PROPOSED KLEINZEE SOLAR PV FACILITY AND ASSOCIATED GRID CONNECTION INFRASTRUCTURE, NORTHERN CAPE PROVINCE

VISUAL IMPACT ASSESSMENT

Produced for:

Energy Team (Pty) Ltd

On behalf of:

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- December 2022 -

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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 modeling 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. Although the guidelines have been developed with specific reference to the Western Cape Province of South Africa, the core elements are more widely applicable (i.e. within the Northern Cape Province).

1.2. Assumptions and limitations

This assessment was undertaken during the planning stage of the project and is based on information available at that time.

1.3. 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.

[1] Adapted from Oberholzer (2005).

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

- The information available, understanding of the study area and experience of this type of project by the practitioner:

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

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 high:*

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

1.4. 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 is determined according to the nature, extent, duration, intensity or magnitude, probability and significance of the potential visual impacts, and will propose management actions and/or monitoring ~~programs, and~~programs and may include recommendations related to the facility layout/position.

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

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

The following VIA-specific tasks were 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 resolution AW3D30 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 facility.

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 (anticipated) negative visual perception of the proposed infrastructure.

- **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 may be exposed to the project infrastructure.

This is done in order to focus 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 data set, is a land use character map, that further aids in identifying sensitive areas and possible critical features (i.e. tourist facilities, protected areas, etc.), that should be addressed.

- **Determine the visual absorption capacity 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 is 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 are 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. BACKGROUND

The development of a solar photovoltaic (PV) facility with a generating capacity of up to 200MW is proposed by **Energy Team (Pty) Ltd** on a site located ~~located~~ approximately 20km west of the town of Komaggas, and 24km southeast of Kleinzee. The project is located in the Nama Khoi Local Municipality within the Namakwa District Municipality, Northern Cape. The solar PV development will be known as the Kleinzee Solar PV Facility. The Kleinzee Solar PV Facility is located within Focus Area 8 of the Renewable Energy Development Zones (REDZ), which is known as the Springbok REDZ, and within the Northern Corridor of the Strategic Transmission Corridors.

The infrastructure associated with the 200MW solar PV facility will include:

- Solar PV array comprising PV modules and mounting structures
- Inverters and transformers
- Low voltage cabling between the PV modules to the inverters
- 33kV cabling between the project components and the facility substation
- 132kV onsite facility substation
- 132kV power line to connect to the grid at Zonnequa Collector Substation within a 300m wide and 30km long corridor
- Battery Energy Storage System (BESS)
- Site offices and maintenance buildings, including workshop areas for maintenance and storage
- Laydown areas
- Site access and internal roads.

The power generated by Kleinzee Solar PV Facility will be sold to Eskom and will feed into the national electricity grid. Ultimately, Kleinzee Solar PV facility and the associated grid connection infrastructure is intended to be part of the renewable energy projects portfolio for South Africa, as contemplated in the Integrated Resources Plan (IRP) and Renewable Energy Independent Power Producer Procurement (REIPPP) Programme.

The PV facility will take approximately four months to construct and the operational lifespan of the facility is estimated at up to 30 years.

The proposed properties identified for the PV facility and associated grid connection infrastructure are indicated on the maps within this report. Sample images of similar PV technology, Battery Energy Storage System (BESS) facilities and associated grid connection infrastructure 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 facility (*Photo: Power Engineering International)*.

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

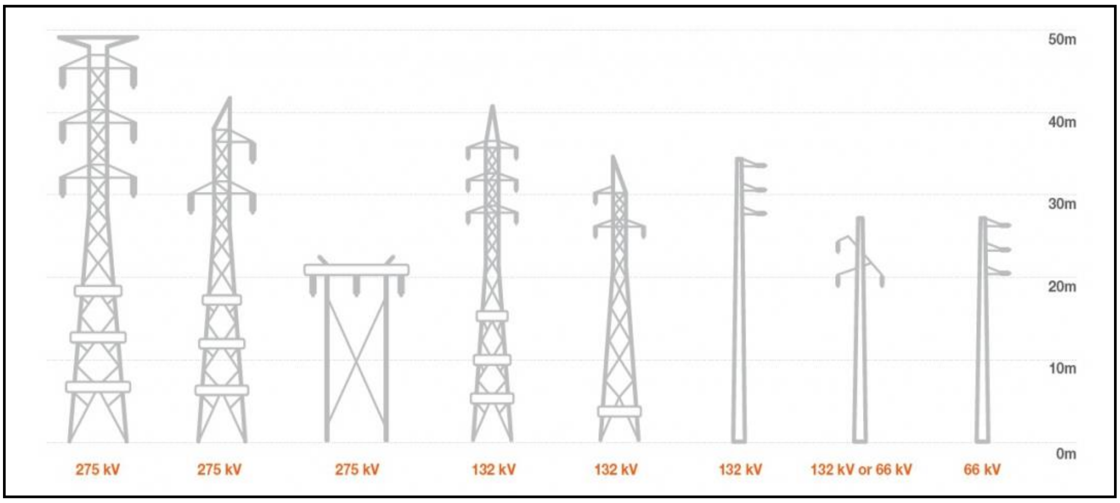


Figure 5: Schematic representation of power line towers

Figure 6: Typical 132 kV power line structures

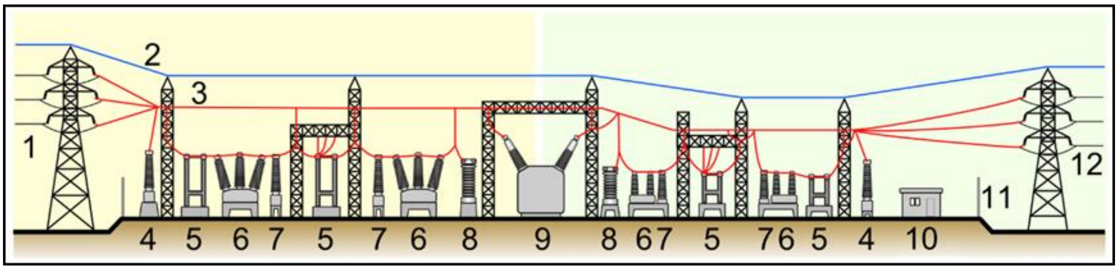


Figure 7: Schematic representation of the components of a substation. See below. (Source: Shigeru23 - Own work, CC BY-SA 3.0)

1. Primary power lines
2. Ground wire

3. Overhead lines
4. Transformer for measurement of electric voltage
5. Disconnect switch
6. Circuit breaker
7. Current transformer
8. Lightning arrester
9. Main transformer
10. Control building
11. Security fence
12. Secondary power lines

Figure 8: Typical substation.

3. SCOPE OF WORK

This report is the undertaking of a Visual Impact Assessment (VIA) of the proposed PV facility and associated grid connection 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 includes a 6km buffer zone (area of potential visual influence) from the proposed Solar PV development footprint and a 3km buffer zone (area of potential visual influence) from the proposed associated grid connection infrastructure.

Anticipated issues related to the potential visual impact of the proposed PV facility and its associated grid connection infrastructure include the following:

- The visibility of the facility to, and potential visual impact on, observers in closer proximity to the proposed infrastructure.
- The visibility of the facility to, and potential visual impact on residents of dwellings within the study area, with specific reference to the farm residences in closer proximity to the proposed development.
- 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/facilities (if present).
- The potential visual impact of the construction of ancillary infrastructure (i.e. internal access roads, buildings, power line, etc.) 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 location of the proposed infrastructure within the Springbok REDZ, and within very close proximity to existing power lines and other approved Wind Energy Facilities.
- 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. RELEVANT LEGISLATION AND GUIDELINES

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

- National Environmental Management Act 107 of 1998 (NEMA);
- The Environmental Impact Assessment Regulations, 2014 (as amended);
- Guideline on Generic Terms of Reference for EAPS and Project Schedules (DEADP, Provincial Government of the Western Cape, 2011); and
- Guideline for involving visual and aesthetic specialists in EIA processes: Edition 1.

5. THE AFFECTED ENVIRONMENT

The Kleinzee PV is located about 15km southwest of the town of Komaggas, and 24km southeast of Kleinsee, within the Springbok Renewable Energy Development Zone (REDZ), in the Nama Khoi Local Municipality. Regionally, the proposed WEF site is located approximately 80km west of Springbok within the Northern Cape Province. Existing roads will be used, wherever possible, to access the project site and development area. Access to the site will be from the current existing gravel Kleinsee to Komaggas secondary road that traverses north of the proposed development site. The site can also be accessed off a provincial gravel minor road that connects from the surfaced MR751 road located to the west of the project site.

The study area for visual assessment occurs on land that ranges in elevation from 165m above sea level (asl) to about 450m asl at the top of the local hills Graafwater se Kop and Byneskop. The lowest areas are associated with dry pans located to the west of the site. Refer to **Map 1**.

Figure 9: Topography and vegetation of the region overlooking the hills on the site.

The terrain surrounding the proposed site is generally flat, sloping gently westwards towards the shore. The terrain type of the region is described as *slightly undulating plains*. Low hills are present in the far east and south east of the study area.

The small town of Kleinsee lies about 24km north west of the proposed site. Large parts of the region are mine-owned, and as a result, significant diamond mining activities are evident, especially within a 7km band along the coast.

The region has a very low population density of 3 people per km^2[2]. Roads include a number internal farm roads and one lower order secondary road extending to the east and west from Komaggas to Kleinsee.

Individual homesteads/farmsteads are scattered throughout the region. Some of these in closer proximity to the proposed PV Cluster and associated grid connection infrastructure include:

- Sonnekwa A
- Sonnekwa B
- Graafwater
- Vaalkol
- Droëvlei
- Kapvlei

[2] www.wikipedia.org/wiki/Nama_Khoi_Local_Municipality

Figure 10: Example of farmsteads/homesteads in the region

Other than the mining activity located along the West Coast, the proposed development is also within the Northern Corridor of the Strategic Transmission Corridors. As a result, industrial infrastructure within the region includes a network of distribution power lines, a distribution substation in Kleinsee and the Gromis Transmission Substation. The study area is further traversed by the alignment of the Gromis to Juno 400kV overhead power lines, as well as, the Sandveld to Kommagas 66kV overhead power line running along the Kleinsee to Kommagas secondary road.

Figure 11: The Komaggas (east) to Kleinsee (west) road north of the proposed development site (to the left), as well as, the 66kV overhead power line.

The desert climate of the study area is dry, receiving between 28mm and 123mm of rainfall per annum. Land cover is primarily *low shrubland (Succulent Karoo)* with localised areas of *exposed rock and sand,* as well as, *dry pans.* The vegetation type is *Strandveld of the West Coast.* Refer to **Map 2**.

Since the proposed site is located within the Springbok REDZ a number of approved renewable energy applications are already located within the study area. These include the Kleinzee Wind Energy Facility (WEF), Zonnequa WEF, Kap Vley WEF and Namas WEF. Of note is that the proposed site for the Kleinzee Solar PV Facility falls within the already approved development area of the Namas WEF. Refer to **Map 3**.

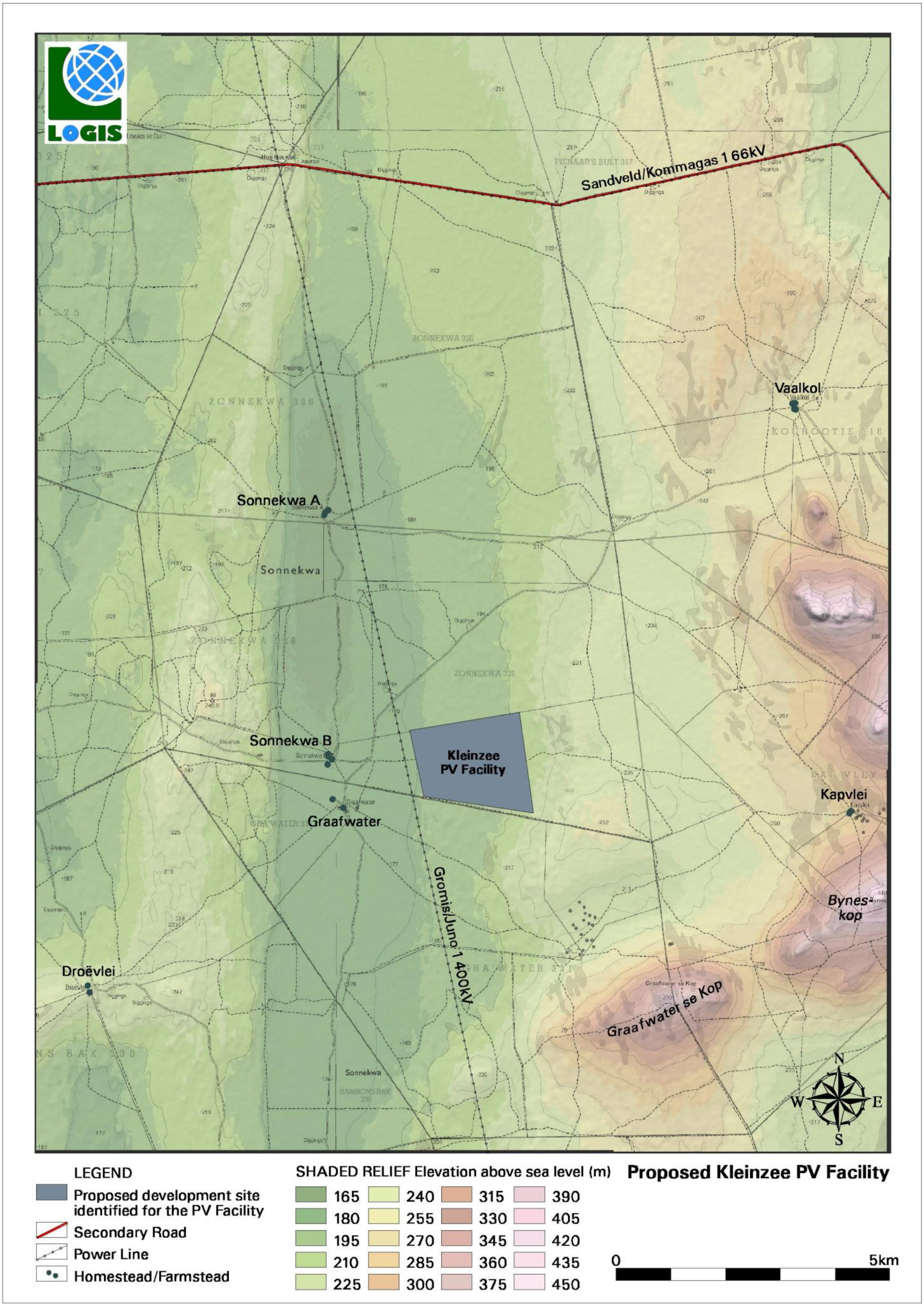
The Namaqua National Park lies approximately 25km to the south east, just beyond the boundary of the Springbok REDZ and is therefore outside of the study area (and not shown on the maps). The park is not expected to be visually influenced by the proposed PV Cluster.

The greater region is generally seen as having a high scenic value and high tourism value potential. It is well known for its scenic natural beauty (West Coast as a whole) and annual wild flower displays (Namaqualand)[3].This occurs once a year between July and October, depending on a number of environmental factors, but mainly the occurrence and duration of rainfall. The length of the display is also highly variable.

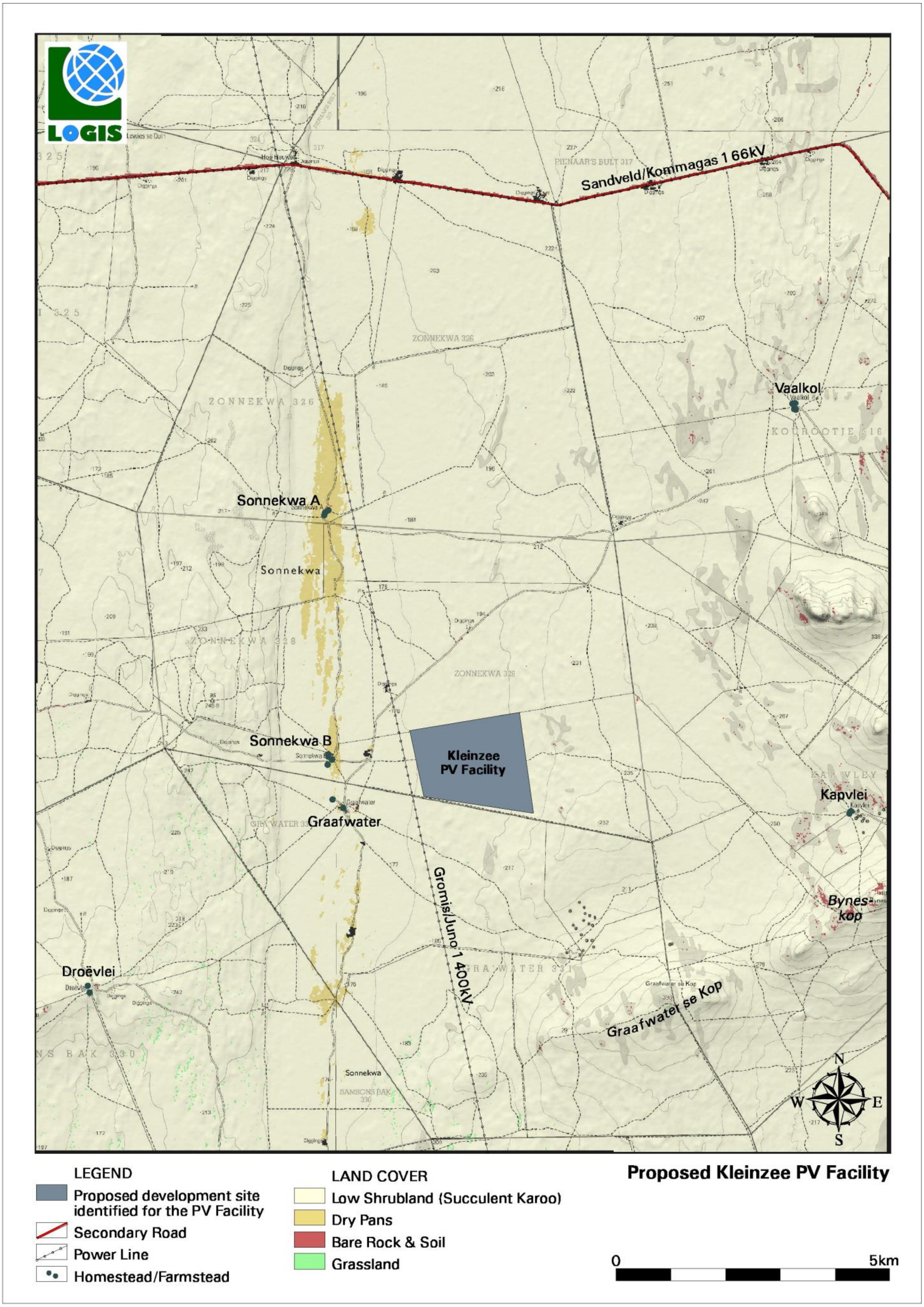
Within this scenic context, it is noteworthy that the mining areas along the coastline are significantly disturbed and visually apparent due to the scale and nature of the surface-based mining. In this respect the visual quality of the receiving environment is already impacted upon to some extent.

Figure 12: Mine dumps and mining activity within the region along the coastline.

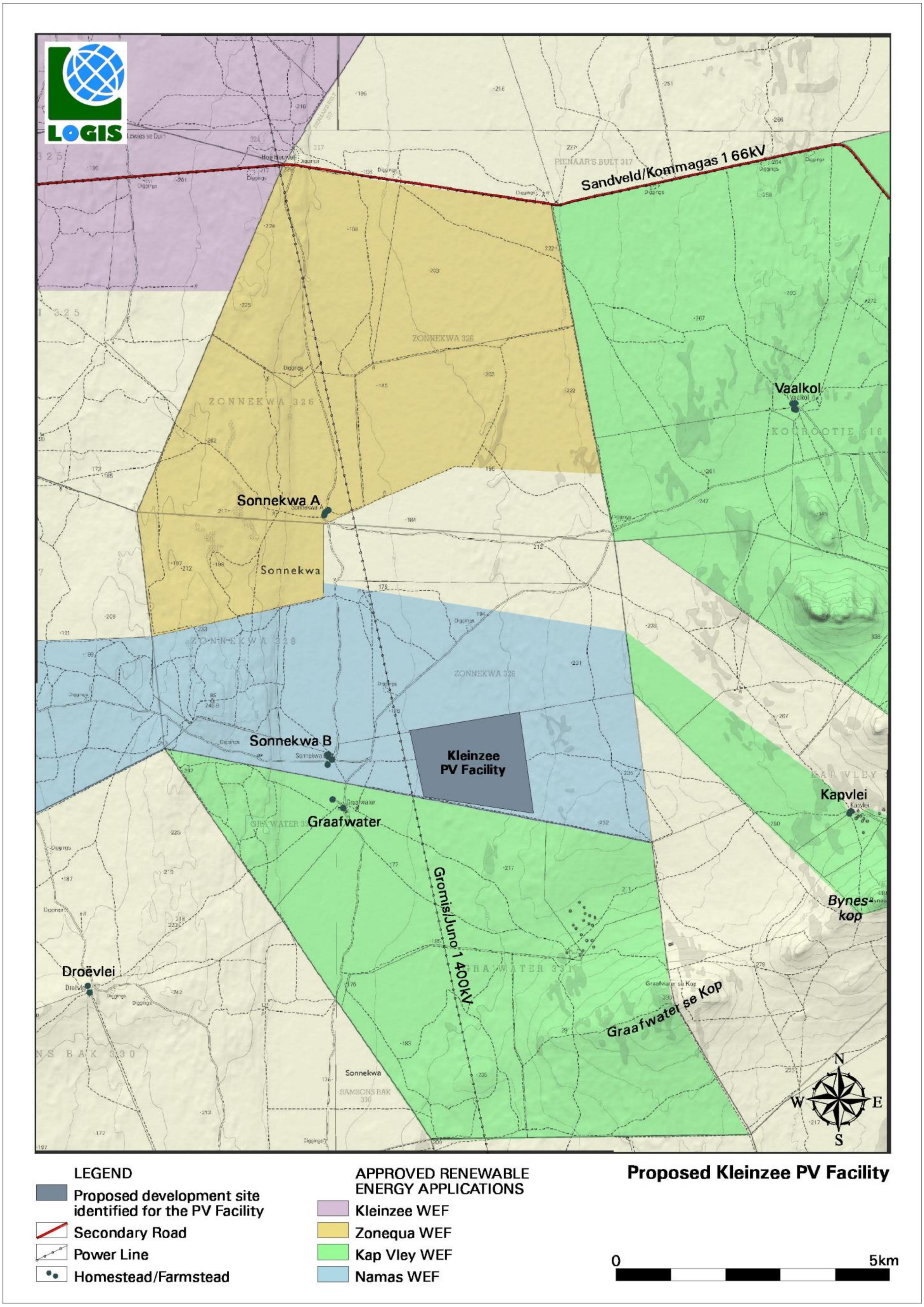
[3] Namaqualand stretches from the small town of Garies in the south to the Orange River to the north, its western border is the wild Atlantic coast, the remote town of Pofadder marks the eastern border (http://www.discoverthecape.com/namaqualand/flower-route.html)



Map 1: Shaded relief map of the study area.



Map 2: Land cover and broad land use patterns.



Map 3: Approved Renewable Energy Applications in the Study Area

6. RESULTS – KLEINZEE SOLAR PV FACILITY

6.1. Potential visual exposure

The result of the viewshed analysis for the proposed facility is shown on the map below (**Map 4**). 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 structures (PV panels, inverters, BESS, etc.) associated with the facility.

Map 4 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.

Results

It is clear that the relatively constrained dimensions of the PV facility would amount to a fairly limited area of potential visual exposure. The visual exposure would largely be contained within a 6km radius of the proposed development site, with the predominant exposure to the western portion of the study area and on the low hills (Graafwater se Kop and Byneskop) extending from the south to the east of the study area.

The following is evident from the viewshed analyses:

0 – 1km

The potential visual exposure of the facility is contained to a core area on the site itself and within a 1 km radius thereof. There are no residences within this zone.

1 – 3km

Potential visual exposure in the short to medium distance (i.e. between 1 and 3km), is largely contained to the western half of the proposed site, where the eastern portion is visually screened.

Sensitive visual receptors are residents of Graafwater and Sonnekwa B.

3 - 6km

Within a 3 – 6km radius, the visual exposure becomes very scattered and interrupted due to the undulating nature of the topography. Visually screened areas lie to the north east, east and south east.

Sensitive visual receptors are observers travelling along the numerous internal farm roads and residents of Sonnekwa A. Residents of Kapvlei while lying within this zone are not expected to be visually exposed. The northern aspects of the Graafwater se Kop hill is also expected to be visually exposed.

> 6km

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. Sensitive visual receptors are not likely to be visually exposed to the proposed facility, despite lying within the viewshed.

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.

6.2. Potential cumulative visual exposure

The Kleinzee PV Solar Energy Facility addressed in this report is only one component of a larger solar cluster consisting of up to 2 different facilities within the greater area.

This cluster of renewable energy facilities inclusive of two (2) additional Solar PV Facilities (Kleinzee solar PV and Daisy solar PV) and associated infrastructure.

Map 5 illustrates the anticipated cumulative visual impact of these facilities and specifically the anticipated frequency of visual exposure. Areas shaded red are likely to be exposed to both of the facilities, areas shaded in orange are likely to be exposed to only the Daisy Solar PV facility, while areas shaded in yellow are likely to be exposed to only the Kleinzee Solar PV facility.

The higher lying western portion of the study area will predominately be exposed to all of the facilities resulting in a moderate cumulative visual exposure. Sensitive visual receptors likely to be cumulatively exposed to all facilities are Sonnekwa B and Graafwater.

The lower lying areas located in the western and central portions of the study area will experience a low cumulative exposure to only the Daisy solar PV Facility and include residents of homestead Sonnekwa A.

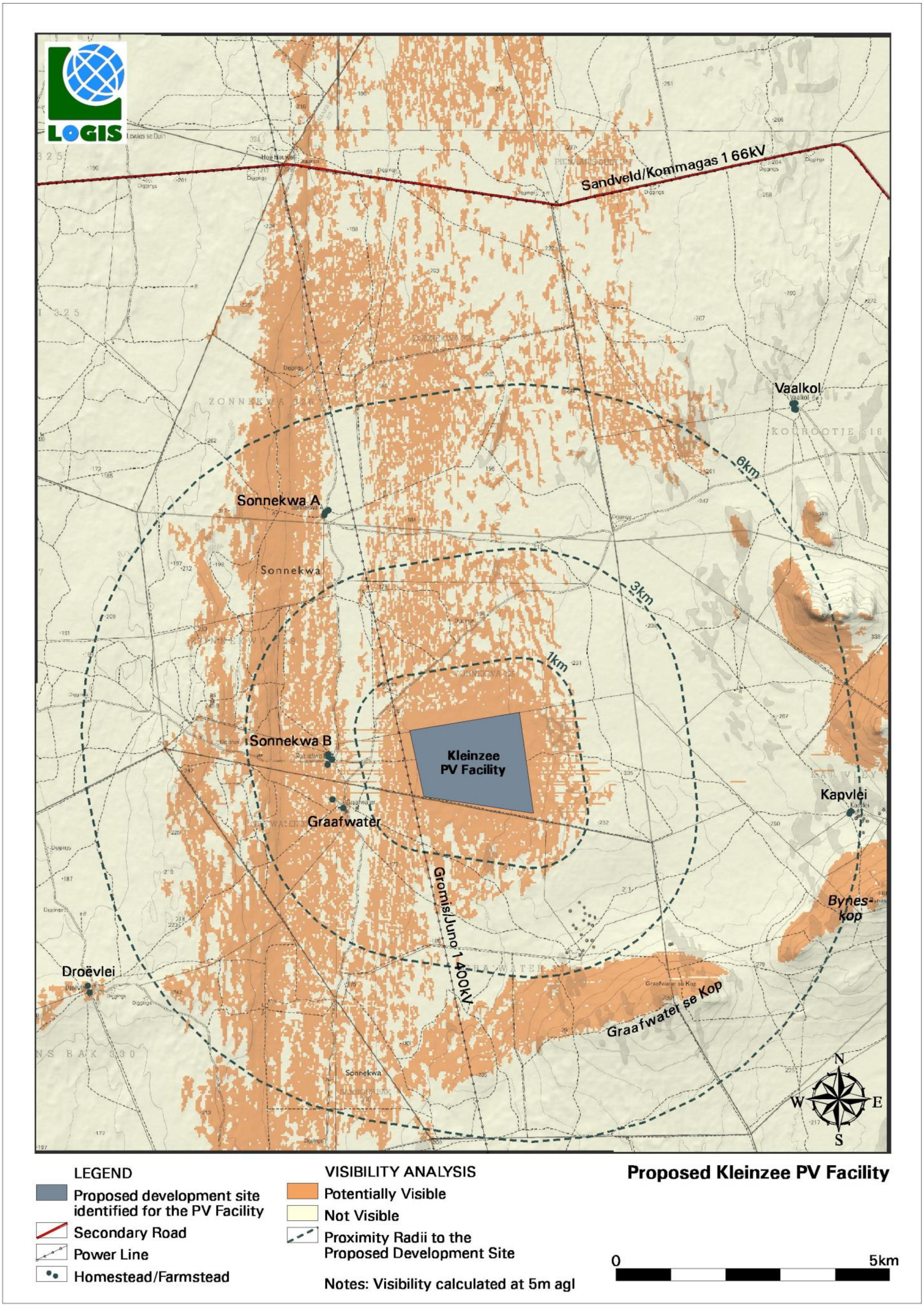
Additionally, areas located on the northern and western aspects of the line of hills extending from the south to the east of the study area (including Graafwater se Kop and Byneskop) are expected to have a cumulative visual exposure ranging from moderate (2 facilities) at the highest points to low (1 facility) at the base.

The proposed PV Facilities, although in line with current development and land use trends in the region and located within the Springbok REDZ, will certainly contribute to the increased cumulative visual impact of solar energy facilities in the region.

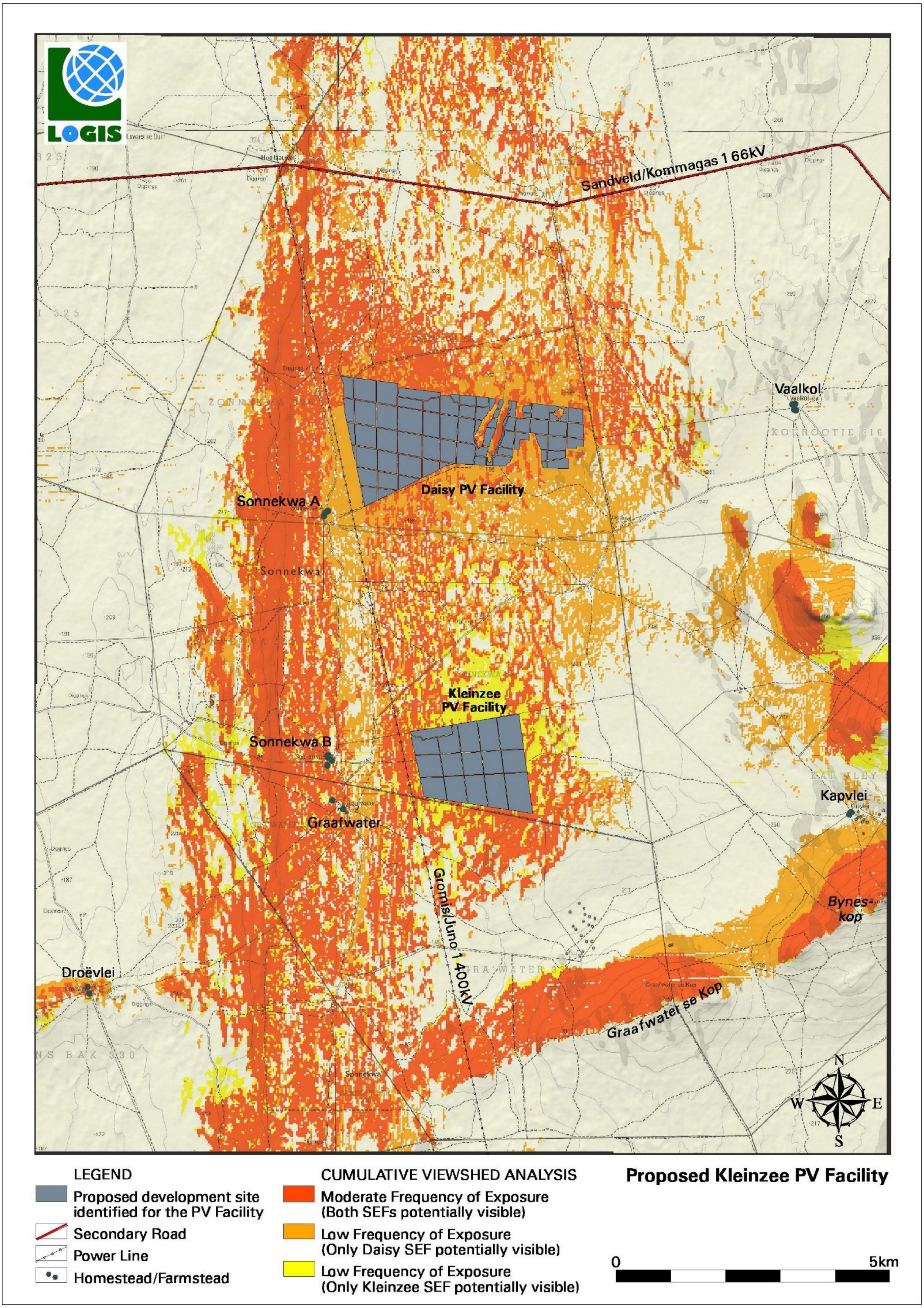
Additionally **Map 3** illustrates that it will contribute to the increased cumulative visual impact of renewable energy facilities in the region in general, assuming that all approved renewable energy applications are constructed.

The cumulative visual impact of the proposed PV Facilities is ultimately expected to be of moderate to low significance due to their remote location and the general low occurrence of potential sensitive visual receptors.

The potential cumulative visual impact is therefore expected to be within acceptable limits, considering the REDZ planning criteria, the approved Wind Energy Facilities in the area and the existing mining disturbance within the region.



Map 4: Viewshed analysis of the proposed Kleinzee Solar PV Facility



Map 5: Cumulative visual exposure – Solar PV Facilties

6.3. 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 solar energy facilities/technologies (e.g. more extensive infrastructure associated with power plants exceeding 100MW) 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.

6.4. 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 within the study area is anticipated to be the highest for sensitive visual receptors 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.

Additional sensitive receptors are observers travelling along the secondary road traversing the northern portion of the study area. Travellers using these roads may be negatively impacted upon by visual exposure to the PV facility infrastructure.

Due to the generally remote location of the proposed PV facility, and the ill populated nature of the receiving environment, there are only a limited number of potential sensitive visual receptor sites within closer proximity to the proposed development site. These receptor sites were listed in **Section 6.1**.

The potential sensitive visual receptor sites and areas of higher viewer incidence are indicated on **Map 6**.

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

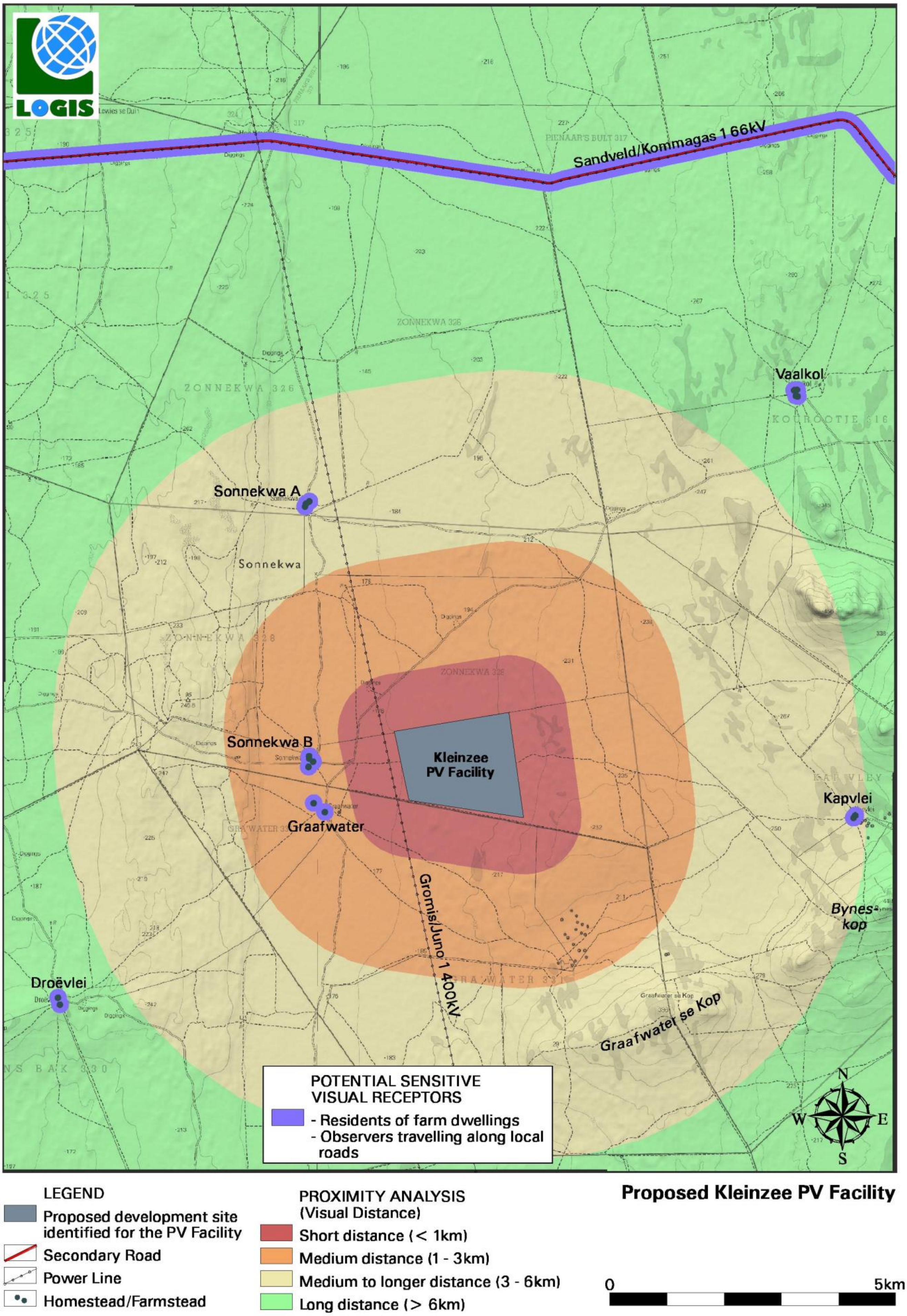
6.5. Visual absorption capacity

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.

Land cover is dominated primarily by *low shrubland* with patches of *grassland* and bare rock and soil in places. *Low shrubland* is described as *natural / semi-natural low shrub dominated areas, typically within < +/- 2m canopy height, specifically associated with the Fynbos Biome. It includes a range of canopy densities encompassing sparse to dense canopy covers. Very sparse covers may be associated with the bare ground glass. Note that taller tree / bush / shrub communities within this vegetation type are typically classified separately as one of the other tree or bush dominated cover classes.*

Overall, the Visual Absorption Capacity (VAC) of the receiving environment is low by virtue of the limited height (or absence) of the vegetation and the absence of urban development. In addition, the scale and form of the proposed structures mean that it is unlikely that the environment will visually absorb them in terms of texture, colour, form and light/shade characteristics. Within this area the VAC of vegetation will not be taken into account, thus assuming a worst-case scenario in the impact assessment.

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 infrastructure). 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.



Map 6: Proximity analysis and potential sensitive visual receptors – Solar PV facility

6.6. Visual impact index

The combined results of the visual exposure, viewer incidence/perception and visual distance of the proposed PV 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 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.~~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** within a 1km radius of the PV facility may experience a **very high** visual impact. The magnitude of visual impact on sensitive visual receptors subsequently subsides with distance to; **high** within a 1–3km radius (where/if sensitive receptors are present) and **moderate** within a 3–6km radius (where/if sensitive receptors are present). Receptors beyond 6km are expected to have a **low** potential visual impact.

Magnitude of the potential visual impact

0 – 1km

The majority of the exposed areas in this zone fall within vacant open space, generally devoid of observers or potential sensitive visual receptors.

1 – 3km

The majority of the exposed areas in this zone fall within natural open space, generally devoid of observers or potential sensitive visual receptors. This zone contains the homesteads, Sonnekwa B (site 1) and Graafwater (site 2) where residents may experience visual impacts of **high** magnitude.

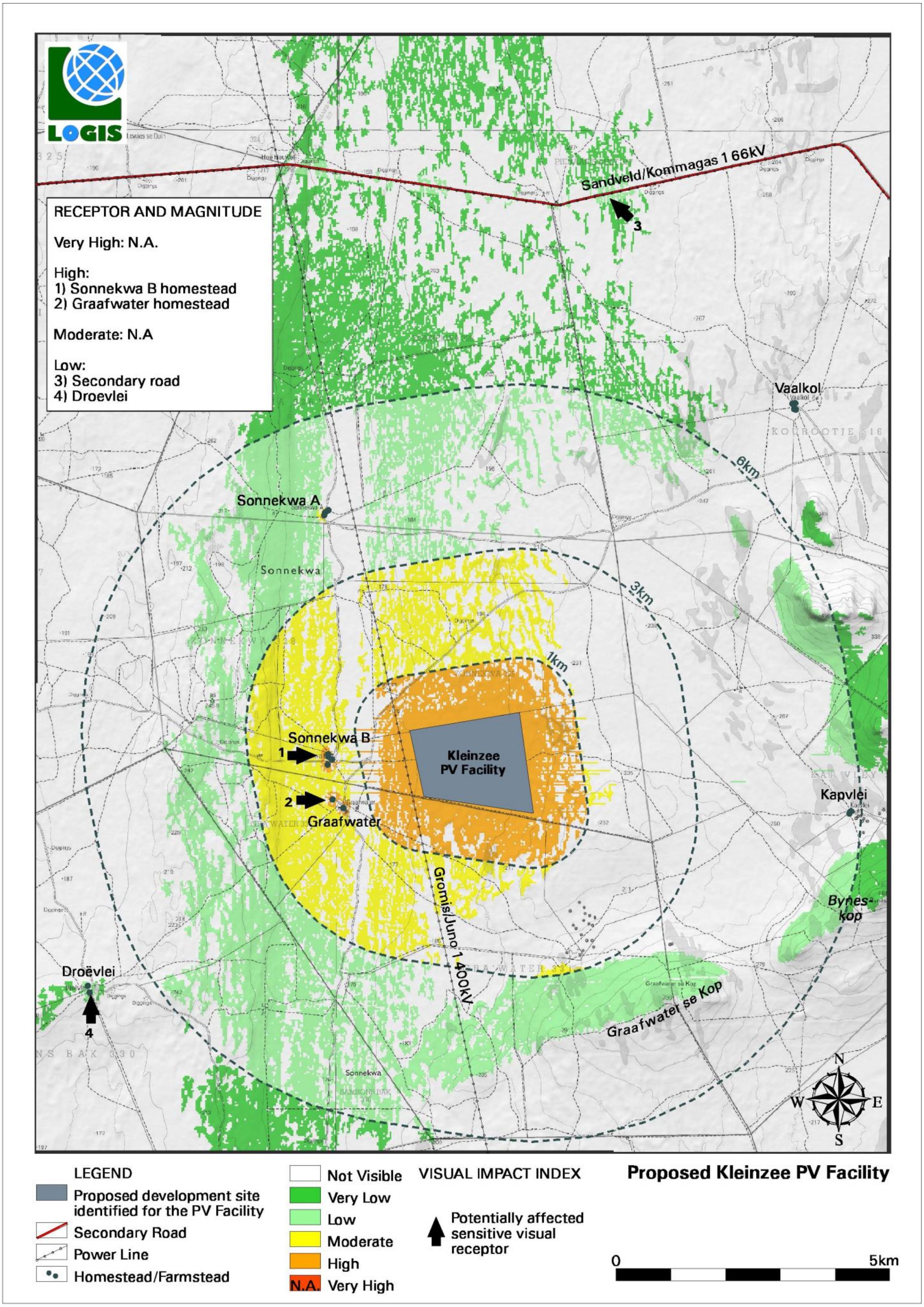
3 – 6km

There is a single potential sensitive receptor site within this zone the Sonnekwa A homestead. Visual exposure around this sensitive receptor is however limited. The magnitude of the visual impact is expected to be **moderate**, if it occurs.

>6 Km

Potential sensitive receptor site within this zone include observers traveling along the secondary road (site 3) and the residents of the ~~Droëvlie~~Droëvlei homestead (site 4). The magnitude of the visual impact is expected to be **low.**

Notes:
Where homesteads are derelict or deserted, the visual impact will be non-existent, until such time as it is inhabited again.



Map 7: Visual impact index and potentially affected sensitive visual receptors – Solar PV Facility

6.7. Visual impact assessment: impact rating methodology

The previous section of the report identified specific areas where likely visual impacts would occur and indicate the expected **magnitude** of potential impact. 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:** SCOPE OF WORK) 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 PV facility) and includes a table quantifying the potential visual impact according to the following criteria:

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

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

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

- <30 points: Low (where the impact would not have a direct influence on the decision to develop in the area)
- 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)

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[4] 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 PV facility).

[5] 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.

6.8. Visual impact assessment

The primary visual impacts of the proposed PV facility infrastructure are assessed below.

6.8.1. Construction impacts

6.8.1.1. Potential visual impact of construction activities on sensitive visual receptors in close proximity to the proposed PV facility and ancillary infrastructure

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

Construction activities may potentially result in a **Low** significance, temporary visual impact, both before and after mitigation.

A mitigating factor within this scenario is the very low occurrence of receptors within the receiving environment. No sensitive receptors are located in close proximity to the proposed PV facility. This essentially negates the probability of this impact occurring.

Table 2: Visual impact of construction activities on sensitive visual receptors in close proximity to the proposed PV facility.

Nature of Impact: Visual impact of construction activities on sensitive 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)**	Moderate **(6)**
Probability	Very Improbable **(1)**	Very Improbable **(1)**
Significance	Low **(16)**	Low **(12)**
Status (positive or negative)	Negative	Negative
Reversibility	Reversible **(1)**	Reversible **(1)**
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation: Planning: ➢ Retain and maintain natural vegetation (if present) immediately adjacent to the development footprint. Construction: ➢ Ensure that vegetation cover adjacent to the development footprint (if present) is not unnecessarily removed during the construction phase, where possible. ➢ Plan the placement of laydown areas and temporary construction equipment camps 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 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 (if present/if required) immediately after the completion of construction works.
Residual impacts: None, provided rehabilitation works are carried out as specified.

6.8.2. Operational impacts

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

The PV facility may potentially result in a **low** significance, visual impact, both before and after mitigation.

A mitigating factor within this scenario is the very low occurrence of receptors within the receiving environment. No sensitive receptors are located in close proximity to the proposed PV facility. This essentially negates 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 3: Visual impact on observers in close proximity to the proposed PV facility structures.

Nature of Impact: Visual impact on sensitive receptors within a 1km radius of the PV facility structures		
	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	Very Improbable **(1)**	Very Improbable **(1)**
Significance	Low **(18)**	Low **(14)**
Status (positive, neutral or negative)	Negative	Negative
Reversibility	Reversible **(1)**	Reversible **(1)**
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation / Management: Planning: ➢ Retain/re-establish and maintain natural vegetation (if present) immediately adjacent to the development footprint, where possible. ➢ Consult adjacent landowners (if present) in order to inform them of the development and to identify any (valid) visual impact concerns. ➢ Investigate the potential to screen affected receptor sites (if applicable and located within 1km of the facility) with planted vegetation cover. Operations: ➢ Maintain the general appearance of the facility as a whole. Decommissioning: ➢ Remove infrastructure not required for the post-decommissioning use. ➢ Rehabilitate all affected areas. Consult an ecologist regarding rehabilitation specifications.		
Residual impacts: The visual impact will be removed after decommissioning, provided the PV facility infrastructure is removed. Failing this, the visual impact will remain.		

6.8.2.2. Potential visual impact on sensitive visual receptors within a 1 – 3km radius

The operational PV facility could have a **moderate** visual impact (significance rating = 45) on residents of Sonnekwa B and Graafwater within 1 – 3km radius of the PV facility structures. This impact may be mitigated to **low** (significance rating = 26).

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 4: Visual impact of the proposed PV facility structures within a 1 – 3km radius.

<table>
<tr><td colspan="3">Nature of Impact:
Visual impact on residents of homesteads within a 1 – 3km radius of the PV facility structures</td></tr>
<tr><td></td><td>Without mitigation</td><td>With mitigation</td></tr>
<tr><td>Extent</td><td>Short distance (3)</td><td>Short distance (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>Probable (3)</td><td>Improbable (2)</td></tr>
<tr><td>Significance</td><td>Moderate (45)</td><td>Low (26)</td></tr>
<tr><td>Status (positive, neutral 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 / Management:
<u>Planning:</u>
➢ Retain/re-establish and maintain natural vegetation (if present) immediately adjacent to the development footprint.
<u>Operations:</u>
➢ Maintain the general appearance of the facility as a whole.
<u>Decommissioning:</u>
➢ Remove infrastructure not required for the post-decommissioning use.
➢ Rehabilitate all affected areas. Consult an ecologist regarding rehabilitation specifications.</td></tr>
<tr><td colspan="3">Residual impacts:
The visual impact will be removed after decommissioning, provided the PV facility infrastructure is removed. Failing this, the visual impact will remain.</td></tr>
</table>

6.8.2.3. Lighting impacts

Potential visual impact of operational, safety and security lighting of the facility at night on observers in close proximity to the proposed PV facility.

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 PV facility and the ancillary infrastructure (e.g. workshop and storage facilities) will go far to contain rather than spread the light.

The following table summarises the assessment of this anticipated impact, which is likely to be of **moderate** significance, and may be mitigated to **low**.

Table 5: Impact table summarising the significance of visual impact of lighting at night on visual receptors in close proximity to the proposed PV facility.

Nature of Impact: Visual impact of lighting at night 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	Long term **(4)**	Long term **(4)**
Magnitude	Very High **(10)**	Moderate **(6)**
Probability	Probable **(3)**	Improbable **(2)**
Significance	Moderate **(54)**	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: ➢ 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.		
Residual impacts: The visual impact will be removed after decommissioning, provided the PV facility and ancillary infrastructure is removed. Failing this, the visual impact will remain.		

6.8.2.4. Solar glint and glare impacts

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

Glint and glare occur 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 relatively 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 (i.e. such as those proposed for the Kleinzee Solar PV Facility) 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.[6]

There are no roads within a 1km radius of the proposed PV facility. This 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.[7] The potential visual impact related to solar glint and glare as a road travel hazard is therefore expected to be of **low** significance. No mitigation of this impact is required since the solar reflection is not predicted towards any roads.

Table 6: Impact table summarising the significance of the visual impact of solar glint and glare as a visual distraction to users of the secondary road

Nature of Impact: The visual impact of solar glint and glare as a visual distraction and possible road travel hazard		
	Without mitigation	***With mitigation***
Extent	Very short distance **(4)**	N.A.
Duration	Long term **(4)**	N.A.
Magnitude	Low **(4)**	N.A.
Probability	Improbable **(2)**	N.A.
Significance	Low **(24)**	N.A.
Status (positive or negative)	Negative	N.A.
Reversibility	Reversible **(1)**	N.A.
Irreplaceable loss of resources?	No	N.A.
Can impacts be mitigated?	N.A.	
Mitigation: N.A.		
Residual impacts: N.A.		

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

There are no affected residences within a 1km radius of the proposed PV facility. The potential visual impact related to solar glint and glare on static ground-based receptors (residents of homesteads) is therefore expected to be of **low** significance, both before and after mitigation.

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[6] Sources: Blue Oak Energy, FAA and Meister Consultants Group.

[7] December 2020, Solar Photovoltaic Glint and Glare Guidance Third Edition.

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: 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	Low **(4)**	Low **(4)**
Probability	Improbable **(2)**	Improbable **(2)**
Significance	Low **(24)**	Low **(24)**
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. ➢ 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, 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.		

6.8.2.5. Ancillary infrastructure

On-site ancillary infrastructure associated with the PV facility includes a BESS, inverters, low voltage cabling between the PV arrays, internal access roads, workshop, office buildings, etc.

No dedicated viewshed analyses have been generated for the ancillary infrastructure, as the range of visual exposure will fall within that of the PV arrays. The anticipated visual impact resulting from this infrastructure is likely to be of **low** significance both before and after mitigation.

Table 8: Visual impact of the ancillary infrastructure.

Nature of Impact: Visual impact of the ancillary infrastructure during the operation phase 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?	No, only best practise measures can be implemented	

Generic best practise mitigation/management measures: Planning: ➢ Retain/re-establish and maintain natural vegetation (if present) immediately adjacent to the development footprint/power line servitude where possible. Operations: ➢ Maintain the general appearance of the infrastructure. Decommissioning: ➢ Remove infrastructure not required for the post-decommissioning use. ➢ Rehabilitate all affected areas. Consult an ecologist regarding rehabilitation specifications.
Residual impacts: The visual impact will be removed after decommissioning, provided the ancillary infrastructure is removed. Failing this, the visual impact will remain.

6.9. Secondary impacts

The potential visual impact of the proposed PV facility 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.), plays a significant role.

An impact on the sense of place is one that alters the visual landscape to such an extent that the user experiences the environment differently, and more specifically, in a less appealing or less positive light.

The greater environment has a predominantly rural, undeveloped character and a natural appearance. These generally undeveloped landscapes are considered to have a high visual quality, except where urban development and power generation/distribution infrastructure represents existing visual disturbances.

The anticipated visual impact of the proposed PV facility on the regional visual quality (i.e. beyond 6km of the proposed infrastructure), and by implication, on the sense of place, is difficult to quantify, but is generally expected to be of **low** significance. This is due to the relatively low viewer incidence within close proximity to the proposed development and the presence of existing electricity infrastructure, as well as, the developments location within the Springbok REDZ.

Table 9: 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.		
	Without mitigation	***With mitigation***
Extent	Medium to longer distance **(2)**	Medium to longer distance **(2)**
Duration	Long term **(4)**	Long term **(4)**
Magnitude	Low **(4)**	Low **(4)**
Probability	Improbable **(2)**	Improbable **(2)**
Significance	Low **(20)**	Low **(20)**
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 (if present) immediately adjacent to the development footprint/servitude, where possible. <u>Operations:</u> ➢ Maintain the general appearance of the facility as a whole. <u>Decommissioning:</u> ➢ Remove infrastructure not required for the post-decommissioning use. ➢ Rehabilitate all affected areas. Consult an ecologist regarding rehabilitation specifications.
Residual impacts: The visual impact will be removed after decommissioning, provided the PV facility infrastructure is removed. Failing this, the visual impact will remain.

The potential cumulative visual impact of the PV facility on the visual quality of the landscape.

The construction of the Klienzee PV Facility may increase the cumulative visual impact of industrial type infrastructure within the region, especially in relation to the other two (2) solar energy facilities that form part of the PV Cluster.

On the other hand, the location of the PV Cluster within a REDZ will contribute to the consolidation of Solar Energy Facilities and other renewable energy facilities to this locality and avoid a potentially scattered proliferation of Solar Energy infrastructure throughout the region.

The cumulative visual impact is expected to be of **moderate** significance due to their remote locations and the general absence of potential sensitive visual receptors. This is considered to be acceptable from a visual perspective.

Table 10: The potential cumulative visual impact of the PV facilities on the visual quality of the landscape.

Nature of Impact: The potential cumulative visual impact of the PV facility on the visual quality of the landscape.		
	Overall impact of the proposed project considered in isolation (with mitigation)	***Cumulative impact of the project and other projects within the area (with mitigation)***
Extent	Very short distance **(4)**	Medium to longer distance **(2)**
Duration	Long term **(4)**	Long term **(4)**
Magnitude	Moderate **(6)**	Moderate **(6)**
Probability	Probable **(3)**	Probable **(3)**
Significance	Moderate **(42)**	Moderate **(36)**
Status (positive, neutral or negative)	Negative	Negative
Reversibility	Reversible **(1)**	Reversible **(1)**
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	No, only best practise measures can be implemented	

Generic best practise mitigation/management measures:
Planning: ➢ Retain/re-establish and maintain natural vegetation (if present) immediately adjacent to the development footprint where possible. Operations: ➢ Maintain the general appearance of the facility as a whole. Decommissioning: ➢ Remove infrastructure not required for the post-decommissioning use. ➢ Rehabilitate all affected areas. Consult an ecologist regarding rehabilitation specifications.
Residual impacts: The visual impact will be removed after decommissioning, provided the PV facility infrastructure is removed. Failing this, the visual impact will remain.

6.10. 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.
  - 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, where possible.

- 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. RESULTS – GRID CONNECTION INFRASTRUCTURE

7.1. Potential visual exposure

The potential visual exposure (visibility) of the proposed grid connection infrastructure is shown on **Map 8**. The visibility analyses were undertaken from the proposed power line alignments at 32m above ground level (i.e. the approximate maximum height of the power line towers). The viewshed analyses were restricted to a 3km radius due to the fact that visibility beyond this distance is expected to be negligible/highly unlikely for the relatively constrained vertical dimensions of this type of infrastructure (i.e. a 132kV power line).

Map 8 also indicates proximity radii from the proposed grid connection infrastructure in order to show the viewing distance (scale of observation) of the structures in relation to their surrounds.

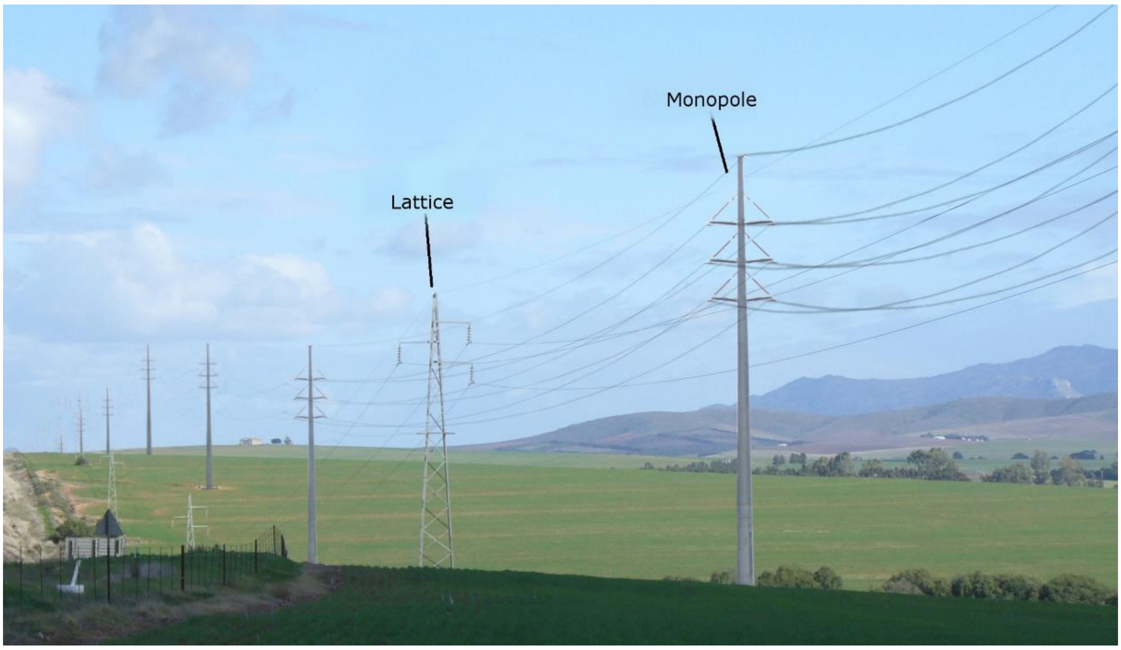


Figure 13: Examples of 132 kV overhead power lines

General

It is expected that the grid connection infrastructure may theoretically be visible within the 3km visual corridor and potentially highly visible within a 0.5km radius of the structures due to the generally flat terrain it traverses. Beyond 1,5km the visibility becomes more scattered due to the slightly undulating nature of the topography. The grid connection structures are unlikely to be visible beyond a 3km radius of the structures.

It should also be noted that the potential visual exposure will not occur in isolation, but rather in conjunction with the existing power line adjacent to the road.

0 – 0.5km

It is expected that the visual exposure of the proposed power line structures would be contained within the extend of the development site itself. Homesteads within this zone include:

- Sonnekwa A

0.5 – 1.5km

Potential visual exposure in the short to medium distance (i.e. between 0.5 and 1.5km), is still highly concentrated. There are no potential sensitive visual receptors located within this zone as the visually exposed areas fall within farmland and open space devoid of potential sensitive visual receptors.

1.5 – 3km

Within a 1.5 – 3km radius, the visual exposure becomes more scattered and interrupted due to the slightly undulating nature of the topography. Visually screened areas lie mainly to the north west of the proposed Kleinzee Solar PV Facility.

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

- Sonnekwa B
- Graafwater

> 3km

At distances exceeding 3km the intensity of visual exposure is expected to be very low and highly unlikely due to the distance between the object (grid connection infrastructure) and the observer.

Conclusion

In general terms it is envisaged that the grid connection infrastructure, where visible from shorter distances (e.g. less than 0.5km and potentially up to 1.5km), and where sensitive visual receptors may find themselves within this zone, may constitute a high visual prominence, potentially resulting in a visual impact. The incidence rate of sensitive visual receptors is however expected to be low, due to the generally remote location of the proposed infrastructure and the low number of potential observers. It should once again be noted that the potential visual exposure will not occur in isolation, but rather in conjunction with the existing power lines in the study area.

7.2. Potential cumulative visual exposure

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 be a new 132kV power line and substation as seen in conjunction with the existing (or proposed/authorised) grid connection infrastructure in close proximity.

Cumulative visual impacts may be:

- Combined, where several power lines 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 structures of a power line; and
- Sequential, when the observer has to move to another viewpoint to see different power line structures, or different views of the same power line (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 the power line infrastructure.

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 grid connection infrastructure on the landscape and visual amenity is a product of:

- The distance between the power lines;
- 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 power line; 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 the industrial infrastructure proposed in the area.

Conclusion

The proposed power line infrastructure is located in the vicinity to an existing power line and various authorised renewable energy facilities with their associated grid connections still to be constructed. The visual amenity along this power line corridor has already been or is already proposed to be compromised to a large degree. Admittedly, the frequency of visual exposure to power line infrastructure is expected to increase, but it is still preferable to consolidate the linear infrastructure as much as possible. To this end, the cumulative visual impact associated with the proposed power line is considered to be within acceptable limits, especially considering it is located within the Northern Corridor of the Strategic Transmission Corridors and the existing mining disturbance within the region.

7.3. Visual distance / observer proximity to the grid connection infrastructure

The proximity radii are based on the anticipated visual experience of the observer over varying distances. The distances are adjusted upwards for larger grid connection infrastructure (e.g. 400kV power lines) and downwards for smaller structures (e.g. 132kV power line) due to variations in height. This methodology was developed in the absence of any known and/or accepted standards for South African power line infrastructure.

The proximity radii (calculated from the grid connection infrastructure) are indicated on **Map 9**, and include the following:

- 0 – 0.5km - Short distance view where the structures would dominate the frame of vision and constitute a very high visual prominence.
- 0.5 – 1.5km - Medium distance views where the structures would be easily and comfortably visible and constitute a high visual prominence.
- 1.5 - 3km - Medium to longer distance view where the structures would become part of the visual environment, but would still be visible and recognisable. This zone constitutes a medium visual prominence.
- Greater than 3km - Long distance view where the structures may still be visible though not as easily recognisable. This zone constitutes a low visual prominence for the power lines.

The visual distance theory and the observer's proximity to the 132kV power line are closely related, and especially relevant, when considered from areas with a higher viewer incidence and a potentially negative visual perception of the proposed infrastructure.

7.4. 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 grid infrastructure. 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 within the study area is anticipated to be the highest for sensitive visual receptors 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 generally remote location of the proposed PV facility and associated grid connection ~~infrastucture~~infrastructure, and the ill populated nature of the receiving environment, there are only a limited number of potential sensitive visual receptor sites within closer proximity to the proposed development site. These receptor sites were listed in **Section 7.1**.

The potential sensitive visual receptor sites and areas of higher viewer incidence are indicated on **Map 9**.

The author (at the time of the compilation of this report) is not aware of any objections raised against the proposed Kleinzee Solar PV Facility or its associated grid connection infrastructure.

7.5. Visual absorption capacity

Visual Absorption Capacity (VAC) is the capacity of the receiving environment to absorb the potential visual impact of the proposed infrastructure. 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.

Land cover is dominated primarily by *low shrubland* with patches of *grassland* and bare rock and soil in places. *Low shrubland* is described as *natural / semi-natural low shrub dominated areas, typically within < +/- 2m canopy height, specifically associated with the Fynbos Biome. It includes a range of canopy densities encompassing sparse to dense canopy covers. Very sparse covers may be associated with the bare ground glass. Note that taller tree / bush / shrub communities within this vegetation type are typically classified separately as one of the other tree or bush dominated cover classes.*

Overall, the Visual Absorption Capacity (VAC) of the receiving environment is low by virtue of the limited height (or absence) of the vegetation and the absence of urban development. In addition, the scale and form of the proposed structures mean that it is unlikely that the environment will visually absorb them in terms of texture, colour, form and light/shade characteristics. Within this area the VAC of vegetation will not be taken into account, thus assuming a worst-case scenario in the impact assessment.

Where homesteads 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 infrastructure). 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.

7.6. Visual impact index

The combined results of the visual exposure, viewer incidence/perception and visual distance of the proposed grid connection infrastructure culminate in a visual impact index. 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 grid connection infrastructure, a high viewer incidence and a potentially negative perception 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 **potential sensitive visual receptors** within a 500m radius of the project infrastructure may experience visual impacts of a **very high magnitude**. The magnitude of visual impact on sensitive visual receptors subsequently subsides with distance to; **high** within a 0.5 – 1.5km radius (where/if sensitive receptors are present) and **moderate** within a 1.5 – 3km radius (where/if sensitive receptors are present). Receptors beyond 3km are expected to have visual impacts of **low** or **negligible** magnitude.

The visual impact index and potentially affected sensitive visual receptors are indicated on **Map 10**. In general, there are only a limited number of receptor sites within closer proximity (3km) to the proposed project infrastructure. The magnitude of the potential visual impact on these receptor sites are discussed below.

Magnitude of the potential visual impact

0 – 0.5km

The grid connection infrastructure (power line) may have a visual impact of **very high** magnitude on the following observers:

Residents of/or visitors to:

- Site 1 –Sonnekwa A

0.5 – 1.5km

There are no potential sensitive receptors located within this zone therefore the grid connection infrastructure (power line) is not expected to have a visual impact of **high** magnitude on any known observers.

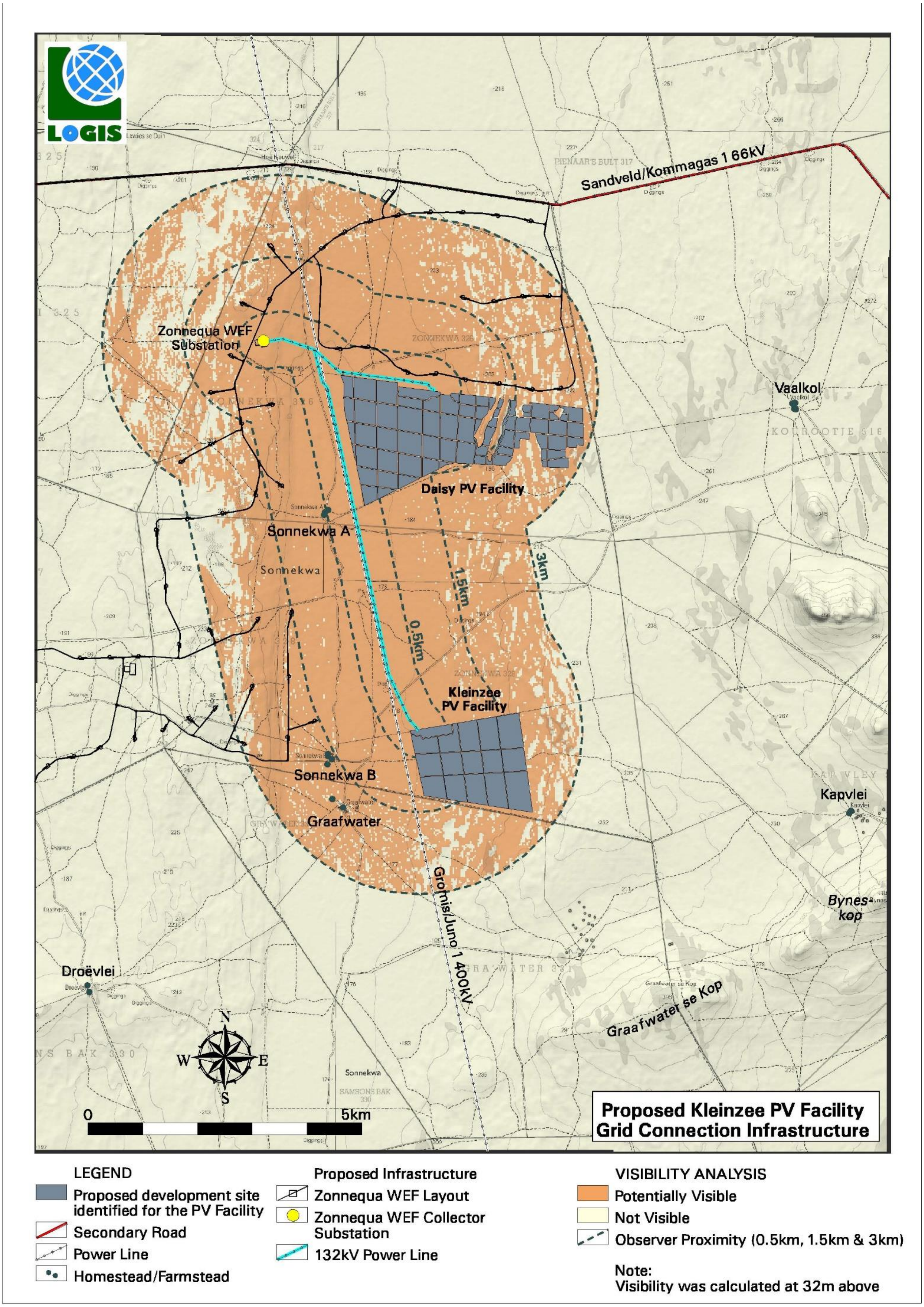
1.5 – 3km

The grid connection infrastructure (power line) may have a visual impact of **moderate** magnitude on the following observers:

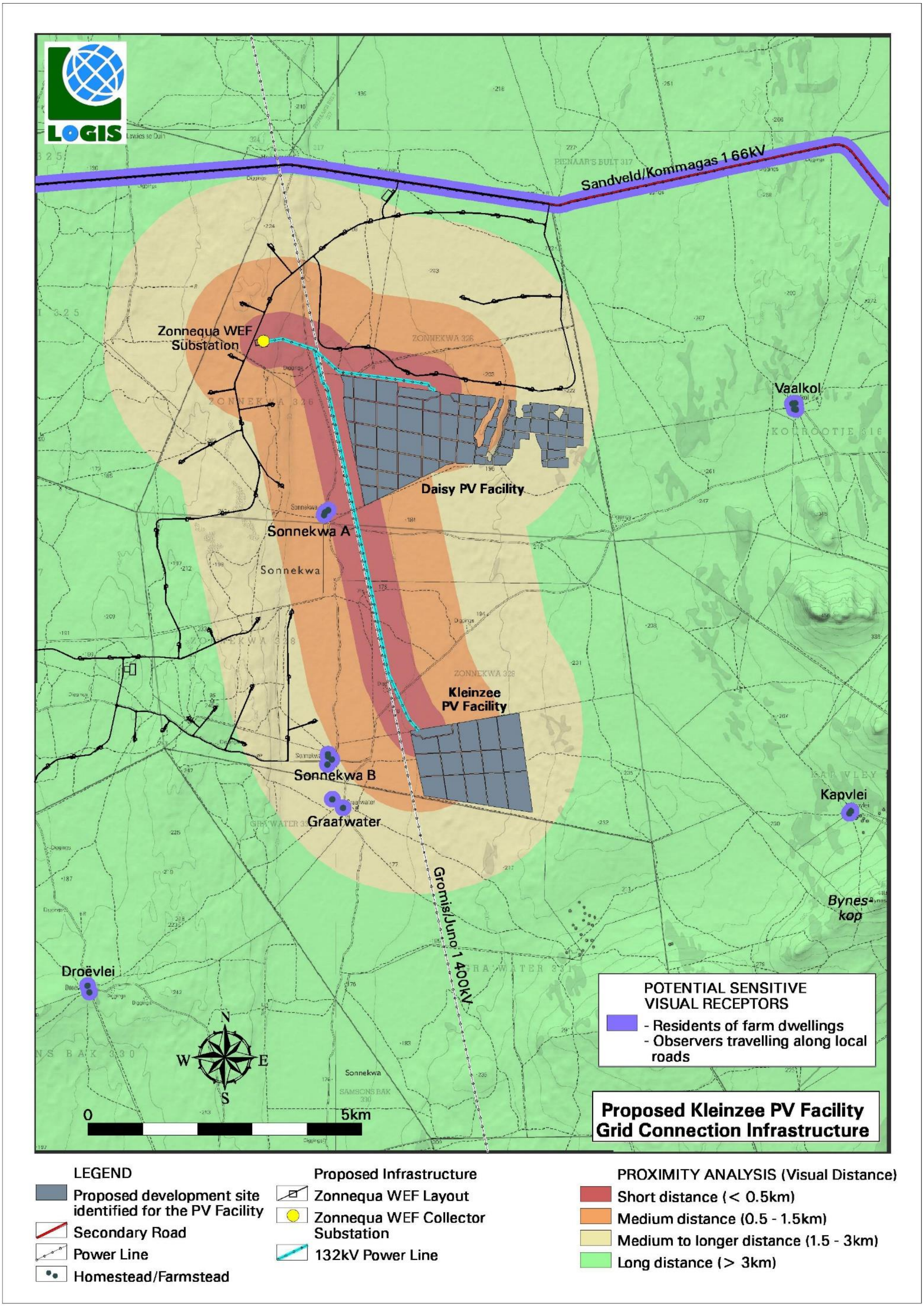
Residents of/or visitors to:

- Site 2 –Sonnekwa B
- Site 3 - Graafwater

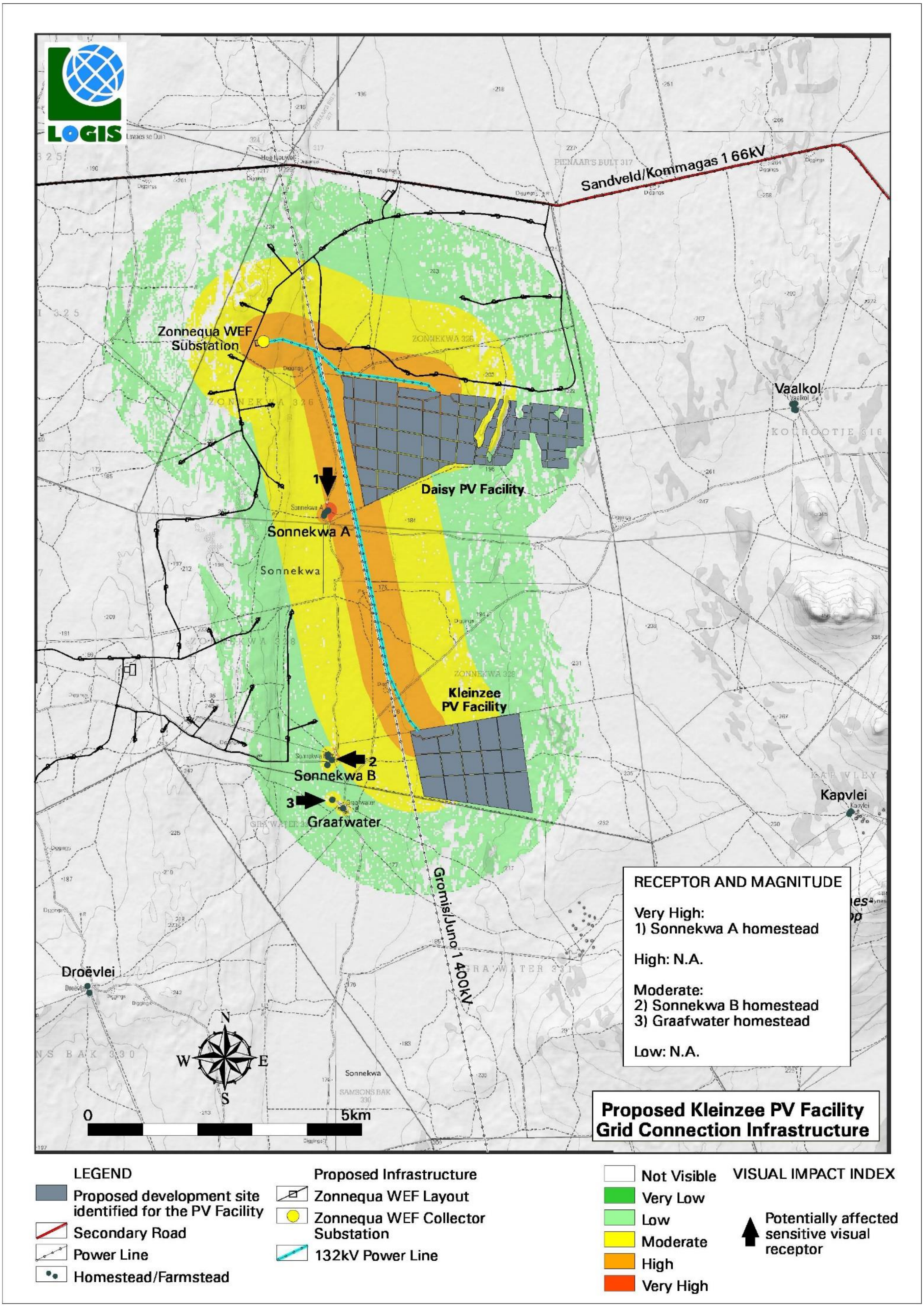
Notes:
Where homesteads are derelict or deserted, the visual impact will be non-existent, until such time as it is inhabited again.



Map 8: Viewshed analysis of the proposed grid connection infrastructure – Grid Connection



Map 9: Proximity analysis and potential sensitive visual receptors – Grid Connection



Map 10: Visual impact index and potentially affected sensitive visual receptors – Grid Connection

7.7. Visual impact assessment: 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:** SCOPE OF WORK) related to the visual impact.

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

- **Extent** - long distance (very low = 1), medium to longer distance (low = 2), short distance (medium = 3) and very short distance (high = 4)[8].
- **Duration** - very short (0-1 yrs. = 1), short (2-5 yrs. = 2), medium (5-15 yrs. = 3), long (>15 yrs. = 4), and permanent (= 5).
- **Magnitude** - None (= 0), minor (= 2), low (= 4), medium/moderate (= 6), high (= 8) and very high (= 10)[9].
- **Probability** – very improbable (= 1), improbable (= 2), probable (= 3), highly probable (= 4) and definite (= 5).
- **Status** (positive, negative or neutral).
- **Reversibility** - reversible (= 1), recoverable (= 3) and irreversible (= 5).
- **Significance** - low, medium or high.

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

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

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

7.8. Visual impact assessment

The primary visual impacts of the proposed grid connection infrastructure for the Kleinzee Solar PV's associated Grid Connection Infrastructure are assessed below.

7.8.1. Construction impacts

7.8.1.1. Potential visual impact of construction activities on sensitive visual receptors in close proximity to the proposed grid connection infrastructure.

During construction, there may be an increase in heavy vehicles utilising the roads to the power line servitude site that may cause, at the very least, a visual nuisance to other road users and landowners in the area.

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

[9] 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.

Construction activities may potentially result in a **moderate** (significance rating = 36), temporary visual impact, that may be mitigated to **low** (significance rating = 20).

A mitigating factor within this scenario is the very low occurrence of receptors within the receiving environment. This reduces the probability of this impact occurring.

Table 11: Visual impact of construction activities on sensitive visual receptors in close proximity to the proposed grid connection infrastructure.

<table>
<tr><td colspan="3">Nature of Impact:
Visual impact of construction activities on sensitive visual receptors in close proximity to the proposed grid connection infrastructure.</td></tr>
<tr><td></td><td>Without mitigation</td><td>With mitigation</td></tr>
<tr><td>Extent</td><td>Very short distance (4)</td><td>Very short distance (4)</td></tr>
<tr><td>Duration</td><td>Short term (2)</td><td>Short term (2)</td></tr>
<tr><td>Magnitude</td><td>Moderate (6)</td><td>Low (4)</td></tr>
<tr><td>Probability</td><td>Probable (3)</td><td>Improbable (2)</td></tr>
<tr><td>Significance</td><td>Moderate (36)</td><td>Low (20)</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:</u>
➢ Retain and maintain natural vegetation immediately adjacent to the development footprint/servitude.
<u>Construction:</u>
➢ Ensure that vegetation is not unnecessarily removed during the construction phase.
➢ Plan the placement of lay-down areas (if required) and temporary construction equipment 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 area 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 appropriate and effective 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.</td></tr>
<tr><td colspan="3">Residual impacts:
None, provided rehabilitation works are carried out as specified.</td></tr>
</table>

7.8.2. Operational impacts

7.8.2.1. Potential visual impact on sensitive visual receptors located within a 0.5km radius of the grid connection infrastructure during the operation phase

The grid connection infrastructure is expected to have a **moderate** visual impact (significance rating = 32) on observers within a 0.5km radius (and potentially up to a 1.5km radius) of the grid connection infrastructure.

A mitigating factor within this scenario is the very low occurrence of receptors within the receiving environment. Additionally, no sensitive receptors are located within 0.5 – 1.5km of the proposed grid connection infrastructure. This reduces the probability of this impact occurring.

No mitigation of this impact is possible (i.e. the structures will be visible regardless), but general mitigation and management measures are recommended as best practice. The table below illustrates this impact assessment.

Table 12: Visual impact on observers in close proximity to the proposed grid connection infrastructure.

Nature of Impact: Visual impact on residents at homesteads in close proximity to the power line structures.		
	Without mitigation	***With mitigation***
Extent	Very short distance **(4)**	Very short distance **(4)**
Duration	Long term **(4)**	Long term **(4)**
Magnitude	Very High **(10)**	Very High **(10)**
Probability	Improbable **(2)**	Improbable **(2)**
Significance	Moderate **(36)**	Moderate **(36)**
Status (positive, neutral or negative)	Negative	Negative
Reversibility	Reversible **(1)**	Reversible **(1)**
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	No	
Best Practise Mitigation/Management: Planning: ➢ Retain/re-establish and maintain natural vegetation immediately adjacent to the development footprint/servitude. Operations: ➢ Maintain the general appearance of the infrastructure. Decommissioning: ➢ Remove infrastructure not required for the post-decommissioning use. ➢ Rehabilitate all affected areas. Consult an ecologist regarding rehabilitation specifications.		
Residual impacts: The visual impact will be removed after decommissioning, provided the power line infrastructure is removed. Failing this, the visual impact will remain.		

7.8.2.2. Potential visual impact on sensitive visual receptors within the region (1.5 – 3km radius) during the operation of the grid connection infrastructure

The grid connection infrastructure will have a **low** visual impact (significance rating = 15) on residents of homesteads within a 1.5 - 3km radius of the infrastructure.

A mitigating factor within this scenario is the very low occurrence of receptors within the receiving environment. This reduces the probability of this impact occurring.

No mitigation of this impact is possible (i.e. the structures will be visible regardless), but general mitigation and management measures are recommended as best practice. The table below illustrates this impact assessment.

Table 13: Visual impact of the proposed grid connection infrastructure within the region.

Nature of Impact: Visual impact on observers travelling along the roads and residents at homesteads within a 1.5 – 3km radius of the grid connection infrastructure.		
	Without mitigation	***With mitigation***
Extent	Short distance **(3)**	Short distance **(3)**
Duration	Long term **(4)**	Long term **(4)**
Magnitude	High **(8)**	High **(8)**
Probability	Very Improbable **(1)**	Very Improbable **(1)**
Significance	Low **(15)**	Low **(15)**
Status (positive, neutral or negative)	Negative	Negative
Reversibility	Reversible **(1)**	Reversible **(1)**
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	No	
Best Practise Mitigation/Management: Planning: ➢ Retain/re-establish and maintain natural vegetation immediately adjacent to the development footprint/servitude. Operations: ➢ Maintain the general appearance of the servitude as a whole. Decommissioning: ➢ Remove infrastructure not required for the post-decommissioning use. ➢ Rehabilitate all affected areas. Consult an ecologist regarding rehabilitation specifications.		
Residual impacts: The visual impact will be removed after decommissioning, provided that the grid connection infrastructure is removed. Failing this, the visual impact will remain.		

7.8.2.3. Potential visual impact of associated infrastructure on sensitive visual receptors in close proximity

The height of the proposed new substation will not exceed 32m in height, therefore the visual exposure of this component will fall within the view sheds generated for the power line infrastructure. Other associated infrastructure would include access roads and cleared servitudes along the alignments.

Servitudes will need to be maintained along the length of the proposed power line for their entire operational life and access roads will be required both to construct the power line, and to maintain the servitudes (operational phase). These servitudes and access roads have the potential of manifesting as landscape scarring, and thus represent a potential visual impact within the viewshed areas. This is especially relevant for steep slopes where erosion could occur over time. Such erosion and landscape scarring could represent a visual impact. As access roads and servitudes have no elevation or height, so the visual impact of this associated infrastructure will be absorbed by the visual impact of the primary infrastructure.

The grid connection infrastructure is expected to have a **low** visual impact (significance rating = 30) on observers within a 0.5km radius (and potentially up to a 1.5km radius) of the grid connection infrastructure pre mitigation and a **low** visual impact (significance rating= 15) post mitigation.

A mitigating factor within this scenario is the very low occurrence of receptors within the receiving environment. Additionally, no sensitive receptors are located within 0.5 – 1.5km of the proposed grid connection infrastructure. This reduces the probability of this impact occurring.

Table 14: Visual impact of the associated infrastructure on sensitive receptors in close proximity

Nature of Impact: Visual impact on observers travelling along the roads and residents at homesteads within a 1.5 – 3km radius of the grid connection infrastructure.		
	Without mitigation	***With mitigation***
Extent	Short distance **(3)**	Short distance **(3)**
Duration	Long term **(4)**	Long term **(4)**
Magnitude	High **(8)**	High **(8)**
Probability	Improbable **(2)**	Very Improbable **(1)**
Significance	Low **(30)**	Low **(15)**
Status (positive, neutral or negative)	Negative	Negative
Reversibility	Reversible **(1)**	Reversible **(1)**
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	No	
Best Practise Mitigation/Management: Planning: ➢ Retain and maintain natural vegetation immediately adjacent to the development footprint/servitude. Construction: ➢ Ensure that vegetation is not unnecessarily removed during the construction phase. ➢ Plan the placement of lay-down areas (if required) and temporary construction equipment 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 area 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 appropriate and effective 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: The visual impact will be removed after decommissioning, provided that the grid connection infrastructure is removed. Failing this, the visual impact will remain.		

7.9. Visual impact assessment: secondary impacts

The potential visual impact of the proposed grid connection infrastructure 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.), plays a significant role.

An impact on the sense of place is one that alters the visual landscape to such an extent that the user experiences the environment differently, and more specifically, in a less appealing or less positive light.

The greater environment has a predominantly rural, undeveloped character and a natural appearance. These generally undeveloped landscapes are considered to have a high visual quality, except where urban development and power generation/distribution infrastructure represents existing visual disturbances.

The anticipated visual impact of the proposed grid connection infrastructure on the regional visual quality (i.e. beyond 3km of the proposed infrastructure), and by implication, on the sense of place, is difficult to quantify, but is generally expected to be of **low** significance.

Table 15: The potential impact on the sense of place of the region of the grid connection infrastructure

Nature of Impact: The potential impact of the development of the proposed grid connection infrastructure on the sense of place of the region.		
	Without mitigation	***With mitigation***
Extent	Medium to longer distance **(2)**	Medium to longer distance **(2)**
Duration	Long term **(4)**	Long term **(4)**
Magnitude	Low **(4)**	Low **(4)**
Probability	Improbable **(2)**	Improbable **(2)**
Significance	Low **(20)**	Low **(20)**
Status (positive, neutral or negative)	Negative	Negative
Reversibility	Reversible **(1)**	Reversible **(1)**
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	No, only best practise measures can be implemented	
Generic best practise mitigation/management measures: Planning: ➢ Retain/re-establish and maintain natural vegetation immediately adjacent to the development footprint/servitude. Operations: ➢ Maintain the general appearance of the servitude as a whole. Decommissioning: ➢ Remove infrastructure not required for the post-decommissioning use. ➢ Rehabilitate all affected areas. Consult an ecologist regarding rehabilitation specifications.		
Residual impacts: The visual impact will be removed after decommissioning, provided the grid connection infrastructure is removed. Failing this, the visual impact will remain.		

The potential cumulative visual impact of the proposed grid connection infrastructure on the visual quality of the landscape.

The construction of the grid connection infrastructure for the Kleinzee Solar PV facility may increase the cumulative visual impact of industrial type infrastructure within the region.

The anticipated cumulative visual impact of the proposed grid connection infrastructure is expected to be of **moderate** significance (significance rating = 42). This is considered to be acceptable from a visual impact perspective.

Table 16: The potential cumulative visual impact on the visual quality of the landscape.

<table>
<tr><td colspan="3">Nature of Impact:
The potential cumulative visual impact of the grid connection infrastructure on the visual quality of the landscape.</td></tr>
<tr><td></td><td>Overall impact of the project considered in isolation (with mitigation)</td><td>Cumulative impact of the project and other projects within the area (with mitigation)</td></tr>
<tr><td>Extent</td><td>Very short distance (4)</td><td>Medium to longer distance (2)</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>High (8)</td></tr>
<tr><td>Probability</td><td>Improbable (2)</td><td>Probable (3)</td></tr>
<tr><td>Significance</td><td>Moderate (32)</td><td>Moderate (42)</td></tr>
<tr><td>Status (positive, neutral 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">No, only best practise measures can be implemented</td></tr>
<tr><td colspan="3">Generic best practise mitigation/management measures:
<u>Planning:</u>
➢ Retain/re-establish and maintain natural vegetation immediately adjacent to the development footprint/servitude.
<u>Operations:</u>
➢ Maintain the general appearance of the servitude as a whole.
<u>Decommissioning:</u>
➢ Remove infrastructure not required for the post-decommissioning use.
➢ Rehabilitate all affected areas. Consult an ecologist regarding rehabilitation specifications.</td></tr>
<tr><td colspan="3">Residual impacts:
The visual impact will be removed after decommissioning, provided the grid infrastructure is removed. Failing this, the visual impact will remain.</td></tr>
</table>

7.10. The potential to mitigate visual impacts

The primary visual impact, namely the appearance of the proposed grid connection infrastructure is not possible to mitigate. The functional design of the structures cannot be changed in order to reduce visual impacts.

Secondary impacts anticipated as a result of the proposed grid connection infrastructure (i.e. visual character and sense of place) are also not possible to mitigate.

The following mitigation is, however possible:

- Retain/re-establish and maintain natural vegetation in all areas immediately adjacent to the development footprint/servitude. This measure will help to soften the appearance of the grid connection infrastructure within its context.

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

  - Ensure that vegetation is not unnecessarily cleared or removed during the construction period.
  - Plan the placement of laydown areas (if required) 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 area 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 appropriate and effective dust suppression techniques as and when required (i.e. whenever dust becomes apparent).
  - Restrict construction activities to daylight hours as far as possible, in order to negate or reduce the visual impacts associated with lighting.
  - Rehabilitate all disturbed areas, construction areas, roads, slopes etc. immediately after the completion of construction works. If necessary, an ecologist must be consulted to assist or give input into rehabilitation specifications.

- During operation, the maintenance of the grid connection infrastructure will ensure that the infrastructure does not degrade, therefore aggravating 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 a when required.

- Once the grid connection infrastructure has exhausted its life span, all associated infrastructure not required for the post rehabilitation use of the site/servitude should be removed and all disturbed areas appropriately rehabilitated. An ecologist should be consulted to give input into rehabilitation specifications.

- All rehabilitated areas should be monitored for at least a year following decommissioning, and remedial actions implemented as and when required.

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

8. CONCLUSION AND RECOMMENDATIONS

The construction and operation of the proposed Kleinzee Solar PV Facility and its associated grid connection infrastructure may have a visual impact on the study area. The visual impact will differ amongst places, depending on the distance from the facility.

The combined visual impact or cumulative visual impact of the proposed two (2) solar ~~energy~~ facilities (i.e. the proposed Daisy PV, and Kleinzee PV facilities that form part of Cluster) is expected to increase the area of potential visual impact within the region. The intensity of visual impact (number of PV arrays visible) to exposed receptors, especially those located within a 3km radius, is expected to be greater than it would be for a single solar energy facility. The cumulative visual impact is however still expected to be within acceptable limits, due to the limited potential sensitive visual receptors and its location within the Springbok REDZ.

The proposed power line infrastructure is located in the vicinity to an existing power line and various authorised renewable energy facilities with their associated grid connections still to be constructed. The visual amenity along this power line corridor has already been or is already proposed to be compromised to a large degree. Admittedly, the frequency of visual exposure to power line infrastructure is expected to increase, but it is still preferable to consolidate the linear infrastructure as much as possible. To this end, the cumulative visual impact associated with the proposed power line is considered to be within acceptable limits, especially considering it is located within the Northern Corridor of the Strategic Transmission Corridors and the existing mining disturbance within the region.

Overall, the significance of the visual impacts for both the Kleinzee Solar PV Facility and its associated Grid Connection Infrastructure is expected to range from **moderate** to **low** as a result of the generally undeveloped character of the landscape and the remote location of the project infrastructure. There are a very limited number of potential sensitive visual receptors within a 3km radius of the proposed structures, although the possibility does exist for visitors to the region to venture in to closer proximity to the PV facility structures. These observers may consider visual exposure to this type of infrastructure to be intrusive.

A number of mitigation measures have been proposed (**Section 6.9. & 7.10**). 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 Solar PV facility and associated grid connection infrastructure would be considered to be acceptable from a visual impact perspective and can therefore be authorised.

9. IMPACT STATEMENT

The findings of the Visual Impact Assessment undertaken for the proposed 200MW Kleinzee Solar PV facility and associated grid connection infrastructure 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).

This impact is applicable to the individual Kleinzee Solar PV Facility and to the potential cumulative visual impact of the facility in relation to the proposed PV Cluster where the combined frequency of visual impact is expected be greater. The potential area of cumulative visual exposure is however still deemed to be within acceptable limits, considering the PV facilities' relatively close proximity to each other, the generally remote location of the infrastructure, and the limited number of observers within the region.

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

Kleinzee ~~PV Solar~~Solar PV Facility:

- During construction, there may be a noticeable increase in heavy vehicles utilising the roads to the development site that may cause, at the very least, a visual nuisance to other road users and landowners in the area. Construction activities may potentially result in a **low**, temporary visual impact, both before and after mitigation. No sensitive receptors are located in close proximity to the proposed PV facility. This essentially negates the probability of this impact occurring.

- The PV facility is expected to have a **low** visual impact pre-mitigation and post mitigation on sensitive receptors within a 1km radius of the proposed PV facility. No sensitive receptors are located in close proximity to the proposed PV facility. This essentially negates the probability of this impact occurring.

- The operational PV facility could have a **moderate** visual impact on residents of Sonnekwa B and Graafwater within a 1 – 3km radius of the PV facility structures. This impact may be mitigated to **low**.

- The anticipated impact of lighting at the PV facility is likely to be of **moderate** significance, and may be mitigated to **low**.

- The potential visual impact related to solar glint and glare as a road travel hazard is expected to be of **low** significance, as there are no roads within a 1km radius of the proposed PV facility.

- There are no affected residences within a 1km radius of the proposed PV facility. The potential visual impact related to solar glint and glare on static ground-based receptors (residents of homesteads) is therefore expected to be of **low** significance, both before and after mitigation.

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

- The anticipated visual impact of the proposed PV facility on the regional visual quality (i.e. beyond 6km of the proposed infrastructure), and by implication, on the sense of place, is difficult to quantify, but is generally expected to be of **low** significance.

- The cumulative visual impact is expected to be of **moderate** significance due to their remote locations and the general absence of potential sensitive visual receptors.

Grid Connection Infrastructure:

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

- The grid connection infrastructure is expected to have a **moderate** visual impact on observers within a 0.5km radius (and potentially up to a 1.5km radius) of the grid connection infrastructure.

- The grid connection infrastructure is expected to have a **low** negative visual impact on observers traveling along the roads and residents of homesteads within a 1.5 - 3km radius of the structures.

- The potential visual impact of associated infrastructure is expected to have a **low** visual impact on observers within a 0.5km radius (and potentially up to a 1.5km radius) of the grid connection infrastructure pre mitigation and a **low** visual impact post mitigation.

- The anticipated visual impact of the proposed grid connection infrastructure on the regional visual quality (i.e. beyond 3km of the proposed infrastructure), and by implication, on the sense of place, is difficult to quantify, but is generally expected to be of **low** significance.

- The anticipated cumulative visual impact of the proposed grid connection infrastructure is expected to be of **moderate** negative significance, which is considered to be acceptable from a visual perspective.

General:

The anticipated visual impacts listed above (i.e. post mitigation impacts) range from **moderate** to **low** significance. Anticipated visual impacts on sensitive visual receptors (if and where present) in close proximity to the proposed facility are not considered to be fatal flaws for the proposed Kleinzee Solar PV facility or its associated grid connection infrastructure.

Considering all factors, it is recommended that the development of the facility as proposed be supported; subject to the implementation of the recommended mitigation measures (**Section 6.10. and 7.10**) and management programmes (**Section 10.**).

10. MANAGEMENT PROGRAMME

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

Kleinzee Solar PV Facility:

Table 17: Management programme – Planning for Kleinzee Solar PV facility.

OBJECTIVE: The mitigation and possible negation of visual impacts associated with the planning of the proposed Kleinzee Solar PV facility.		
Project Component/s	The solar energy facility and ancillary infrastructure (i.e. PV panels, access roads, transformers, security lighting, workshop, power line, etc.).	
Potential Impact	Primary visual impact of the facility due to the presence of the PV panels and associated infrastructure as well as the visual impact of lighting at night.	
Activity/Risk Source	The viewing of the above mentioned by observers on or near the site (i.e. within 1km of the site) as well as within the region.	
Mitigation: Target/Objective	Optimal planning of infrastructure to minimise the visual impact.	
Mitigation: Action/control	**Responsibility**	**Timeframe**
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 18: Management programme – Construction for Kleinzee Solar PV facility.

OBJECTIVE: The mitigation and possible negation of visual impacts associated with the construction of the proposed Kleinzee Solar PV facility.		
Project Component/s	Construction site and activities	
Potential Impact	Visual impact of general construction activities, and the potential scarring of the landscape due to vegetation clearing and resulting erosion.	
Activity/Risk Source	The viewing of the above mentioned by observers on or near the site.	
Mitigation: Target/Objective	Minimal visual intrusion by construction activities and intact vegetation cover outside of immediate construction work areas.	
Mitigation: Action/control	**Responsibility**	**Timeframe**
Ensure that vegetation cover adjacent to the development footprint (if present) is not unnecessarily removed during the construction phase, where possible.	Project proponent / contractor	Early in the construction phase.
Reduce the construction phase through careful logistical planning and productive implementation of resources wherever possible.	Project proponent / contractor	Early in the construction phase.
Restrict the activities and movement of construction workers and vehicles to the immediate construction site and existing access roads.	Project proponent / contractor	Throughout the construction phase.
Ensure that rubble, litter, and disused construction materials are appropriately stored (if not removed 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 19: Management programme – Operation for Kleinzee Solar PV facility.

OBJECTIVE: The mitigation and possible negation of visual impacts associated with the operation of the proposed Kleinzee Solar PV 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 20: Management programme – Decommissioning – Operation for Kleinzee Solar PV facility.

OBJECTIVE: The mitigation and possible negation of visual impacts associated with the decommissioning of the proposed Kleinzee Solar PV facility.		
Project Component/s	The solar energy facility and ancillary infrastructure (i.e. PV panels, access roads, workshop, transformers, etc.).	
Potential Impact	Visual impact of residual visual scarring and vegetation rehabilitation failure.	
Activity/Risk Source	The viewing of the above mentioned by observers on or near the site.	
Mitigation: Target/Objective	Only the infrastructure required for post decommissioning use of the site retained and rehabilitated vegetation in all disturbed areas.	
Mitigation: Action/control	**Responsibility**	**Timeframe**
Remove infrastructure not required for the post-decommissioning use of the site.	Project proponent / operator	During the decommissioning phase.
Rehabilitate access roads and servitudes not required for the post-decommissioning use of the site. If necessary, an ecologist should be consulted to give input into rehabilitation specifications.	Project proponent / operator	During the decommissioning phase.

Monitor rehabilitated areas quarterly for at least a year following decommissioning, and implement remedial action as and when required.	Project proponent / operator	Post decommissioning.
Performance Indicator	Vegetation cover on and in the vicinity of the site is intact (i.e. full cover as per natural vegetation within the environment) with no evidence of degradation or erosion.	
Monitoring	Monitoring of rehabilitated areas quarterly for at least a year following decommissioning.	

Grid Connection Infrastructure:

Table 21: Management Programme: Planning for the Grid Connection Infrastructure

OBJECTIVE: The mitigation and possible negation of visual impacts associated with the planning of the proposed grid connection infrastructure.		
Project component/s	Kleinzee Grid connection infrastructure.	
Potential Impact	Primary visual impact due to the presence of the grid connection infrastructure in the landscape.	
Activity/risk source	The viewing of the grid connection infrastructure by observers near the infrastructure as well as within the region.	
Mitigation: Target/Objective	Optimal planning of infrastructure so as to minimise visual impact.	
Mitigation: Action/control	Responsibility	Timeframe
Implement an environmentally responsive planning approach for the development of roads and infrastructure to limit cut and fill requirements. Plan with due cognisance of the topography.	Project proponent / design consultant	Planning phase.
Consolidate infrastructure and make use of already disturbed sites rather than natural areas, as far as practically feasible.	Project proponent / design consultant	Planning phase.
Performance Indicator	No visible degradation of access roads and other associated infrastructure from surrounding areas.	
Monitoring	Not applicable.	

Table 22: Management Programme: Construction for the Grid Connection Infrastructure

OBJECTIVE: The mitigation and possible negation of visual impacts associated with the construction of the proposed grid connection infrastructure.		
Project component/s	Construction activities associated with the development of the 132kV power line.	
Potential Impact	Visual impact of general construction activities, and the potential scarring of the landscape due to vegetation clearing.	
Activity/risk source	The viewing of general construction activities by observers near the development areas.	
Mitigation: Target/Objective	Minimal visual intrusion by construction activities and intact vegetation cover outside of immediate works areas.	
Mitigation: Action/control	Responsibility	Timeframe
Ensure that vegetation is not unnecessarily cleared or removed during the construction period.	Project proponent / contractor	Early in the construction phase.

Plan the placement of laydown areas (if required) and temporary construction equipment camps in order to minimise vegetation clearing (i.e. in already disturbed areas) wherever possible.	Project proponent / contractor	Early in and throughout the construction phase.
Restrict the activities and movement of construction workers and vehicles to the immediate construction area and existing access roads.	Project proponent / contractor	Throughout the construction phase.
Ensure that rubble, litter, and disused construction materials are appropriately stored (if not removed 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 appropriate and effective 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, as far as possible, in order to negate or reduce the visual impacts associated with lighting.	Project proponent / contractor	Throughout the construction phase.
Rehabilitate all disturbed areas, construction areas, servitudes etc. immediately after the completion of construction works. If necessary, consult an ecologist to give input into rehabilitation specifications.	Project proponent / contractor	Throughout and at the end of the construction phase.

Performance Indicator	Vegetation cover within the servitudes and in the vicinity of the grid connection infrastructure has been maintained as far as possible and disturbed areas have been rehabilitated with no evidence of erosion.
Monitoring	Monitoring of vegetation clearing during construction. Monitoring of rehabilitated areas post construction.

Table 23: Management Programme: Operation for the Grid Connection Infrastructure

OBJECTIVE: The mitigation and possible negation of visual impacts associated with the operation of the proposed grid connection infrastructure.		
Project component/s	Kleinzee Grid connection infrastructure.	
Potential Impact	Visual impact of vegetation rehabilitation failure.	
Activity/risk source	The viewing of the above mentioned by observers near the infrastructure.	
Mitigation: Target/Objective	Well-rehabilitated and maintained servitudes.	
Mitigation: Action/control	Responsibility	Timeframe
Maintain roads 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.
Performance Indicator	Intact vegetation within servitudes and in the vicinity of the infrastructure.	
Monitoring	Monitoring of rehabilitated areas.	

Table 24: Management Programme: Decommissioning for the Grid Connection Infrastructure

OBJECTIVE: The mitigation and possible negation of visual impacts associated with the decommissioning of the proposed grid connection infrastructure.		
Project component/s	Kleinzee Grid connection infrastructure.	
Potential Impact	Visual impact of residual visual scarring and vegetation rehabilitation failure.	
Activity/risk source	The viewing of the residual scarring and vegetation rehabilitation failure by observers along or near the areas where the grid connection infrastructure was constructed.	
Mitigation: Target/Objective	Rehabilitated vegetation in all disturbed areas.	
Mitigation: Action/control	Responsibility	Timeframe
Remove infrastructure not required for the post-decommissioning use of the site/servitude.	Project proponent / operator	During the decommissioning phase.
Rehabilitate access roads and servitudes not required for the post-decommissioning use of the sites. If necessary, consult an ecologist to give input into rehabilitation specifications.	Project proponent / operator	During the decommissioning phase.
Monitor rehabilitated areas quarterly for at least a year following decommissioning, and implement remedial action as and when required.	Project proponent / operator	Post decommissioning.
Performance Indicator	Intact vegetation along and in the vicinity of the servitude.	
Monitoring	If rehabilitation is successful then no further monitoring is required.	

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