airports, airfields, military airbases, etc.). It is generally possible to mitigate the potential glint and glare impacts through the design and careful placement of the infrastructure.

PV panels are designed to generate electricity by absorbing the rays of the sun and are therefore constructed of dark-coloured materials, and are covered by anti-reflective coatings. Indications are that as little as 2% of the incoming sunlight is reflected from the surface of modern PV panels especially where the incidence angle (angle of incoming light) is smaller i.e. the panel is facing the sun directly. This is particularly true for tracker arrays that are designed to track the sun and keep the incidence angle as low as possible.[8]

There are no major, arterial or secondary roads within a 1km radius of the proposed PV facility, however a railway line is located within 50 m of the proposed site. 1 Km is the approximate distance is recommended as a threshold within which the visual impact of glint and glare (if there is visual line of sight from the road) may influence road users and 100 m for railway.[9] The potential visual impact related to solar glint and glare as a rail travel hazard is therefore expected to be of **moderate** significance

Table 10: Impact table summarizing the significance of the visual impact of solar glint and glare as a visual distraction to users of the railway

Nature of Impact: The visual impact of solar glint and glare as a visual distraction and possible rail travel hazard		
	Without mitigation	***With mitigation***
Extent	Very short distance **(4)**	Very short distance **(4)**
Duration	Long term **(4)**	Long term **(4)**
Magnitude	Moderate **(6)**	Moderate **(6)**
Probability	Probable **(3)**	Probable **(3)**
Significance	Moderate **(42)**	Moderate **(42)**
Status (positive or negative)	Negative	Negative
Reversibility	Reversible **(1)**	Reversible **(1)**
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	N.A.	
Best Practice Mitigation: • Investigate the potential to screen affected receptor sites (if applicable and located within 1km of the facility) with planted vegetation cover. • Use an anti-reflective coating on the panels		

8 Sources: Blue Oak Energy, FAA and Meister Consultants Group.

9 December 2020, Solar Photovoltaic Glint and Glare Guidance Third Edition.

Residual impacts: N.A.

6.2.2.6.2. Potential visual impact of solar glint and glare on static ground-based receptors (residents of homesteads) in close proximity (within 1km) to the PV facility

There are two (2) affected residences within a 1km radius of the proposed PV facility, namely England. The potential visual impact related to solar glint and glare on static ground-based receptors (residents of homesteads) is therefore expected to be of **moderate** significance before mitigation and **low** post mitigation.

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

Table 11: Impact table summarising the significance of the visual impact of solar glint and glare on static ground receptors

Nature of Impact: The visual impact of solar glint and glare on residents of homesteads in closer proximity to the PV facility		
	Without mitigation	***With mitigation***
Extent	Very short distance **(4)**	Very short distance **(4)**
Duration	Long term **(4)**	Long term **(4)**
Magnitude	High **(8)**	Moderate **(6)**
Probability	Probable **(3)**	Improbable **(2)**
Significance	Moderate **(48)**	Low **(28)**
Status (positive or negative)	Negative	Negative
Reversibility	Reversible **(1)**	Reversible **(1)**
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation: Planning & operation: ➢ Use anti-reflective panels and dull polishing on structures, where possible and industry standard. ➢ If specific sensitive visual receptors are identified during operation, investigate screening at the receptor site, where possible.		
Residual impacts: The visual impact will be removed after decommissioning, provided the PV facility infrastructure is removed. Failing this, the visual impact will remain.		

6.2.3. Ancillary infrastructure

On-site ancillary infrastructure associated with the PV facility includes a substation and collector substation, Battery Energy Storage System (BESS), laydown areas, site office, parking and guard hut 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 facility.

The anticipated visual impact resulting from this infrastructure is likely to be of **low** significance both before and after mitigation.

Table 12: Visual impact of the ancillary infrastructure

Nature of Impact: Visual impact of the ancillary infrastructure on observers in close proximity to the structures.		
	Without mitigation	***With mitigation***
Extent	Very Short distance **(4)**	Very Short distance **(4)**

Duration	Long term **(4)**	Long term **(4)**
Magnitude	Low **(4)**	Low **(4)**
Probability	Improbable **(2)**	Improbable **(2)**
Significance	Low **(24)**	Low **(24)**
Status (positive, neutral or negative)	Negative	Negative
Reversibility	Reversible (1)	Reversible (1)
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Generic best practise mitigation/management measures: Planning: ➢ Retain/re-establish and maintain natural vegetation in all areas outside of the development footprint/servitude, but within the project site. Operations: ➢ Maintain the general appearance of the facility as a whole. ➢ Retain/re-establish and maintain natural vegetation (if present) immediately adjacent to the development footprint, where possible. ➢ Investigate the potential to screen affected receptor sites (if applicable and located within 1km of the facility) with planted vegetation cover.		
Residual impacts: The visual impact will be removed after decommissioning, provided the ancillary infrastructure is removed and the area rehabilitated. Failing this, the visual impact will remain.		

6.2.4. Decommissioning Impacts

During decommissioning there may be a noticeable increase in heavy vehicles utilising the roads to the site that may cause, at the very least, a visual nuisance to other road users and landowners in closer proximity (< 1 km) to the decommissioning activities.

Decommissioning activities may potentially result in a **high** (significance rating = 65) pre mitigation and **moderate** (significance rating = 48) post mitigation.

A mitigating factor in this scenario is the absence of receptors within the receiving environment.

Table 13: Visual impact of decommissioning activities on sensitive visual receptors in close proximity to the proposed facility

Nature of Impact: Visual impact of construction activities on sensitive visual receptors in close proximity to the proposed facility.		
	Without mitigation	***With mitigation***
Extent	Very short distance **(4)**	Very short distance **(4)**
Duration	Very Short term **(1)**	Very Short term **(1)**
Magnitude	High **(8)**	Moderate **(6)**
Probability	Definite **(5)**	Highly probable **(4)**
Significance	High **(65)**	Moderate **(48)**
Status (positive or negative)	Negative	Negative
Reversibility	Reversible **(1)**	Reversible **(1)**
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation: Decommissioning: ➢ Remove infrastructure not required for the post-decommissioning use of the site.		

➢ Rehabilitate all areas as per the rehabilitation plan undertaken. Consult an ecologist regarding rehabilitation specifications. ➢ Monitor rehabilitated areas post-decommissioning and implement remedial actions as required.
Residual impacts: None, provided rehabilitation works are carried out as specified.

6.3. Indirect Impacts

The indirect visual impacts of the proposed Limestone PV 1 Facility are assessed as follows:

6.3.1. Operational Phase

6.3.1.1. The potential impact on the sense of place of the region

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.), play 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.

In general, the landscape character of the greater study area and site itself presents as largely undeveloped and natural in character, however there are numerous existing powerlines and substations in close proximity to the proposed site which results in the visual quality of the region being moderate.

The anticipated significance of the visual impacts on the sense of place within the region (i.e. beyond a 6km radius of the development and within the greater region) is expected to be of **moderate** significance.

Table 14: The potential impact on the sense of place of the region

Nature of Impact: The potential impact on the sense of place of the region.		
	No Mitigation	***Mitigation considered***
Extent	Long distance **(1)**	Long distance **(1)**
Duration	Long term **(4)**	Long term **(4)**
Magnitude	High **(8)**	High **(8)**
Probability	Probable **(3)**	Probable **(3)**
Significance	Moderate **(39)**	Moderate **(39)**
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: <u>Planning:</u> ➢ Retain/re-establish and maintain natural vegetation in all areas outside of the development footprint/servitude, but within the project site. <u>Operations:</u> ➢ Maintain the general appearance of the facility as a whole.		
Residual impacts: The visual impact will be removed after decommissioning, provided the facility infrastructure is removed and the area rehabilitated. Failing this, the visual impact will remain.		

6.4. Cumulative Impact Assessment

6.4.1. The potential cumulative visual impact of the Limestone PV Cluster on the visual quality of the landscape

The cumulative visual impact of the proposed Limestone PV Facilities and the other authorized renewable energy projects will primarily occur on the plains.

The anticipated cumulative visual impact is expected to be of **high** significance. The cumulative visual impact is ultimately expected to be within acceptable limits due to their remote location, the low occurrence of sensitive visual receptors, the location of other already approved REFs and the general low occurrence of potential sensitive visual receptors in the area.

Table 15: The potential cumulative visual impact on the visual quality of the landscape

Nature of Impact: The potential cumulative visual impact of the Limestone PV1 Facility on the visual quality of the landscape.		
	Overall impact of the proposed project considered in isolation	***Cumulative impact of the project (PV 1 and 2)***
Extent	Medium distance **(2)**	Medium distance **(2)**
Duration	Long term **(4)**	Long term **(4)**
Magnitude	High **(8)**	Very High **(10)**
Probability	Highly probable **(4)**	Highly probable **(4)**
Significance	Moderate **(56)**	High **(64)**
Status (positive, neutral or negative)	Negative	Negative
Reversibility	Reversible (1)	Reversible (1)
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	No	
Mitigation measures: N.A.		
Residual impacts: The visual impact will be removed after decommissioning, provided the facility infrastructure is removed and the area rehabilitated. Failing this, the visual impact will remain.		

6.5. The potential to mitigate visual impacts

The primary visual impact, namely the layout and appearance of the PV panels is not possible to mitigate. The functional design of the PV panels cannot be changed in order to reduce visual impacts.

The following mitigation is however possible:

- It is recommended that vegetation cover (i.e. either natural or cultivated) immediately adjacent to the development footprint be maintained, both during construction and operation of the proposed facility. This will minimise visual impact as a result of cleared areas and areas denuded of vegetation.

- Existing roads should be utilised wherever possible. New roads should be planned taking due cognisance of the topography to limit cut and fill requirements. The construction/upgrade of roads should be undertaken properly, with adequate drainage structures in place to forego potential erosion problems.

- In terms of onsite ancillary buildings and structures, it is recommended that it be planned so that clearing of vegetation is minimised where possible. This implies consolidating this infrastructure as much as possible and making use of already disturbed areas rather than undisturbed sites wherever possible.

- Mitigation of lighting impacts includes the pro-active design, planning and specification of lighting for the facility. The correct specification and placement of lighting and light fixtures for the proposed PV facility and ancillary infrastructure will go far to contain rather than spread the light. 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 foot-lights or bollard level lights;
    - 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.

- 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 adjacent to the development footprint (if present) is not unnecessarily cleared or removed during the construction period.
    - Reduce the construction period through careful logistical planning and productive implementation of resources wherever possible.
    - Plan the placement of laydown 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 wherever possible.
    - Rehabilitate all disturbed areas (if present/if required) immediately after the completion of construction works.

- Glint and glare impact mitigation measures include the following:

    - Use anti-reflective panels and dull polishing on structures, where possible and industry standard.
    - If specific sensitive visual receptors are identified during operation, investigate screening at the receptor site, where possible to mitigate glint and glare.

- During operation, the maintenance of the PV arrays and ancillary structures and infrastructure will ensure that the facility does not degrade, therefore avoiding aggravating 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, unless a new authorisation is granted for the plant to continue a new cycle. 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.

- Secondary impacts anticipated as a result of the proposed PV facility (i.e. visual character and sense of place) are not possible to mitigate.

- Where sensitive visual receptors (if present), are likely to be affected it is recommended that the developer enter into negotiations with the property owners regarding the potential screening of visual impacts at the receptor site. This may entail the planting of vegetation, trees or the construction of screens. Ultimately, visual screening is most effective when placed at the receptor itself.

Good practice requires that the mitigation of both primary and secondary visual impacts, as listed above, be implemented and maintained on an ongoing basis.

7. IMPACT STATEMENT

The findings of the Visual Impact Assessment undertaken for the proposed Limestone PV 1 Facility is that the visual environment surrounding the site, especially within a 1km radius (and potentially up to a radius of 3km) of the proposed facility, may be visually impacted during the anticipated operational lifespan of the facility (i.e. a minimum of 20 years).

The following is a summary of impacts remaining:

- Construction activities may potentially result in a **high** temporary visual impact, that may be mitigated to **moderate**

- The operation of the proposed PV facility is expected to have a **high** visual impact that may be mitigated to **moderate** on sensitive visual receptors within a 1km radius of the PV facility.

- The operational facility could have a **moderate** visual impact (significance rating = 45) which may be mitigated to **low** (significance rating = 26) on residents/visitors to the homestead of Langverwag as well as observers travelling along the secondary road within 1 – 3km radius of the facility.

- The operational facility could have a **moderate** visual impact (significance rating = 36) which may be mitigated to **low** (significance rating = 24) on residents/visitors to the various homesteads as well as observers travelling along the secondary road within 3 – 6km radius of the facility.

- The operational facility could have a **low** visual impact both pre and post mitigation on residents/visitors to various homesteads as well as observers travelling along the various secondary roads beyond the 6km radius of the facility.

- This anticipated lighting impact is likely to be of **high** significance and may be mitigated to **moderate** especially within 0-3 km radius of the PV facility.

- The potential visual impact related to solar glint and glare as a rail travel hazard is expected to be of **moderate** significance.

- There are two (2) affected residences within a 1km radius of the proposed PV facility, namely England. The potential visual impact related to solar glint and glare on static ground-based receptors (residents of homesteads) is therefore expected to be of **moderate** significance before mitigation and **low** post mitigation.

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

- Decommissioning activities may potentially result in a **high** pre mitigation and **moderate** post mitigation.

- The anticipated significance of the visual impacts on the sense of place within the region (i.e. beyond a 6 km radius of the development and within the greater region) is expected to be of **Moderate** significance.

- The anticipated cumulative visual impact of the proposed facility is expected to be of **high** significance.

The anticipated visual impacts listed above (i.e. post mitigation impacts) range from prominently **moderate** to **low** significance. One visual impact of **high** is anticipated in terms of the cumulative visual impact of the proposed Limestone PV facilities.

8. CONCLUSION AND RECOMMENDATIONS

The visual impact assessment (VIA) practitioner takes great care to ensure that all the spatial analyses and mapping is as accurate as possible. The intention is to quantify, using visibility analyses, proximity analyses and the identification of sensitive receptors and the potential visual impacts associated with the proposed **Limestone PV 1 Facility**. These processes are deemed to be transparent and scientifically defensible when interrogated.

The construction and operation of the proposed Limestone PV 1 Facility may have a visual impact on the study area, especially within a 1km radius (and potentially up to a radius of 3km) of the proposed facility. The visual impact will differ amongst places, depending on the distance from the facility.

The greater environment is largely natural in character will wide open spaces however there is a fair amount of industrial infrastructure in the form of substations and high voltage powerlines resulting in an overall moderate visual quality.

Should both Limestone PV facilities be constructed, it is expected that the **potential cumulative visual impacts** may range from **moderate** (where observers are absent i.e. vacant natural land) to **high** significance (where observers are present i.e. at homesteads and along roads). The cumulative visual impact is ultimately expected to be within acceptable limits due to their remote location, the low occurrence of sensitive visual receptors, the location of other already approved REFs and the general low occurrence of potential sensitive visual receptors in the area.

The DFFE screening tool generated for the proposed Limestone 1 PV facility indicated that the PV facility has a very high sensitivity owing to the fact that the site is located within 250 m of a river/wetland. Based on the above findings, it can be found that the sensitivity of the visual environment for the proposed Limestone 1 PV facility is confirmed to be **moderate** due to:

- Low occurrence of visual receptors within 500m of the proposed facility
- Town dwellings are located 9 Km away from the prosed sites
- Provincial/ arterial road located within 9 Km
- No Mountain tops and ridges located near the site
- No PV panels located on steep slopes, mountain tops or ridges

According to the Provincial Government of the Western Cape, Department of Environmental Affairs and Development Planning (DEA&DP) Guideline for Involving Visual and Aesthetic Specialists in the EIA Process (Oberholzer, 2005), the criteria that determine whether or not a visual impact constitutes a potential fatal flaw are categorised as follows:

1. Non-compliance with Acts, Ordinances, By-laws and adopted policies relating to visual pollution, scenic routes, special areas or proclaimed heritage sites.
2. Non-compliance with conditions of existing Records of Decision.
3. Impacts that may be evaluated to be of high significance and that are considered by the majority of the stakeholders and decision-makers to be unacceptable.

In terms of the above and to the knowledge of the author the proposed development is compliant with all Acts, Ordinances, By-laws and adopted policies relating to visual pollution, scenic routes, special areas or proclaimed heritage sites, as well as, conditions of existing Records of Decisions.

Since no objections have been reported from stakeholders or decision-makers within the region to the knowledge of the author, this assessment has adopted a risk averse approach by assuming that the perception of most (if not all) of the sensitive visual receptors (bar the landowners of the properties earmarked for the development and other authorized renewable energy projects), would be predominantly negative towards the development.

Therefore, with the information available to the specialist at the time of writing this report, it cannot be empirically determined that the statistical majority of objecting stakeholders were exceeded. If evidence to the contrary surfaces during the progression of the development application, the specialist reserves the right to revise the statement below.

Overall, the significance of the visual impacts is expected to range from **moderate** to **low,** as a result of the very low occurrence of sensitive visual receptors, with the exception of the cumulative impacts which is anticipated to be of **high** significance. These observers may consider visual exposure to this type of infrastructure to be intrusive.

A number of mitigation measures have been proposed (**Section 6.5**). Regardless of whether or not mitigation measures will reduce the significance of the anticipated visual impacts, they are considered to be good practice and should all be implemented and maintained throughout the construction, operation and decommissioning phases of the proposed facility.

If mitigation is undertaken as recommended, it is concluded that the significance of most of the anticipated visual impacts will remain at or be managed to acceptable levels. As such, the Limestone PV 1 facility would be considered to be acceptable from a visual impact perspective and can therefore be authorised.

It should be noted that the results/deductions in this report are based solely from a visual perspective in relation to potential visual impacts and sensitive visual receptors and exclude any potential issues/comments/fatal flaws identified by other specialist studies.

9. MANAGEMENT PROGRAMME

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

Table 16: Management programme – Planning.

OBJECTIVE: The mitigation and possible negation of visual impacts associated with the planning of the Proposed Limestone PV 1 Facility.		
Project Component/s	The solar energy facility and ancillary infrastructure (i.e. PV panels, access roads, transformers, security lighting, workshop, 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**
Use anti-reflective panels and dull polishing on structures where possible and industry standard.	Project proponent / contractor	Early in the planning phase.
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 infrastructure with due cognisance of the topography to limit cut and fill requirements.	Project proponent/ design consultant	Early in the planning phase.
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: o Shield the sources of light by physical barriers (walls, vegetation, or the structure itself). o Limit mounting heights of fixtures, or use foot-lights or bollard lights. o Make use of minimum lumen or wattage in fixtures. o Making use of down-lighters or shielded fixtures. o Make use of Low Pressure Sodium lighting or other low impact lighting. o 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 17: Management programme – Construction.

OBJECTIVE: The mitigation and possible negation of visual impacts associated with the construction of the Proposed Limestone PV 1 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	Project proponent / contractor	Throughout the construction phase.

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.	Project proponent / contractor	Throughout the construction phase.
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 18: Management programme – Operation.

OBJECTIVE: The mitigation and possible negation of visual impacts associated with the operation of the Proposed Limestone PV 1 Facility.		
Project Component/s	The solar energy 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**
Adjust tilt angles of the panels if glint and glare issues become evident where possible. If specific sensitive visual receptors are identified during operation, investigate screening at the receptor site.	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 19: Management programme – Decommissioning.

OBJECTIVE: The mitigation and possible negation of visual impacts associated with the decommissioning of the Proposed Limestone PV 1 Facility.

<table>
<tr><td>Project Component/s</td><td colspan="2">The solar energy facility and ancillary infrastructure (i.e. PV panels, access roads, workshop, transformers, etc.).</td></tr>
<tr><td>Potential Impact</td><td colspan="2">Visual impact of residual visual scarring and vegetation rehabilitation failure.</td></tr>
<tr><td>Activity/Risk Source</td><td colspan="2">The viewing of the above mentioned by observers on or near the site.</td></tr>
<tr><td>Mitigation: Target/Objective</td><td colspan="2">Only the infrastructure required for post decommissioning use of the site retained and rehabilitated vegetation in all disturbed areas.</td></tr>
<tr><td>Mitigation: Action/control</td><td>Responsibility</td><td>Timeframe</td></tr>
<tr><td>Remove infrastructure not required for the post-decommissioning use of the site.</td><td>Project proponent / operator</td><td>During the decommissioning phase.</td></tr>
<tr><td>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.</td><td>Project proponent / operator</td><td>During the decommissioning phase.</td></tr>
<tr><td>Monitor rehabilitated areas quarterly for at least a year following decommissioning, and implement remedial action as and when required.</td><td>Project proponent / operator</td><td>Post decommissioning.</td></tr>
<tr><td>Performance Indicator</td><td colspan="2">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.</td></tr>
<tr><td>Monitoring</td><td colspan="2">Monitoring of rehabilitated areas quarterly for at least a year following decommissioning.</td></tr>
</table>

10.REFERENCES / DATA SOURCES

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