COMPARATIVE VISUAL IMPACT ASSESSMENT FOR THE ENVIRONMENTAL AUTHORISATION (EA) EXTENSION APPLICATION FOR THE 132KV GRID ALIGNMENT AND 132KV ESKOM PORTION OF THE SHARED ON-SITE SUBSTATION TO SERVICE THE 100MW LOERIESFONTEIN 3 PHOTOTVOLTAIC (PV) SOLAR ENERGY NEAR LOERIESFONTEIN, NORTHERN CAPE- DFFE REFERENCE NUMBER: 12/12/20/2321/2/2

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PREPARED FOR:

NALA Environmental Consulting Firm

DATE:

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DECLARATION

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

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

Tosca de Villiers
Landscape Architect & Environmental Assessment Practitioner
SACLAP Reg nr: 20421
EAPASA Reg nr: 2019/1582

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1. BACKGROUND

In 2012, a full scoping and environmental impact report, inclusive of specialist studies, was undertaken for the proposed 132kV Grid Alignment and on-site Substation for the Loeriesfontein 3 Photovoltaic (PV) Solar Energy Facility (SEF), near Loeriesfontein in the Northern Cape. The impact assessment entailed the construction of the following:

- A 132kV Power line of approximately 15.2km in length connecting to the existing Helios Substation; and
- A new substation (approx. 90 x 120m) and associated transformers. The footprint of the substation site will be approximately 10 800m².

The visual impact assessment (VIA) for the Environmental Impact Assessment (EIA) process was originally undertaken by SiVEST in February 2012. An Environmental Authorisation (EA) for the SEF and grid connection infrastructure was received on 29 October 2012 (DFFE Ref: 12/12/20/2321/2), with further amendments being issued on 10 July 2014 (DFFE Ref: 12/12/20/2321/2/A1), 27 October 2015 (DFFE Ref: 12/12/20/2321/2/AM2), 04 October 2017 (DFFE Ref: 12/12/20/2321/2/AM3) and 24 September 2019 (DFFE Ref: 12/12/20/2321/2/AM4). In addition, following the 2019 amendment, the EA was subsequently split into two separate EAs (1 for the 100MW Loeriesfontein PV SEF and 1 for the grid connection infrastructure), both dated 21 May 2021, as follows:

1) EA for the 100MW Loeriesfontein 3 PV SEF, 33/132kV IPP portion of the shared on-site substation (including Transformer) and associated infrastructure (DFFE Ref: 12/12/20/2321/2/1); and
2) EA for the 132kV Grid Alignment and 132kV Eskom Portion of the shared on-site substation to service the 100 MW Loeriesfontein 3 PV SEF (DFFE Ref: 12/12/20/2321/2/2).

It should be noted that the split EAs for the Loeriesfontein 3 PV SEF (DFFE Ref:.12/12/20/2321/2/1) and Grid Connection infrastructure (DFFE Ref: 12/12/20/2321/2/2), dated 21 May 2021 respectively, replaced the original EA dated 29 October 2012, as well as the subsequent amendments.

Subsequently. the above-mentioned SEF and Grid Connection EAs issued in 2021 lapsed on 29 October 2022. A Part 1 EA Amendment applications to extend the validity of the EAs by 5 years (i.e., EAs lapse on 29 October 2027) were however submitted to the Department of Forestry, Fisheries and the Environment (DFFE) on 26 October 2022, and receipt of the SEF and Grid Connection applications was acknowledged by the DFFE on 07 and 09 November 2022 respectively. It is important to note that according to Regulation 28(1B) of the National Environmental Management Act (NEMA) Environmental Impact Assessment (EIA) Regulations of 2014 (as amended), "*an environmental authorisation which is the subject of an amendment application contemplated in this Chapter remains valid pending the finalisation of such amendment application."*

Since the extension to the validity period of the EAs applied for extends beyond the 10-year period of the original assessment (originally assessed in 2012), the DFFE has requested that additional requirements be submitted in order for them to consider extending the validity of these EAs further.

No additional properties will be affected by the amendment as the proposed amendments are within the original authorised development footprint.

Nuleaf Planning and Environmental (Pty) Ltd have been appointed to undertake a review and comparative assessment of the initial VIA. This report addresses the Grid Connection infrastructure EA extension application specifically, and the EA extension application for the Loeriesfontein 3 PV SEF has been assessed and reported on as part of a separate standalone report. Please note that this report should be read in conjunction with the original VIA undertaken by SiVEST in 2012.
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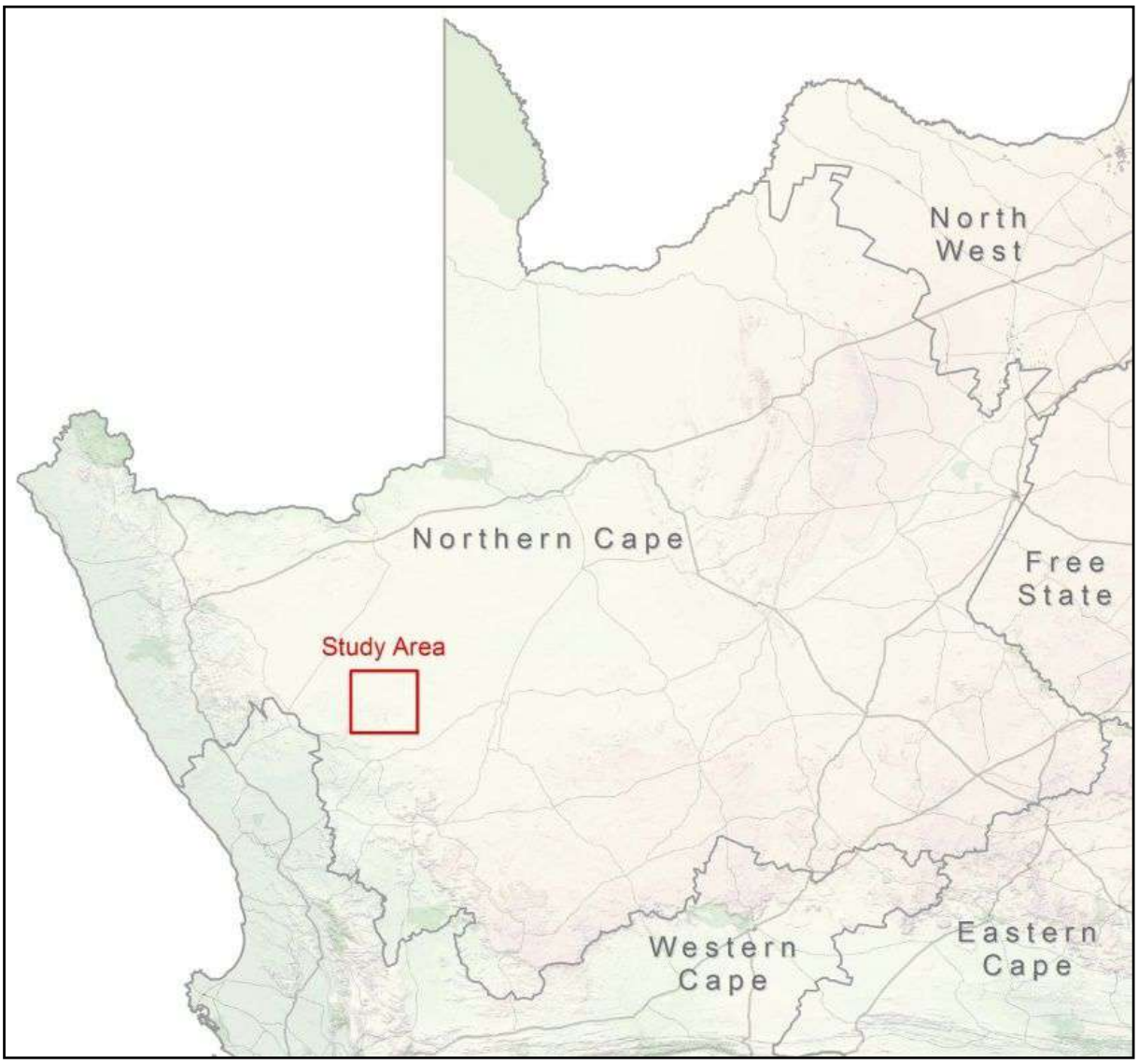


Figure 1: Regional locality of the study area

2. SCOPE OF WORK

The scope of work includes a review and comparative assessment of the previous VIA as undertaken by SiVEST in 2012. This is done in order to determine:

- The status (baseline) of the environment (social and biophysical) that was assessed during the initial assessment;
- The current status of the assessed environment (social and biophysical)
- A description and an assessment of any changes to the environment (social and biophysical) that has occurred since the initial EA was issued;
- A review of the previous specialist study undertaken, and a detailed assessment of their findings, including the following;
    - Indicating if the impact rating as provided in the initial assessment remains valid;
    - If the mitigation measures provided in the initial assessment are still applicable;
    - Or if there are any new mitigation measures which need to be included into the EA, should the request to extend the commencement period be granted by the Department;
- A description and an assessment of the surrounding environment, in relation to new developments or changes in land use which might impact on the authorised project, the assessment must consider the following:
    - Similar developments within the study area;
    - Clearly define identified cumulative impacts, and where possible quantify and indicate the size of the identified impacts;

  - The cumulative impacts significance rating must also inform the need and desirability of the proposed development.
- Include a site verification providing an indication of the status of the receiving environment;
- A visual impact statement on whether the proposed development can proceed.

3. INTRODUCTION

3.1. QUALIFICATION AND EXPERIENCE OF THE PROFESSIONAL TEAM

Nuleaf Planning and Environmental (Pty) Ltd, specialising in Visual Impact Assessments, undertook the review and subsequent comparative assessment to the Visual Impact Assessment.

The team undertaking the review and comparative assessment to the Visual Impact Assessment has extensive practical knowledge in spatial analysis, environmental modelling, and digital mapping, and applies this knowledge in various scientific fields and disciplines. The expertise of these practitioners is often utilised in Environmental Impact Assessments, State of the Environment Reports and Environmental Management Plans.

The visual assessment team 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.

Nuleaf Planning and Environmental have been appointed as an independent specialist consultant to undertake a review and comparative assessment of the original VIA as undertaken by SiVEST in 2012. Neither the author, nor Nuleaf Planning and Environmental will benefit from the outcome of the projects decision-making.

3.2. LEGAL FRAMEWORK

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

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

3.3. INFORMATION BASE

This assessment was based on information from the following sources:

- The initial visual assessment conducted in February 2012 by SiVEST;
- Topographical maps and GIS generated data were sourced from the Surveyor General, Surveys and Mapping in Mowbray, Cape Town;
- Professional judgement based on experience gained from similar projects; and
- Literature research on similar projects.

3.4. ASSUMPTIONS AND LIMITATIONS

This Report has been prepared by Nuleaf on behalf, and at the request, of Nala Environmental to provide them with an independent specialist assessment and review. Unless otherwise agreed by Nuleaf in writing, Nuleaf does not accept

responsibility or legal liability to any person other than the Nala Environmental for the contents of, or any omissions from, this Report.

To prepare this Report, Nuleaf utilised only the documents and information provided by Nala Environmental or any third parties directed to provide information and documents by Nala Environmental. Nuleaf has not consulted any other documents or information in relation to this Report, except where otherwise indicated.

The findings, recommendations and conclusions given in this report are based on the author's best scientific and professional knowledge, as well as, the available information. This report is based on survey and assessment techniques which are limited by time and budgetary constraints relevant to the type and level of investigation undertaken. Nuleaf and its staff reserve the right to modify aspects of the report including the recommendations if and when new information may become available from on-going research or further work in this field, or pertaining to this investigation.

Although Nuleaf exercises due care and diligence in rendering services and preparing documents, Nuleaf accepts no liability, and Nala Environmental, by receiving this document, indemnifies Nuleaf and its directors, managers, agents and employees against all actions, claims, demands, losses, liabilities, costs, damages and expenses arising from or in connection with the services rendered, directly or indirectly by the use of the information contained in this document.

This report must not be altered or added to without the prior written consent of the author. This also refers to electronic copies of this report which are supplied for the purposes of inclusion as part of other reports. Similarly, any recommendations, statements or conclusions drawn from or based on this report must make reference to this report. If this report is used as part of a main report, the report in its entirety must be included as an appendix or separate section to the main report.

This report should be read in conjunction with the original VIA complied by SiVEST in February 2012. This assessment was undertaken during the planning stage of the project and is based on information available at that time.

This assessment was undertaken during the planning stage of the project and is based on information available at that time. It is assumed that all information regarding the project details provided by Nala Environmental and the Applicant is correct and relevant to the proposed project. No public participation had been undertaken at the time of the writing of this report.

This assessment and all associated mapping have been undertaken according to the worst-case scenario.

3.5. LEVEL OF CONFIDENCE

Level of confidence[1] is determined as a function of:

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

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

These values are applied as follows:

[1] Adapted from Oberholzer (2005).

Table 1: Roles and responsibilities outlined for each applicable party on site

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

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

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

4. METHODOLOGY

The study was undertaken using Geographic Information Systems (GIS) software as a tool to generate viewshed analyses and to apply relevant spatial criteria to the proposed development. A detailed Digital Terrain Model (DTM) for the study area was created from 5m interval contours from the National Geo-spatial Information data supplied by the Department: Rural Development and Land Reform.

The approach utilised to determine the status of the environment (past and present), as well as, identify any potential additional issues related to the visual impact in comparison to what was originally assessed included the following activities:

- The creation of a detailed digital terrain model (DTM) of the potentially affected environment;
- The sourcing of relevant spatial data. This includes cadastral features, vegetation types, land use activities, topographical features, site placement, etc.;
- The creation of a preliminary viewshed analyses from the proposed area in order to determine the potential visual exposure and the topography's potential to absorb the potential visual impact in comparison to what was originally assessed. The viewshed analysis takes into account the dimensions of the proposed structures in their proposed locations as per the layout provided by the applicant.
- The identification of sensitive receptors upon which the proposed grid connection infrastructure could have a potential visual impact.

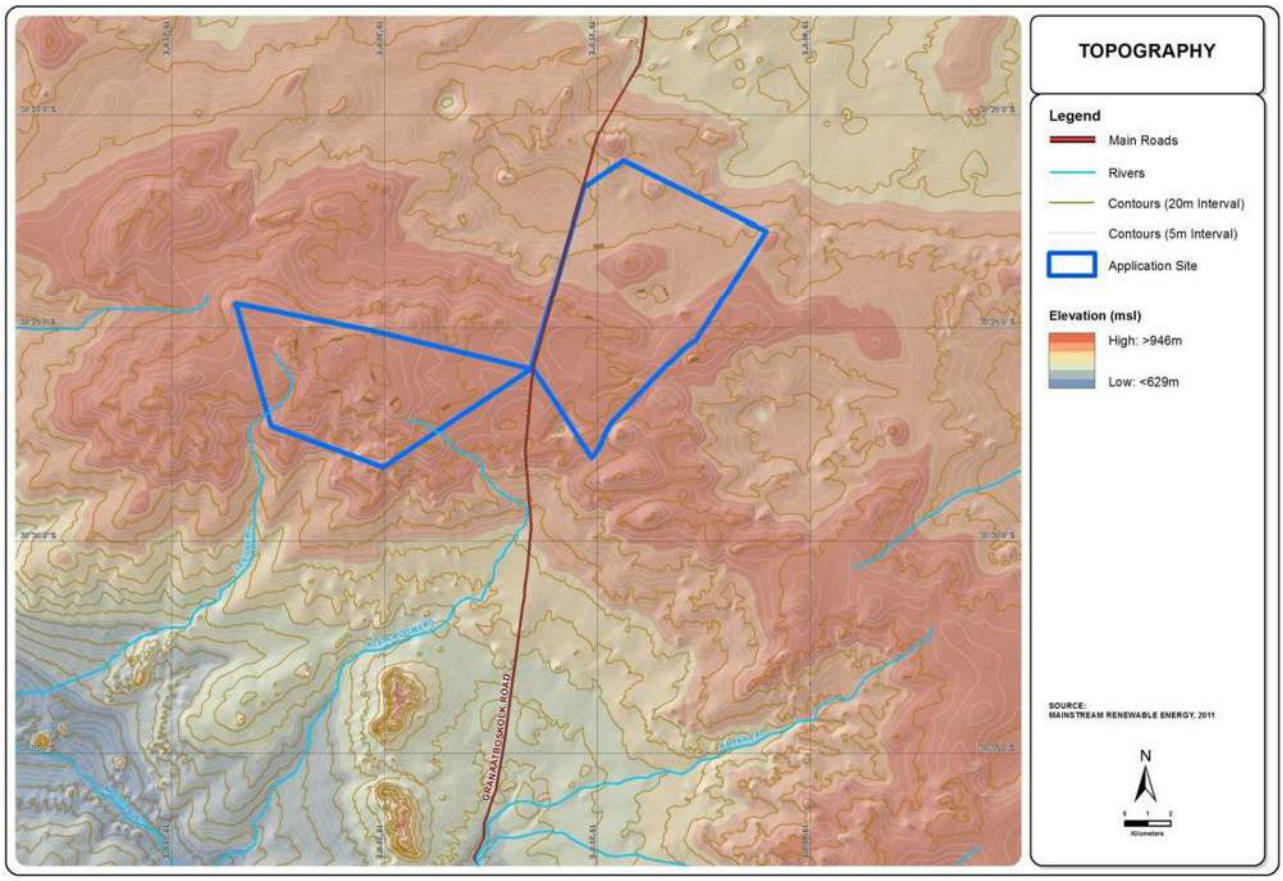
5. STATUS OF THE AFFECTED ENVIRONMENT

5.1. INITIAL ASSESSMENT - STATUS OF THE ENVIRONMENT (2012)

As part of the original Visual Impact Assessment undertaken by SiVEST in 2012, a visual characterisation was undertaken. This consisted of the description of the physical landscape characteristics in terms the prevailing topography, vegetation cover and land use in the study area. A summary of these findings as per the original VIA report undertaken in 2012 is as follows:

Topography

The topography was characterised by a flat to gently undulating landscape (typical of much of the Karoo). In the wider area, the Klein and Groot Rooiberg and Leeuberg koppies formed an area of localised hilly topography to the south and south-west of the site. Immediately north of the site the presence of several large pans signalled that the topography is very flat and poorly drained. It was concluded that there would be very little shielding to lessen the impact of the grid connection infrastructure from any locally-occurring receptor locations. Refer to **Map 1** (SiVEST, 2012).



Map 1: Topography within the study area as per the initial VIA undertaken by SiVEST in 2012

Vegetation

The site was reported to be covered by natural short *Bushmanland Basin Shrubland*. Due to the aridity of the area the vegetation consisted of low shrubs around 30-40 cm in height, distributed uniformly across the landscape, except in areas of disturbance where patches of bare earth occurred. In certain areas, man had an impact on the natural vegetation, especially around farmsteads, where tall exotic trees and other typical garden vegetation had been established. The natural short vegetation cover was reported to offer no visual screening. Tall exotic trees were concluded effectively screen the proposed grid connection infrastructure from farmhouses, where these trees occurred near the farmhouse and were located directly in the way of views to the proposed alignment route.

Figure 2: Typical natural visual character in the study area in 2012 (SiVEST, 2012)

Land Use

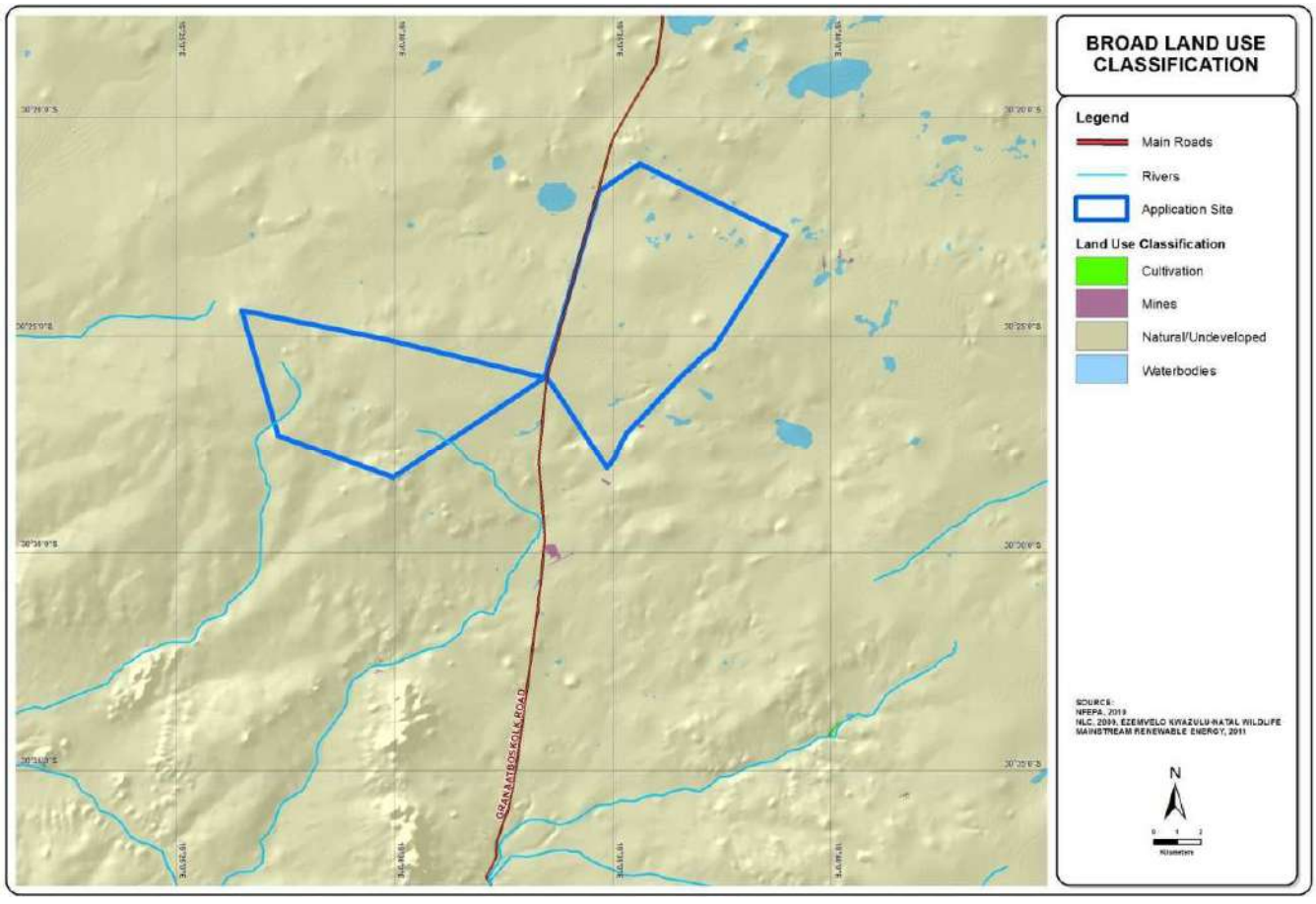
The land use in the wider study area was classified natural or undeveloped with sheep farming activities dominating the area. The sheep were noted to graze on the natural vegetation. Activities related to gypsum mining were reported to be occurring along the railway line. The nature of the arid climate entailed that stocking densities for the sheep was low which resulted in the properties being relatively large across the area. Therefore, the area was noted to be very sparsely populated, with little human-related infrastructure. Some infrastructure was reported to be present in the vicinity of the site in the form of gravel access roads, a railway (the railway linking Sishen with Saldanha Bay), and associated railway works warehousing and offices. An electricity transmission substation (Helios Substation) was also present to the south of the site, as well as power lines that run to and from this. A very tall microwave tower (communication tower) was also located on the proposed site.

It was reported that except for two farmhouses the site of the proposed development was mostly vacant and the surrounding area largely uninhabited. The closest built-up area was the small town of Loeriesfontein approximately 60km to the south of the site.

Additionally, it was noted that several renewable energy facilities were being proposed within relatively close proximity to the proposed grid connection infrastructure. EIAs were underway and a number of them were reported to already be at advanced stages, or have already received environmental authorisation. The renewable energy developments that were being proposed in the surrounding area at that stage (2012), included, CPV/PV Plant on the Farm Kaalspruit (approximately 12km north of Loeriesfontein), Hantam PV Solar Energy Facility (just east of Helios Substation) and PV Plant on Klein Rooiberg Farm (10km south of Helios Substation).

No formal protected areas or leisure / nature-based tourism activities were noted to be taking place within the study area.

It was concluded that the general lack of human habitation and associated human infrastructure, had an obvious impact on the sense of place, thus giving the area a largely natural, rural feel. Refer to **Map 2** (SiVEST, 2012).



Map 2: Map showing land use within the study area as per the initial VIA undertaken by SiVEST in 2012

Figure 3: Views toward the development site from near the old farmhouse on Kareedoorn Pan Farm (SiVEST, 2012)

5.2. CURRENT ASSESSMENT - STATUS OF THE ENVIRONMENT (2023)

A desktop assessment of the current affected environment was undertaken in January 2023 to determine the status of the physical landscape characteristics now. As per the previous VIA undertaken in 2012, this consisted of describing the current physical landscape characteristics in terms of the prevailing topography, vegetation cover and land use within the study area. These findings are described below:

Topography

The topography of the study area is relatively flat and homogenous, described predominantly as slightly irregular plains and pans to the north and east, and plains to the south-west. The elevation ranges from 850m above sea level (a.s.l.) in the south-west (along the Klein_Rooiberg River floodplain) to 1010m a.s.l. at the top of the hills located south of the Khobab Wind Energy Facility (WEF). Refer to **Map 3** for a current topographical map of the study area.

The proposed grid alignment is located at an average of between 880 - 1000m a.s.l. and has an even slope to the south towards the Klein-Rooiberg River. This non-perennial river flows into the Kroms River located further afield to the south west of the site. These rivers are only occasionally flooded during infrequent rainfall periods and are therefore dry riverbeds for most of the year. Other hydrological features in the study area are non-perennial pans to the north. Some of the larger pans include:

- Boegoefontein Pan
- Bitterputs Pan
- Kareedoring Pan
- Brakpan
- Dwaggas Salt Pan (located just beyond the extent of the study area to the north east of Boegoefontein Pan)

Figure 4: Long distance view of the Dwaggas Salt Pan from the north (Photo credit: Google Earth – Rehan Opperman).

Vegetation

Regionally, the proposed alignment is located some 60km north of the little town of Loeriesfontein (at the closest) within the Northern Cape Province, within a region commonly referred to as the Bushmanland. The Bushmanland falls within the arid Nama-Karoo Biome; a biome characterised by its dry semi-dessert climate and associated dessert-like vegetation. The vegetation cover of most of the study area, to the north and east, is identified as Bushmanland Basin Shrubland, interspersed with non-perennial pans (Bushmanland Vloere).

Figure 5: View of the expansive Bushmanland landscape (Photo credit: Google Earth – Rehan Opperman).

Land Use

The dominant land use (at present) within the region is sheep farming. There is very limited agricultural activity (dryland cultivation) due to the limited rainfall (less than 300mm per annum) and arid climate. The predominant land cover types include seasonal grassland, bare sand surfaces and Low Shrubland, mainly to the south. Refer to **Map 4** for the current land cover and broad land use patterns within the study area.

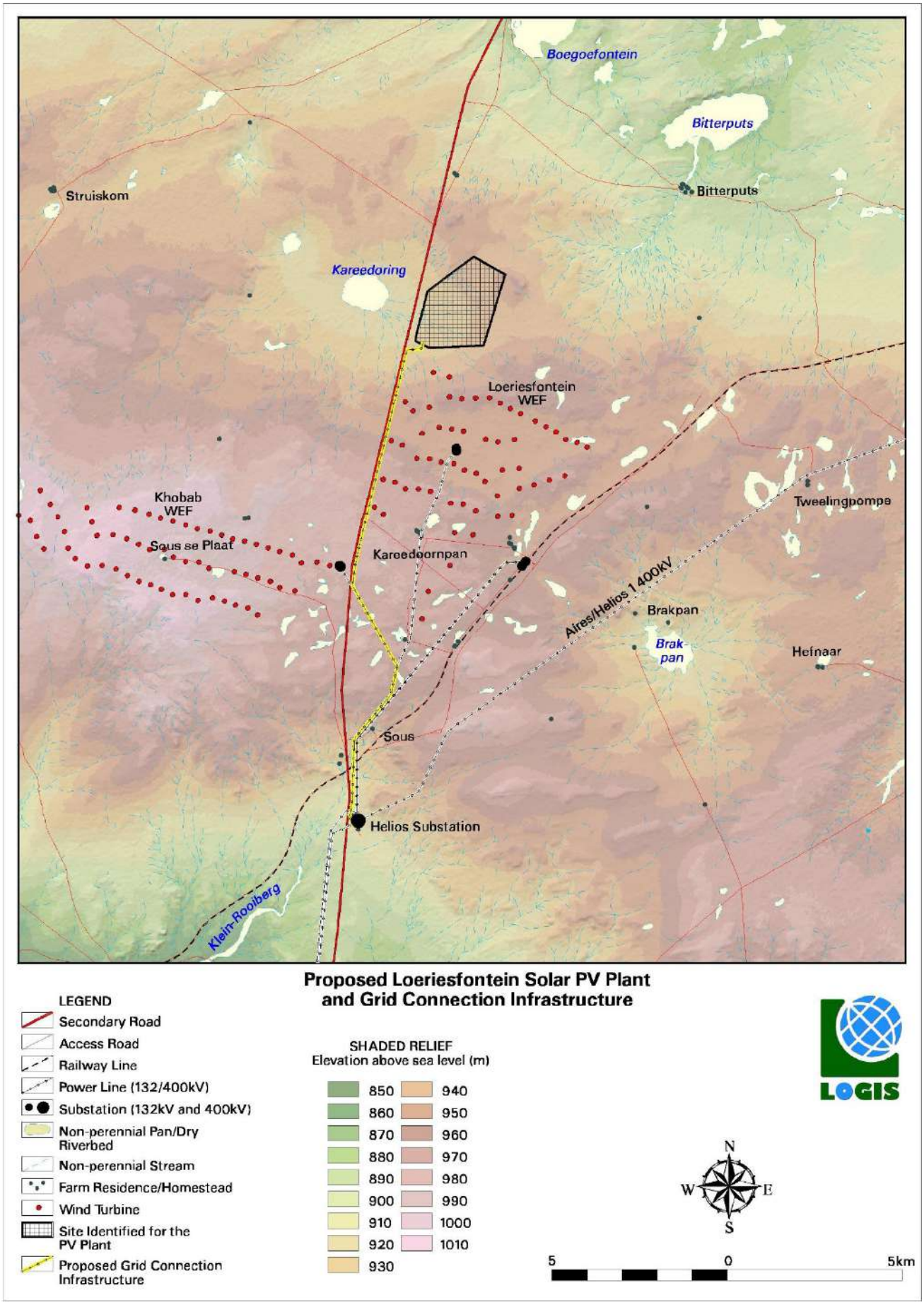
Some of the non-perennial pans previously mentioned are home to limited industrial activities within the region, namely salt mining, e.g. at Boegoefontein Pan and further afield at Dwaggas Pan. Other than these relatively small salt mining operations, other industrial infrastructure within the study area includes the Sishen to Saldanha iron ore railway line (south east of the site), the Helios Substation located to the south, and the Aries to Helios 400kV power line.

Despite the limited industrial activity, it should be noted that the region has, over the years attracted, a large number of renewable energy applications (both wind and solar), most of which have been authorised. Refer to **Map 5** for the approved/authorised EIA Applications and operational Renewable Energy Facilities within the study area.

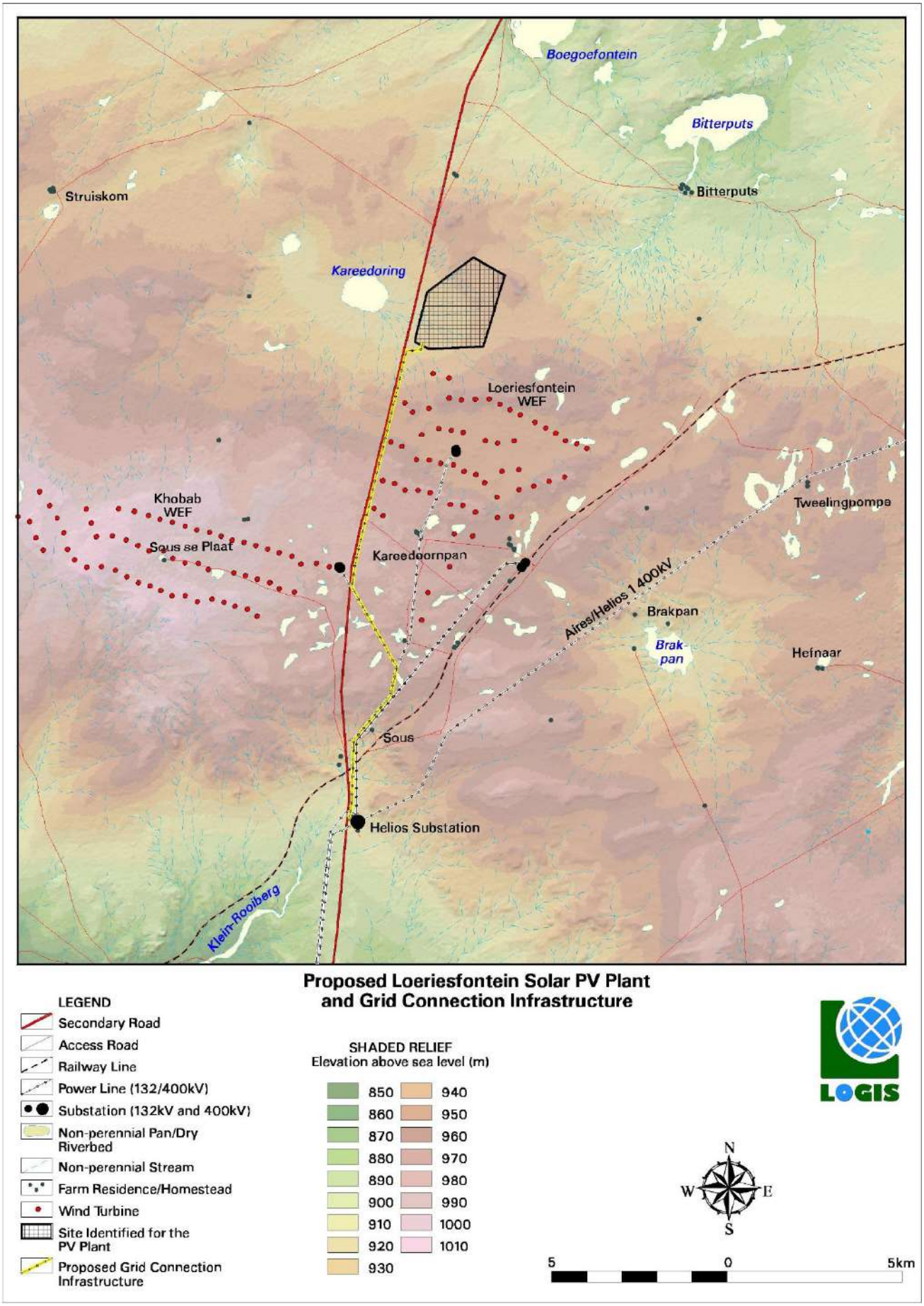
The proposed grid alignment traverses to the west and east of the operational Loeriesfontein and Khobab WEFs respectively. These WEFs respectively have 61 and 58 operational wind turbines, each connected (from their collector substations) to the Eskom Helios Main Transmission Substation, located to the south of the site.

Other authorised but not yet constructed Renewable Energy Facilities within the study area include the Dwarsrug WEF, as well as, the Kokerboom 1 and 3 WEF's.

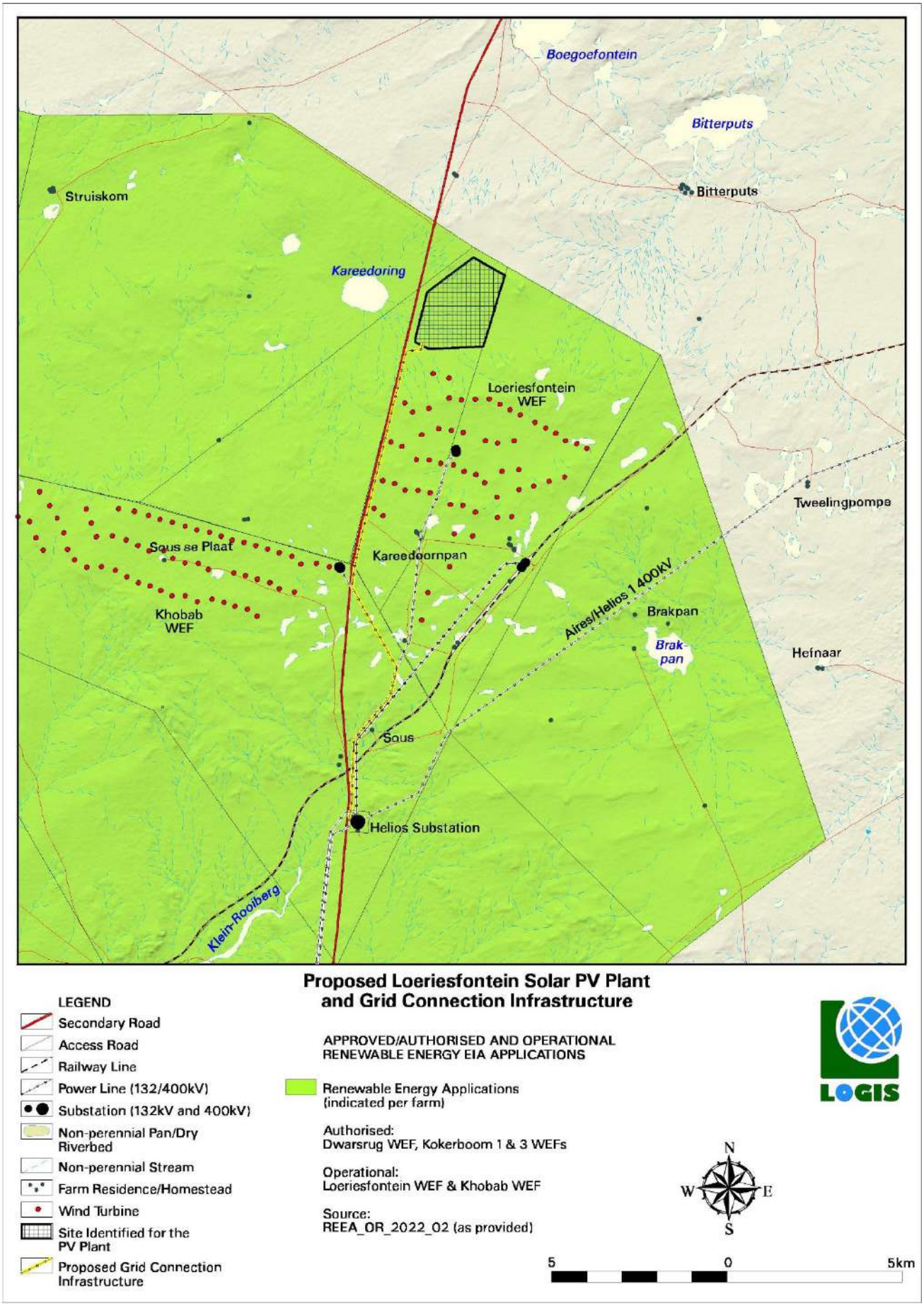
Overall, the region has a predominantly undeveloped, rural and natural character, with scattered isolated homesteads or farm settlements occurring within the study area. These are generally located at great distances from each other. The region has a population density of less the 1 person per km^2.



Map 3: Current shaded relief map of the study area



Map 4: Current land cover / broad land use map of the study area



Map 5: Approved/authorised EIA Applications and operational Renewable Energy Facilities within the study area

5.3. COMPARATIVE ASSESSMENT – CHANGES TO STATUS OF THE ENVIRONMENT BETWEEN 2012 - 2023

Since the initial VIA undertaken by SiVEST in 2012, the landscape characteristics comprising the topography and vegetation of the study area have remained unchanged. However, in terms of the land use, while the majority of the land uses noted in 2012 have remained the same (i.e. sheep farming, etc.), some changes have subsequently taken place as detailed below:

- In 2012, gypsum mining was noted to have taken place along the railway line within the study area. While these areas of disturbance are still noted on the current land cover / broad land use map (Map 4) and updated Google Earth aerial imagery, a comparison of current aerial imagery to historical aerial imagery take in 2012 indicates that these areas have largely remained unchanged in size and are therefore assumed to be inactive mines.
- The most significant changes in land use noted between 2012 and present day (2023) is the presence of the two operational Wind Energy Facilities (i.e. Loeriesfontein and Khobab WEFs) located to the south and south west of the site. However, it must be noted that while these activities are new land uses within the study area currently, this change in land use was anticipated already in the initial 2012 study undertaken. Therefore, as predicted in the initial assessment, this change in land use is in line with the noted trends in the region at that time.
- Salt mining activities are noted to now be taking place at Boegoefontein Pan and further afield at Dwaggas Pan. These activities were not noted to be taking place in 2012, however, subsequently as of 2017, EIA applications were submitted for these activities.

Overall, despite the above-mentioned changes in land use, the study area has retained its predominately undeveloped, rural and natural character, as well as, low population density. Therefore, in the opinion of the author, the **status of the environment has largely remained the same**.

6. VISUAL IMPACT ASSESSMENT

6.1. POTENTIAL VISUAL EXPOSURE - 2012

No viewsheds were generated during the initial visual study that was undertaken by SiVEST in 2012. The reason given is that since detailed digital data was not available and the topography within the study area was relatively flat, generating viewsheds from coarse- grained DTMs would only take the large-scale topographical variations into account and not minor topographical features, vegetative screening, or man-made structures which are important factors influencing the severity of visual impacts in this context.

Additionally, no specific visual assessment was undertaken to determine the visual exposure of the proposed grid connection infrastructure (power line and substation). Thereby, giving the author of this report very little information on the expected visual impacts associated with the proposed grid connection infrastructure itself. Therefore, it is assumed that since the VIA undertaken in 2012 assessed the visual exposure of various components making up the development (i.e. WEFs and PV) together, it was presumed, by the author of that report, that the visual exposure associated with grid connection infrastructure would fall within the expected visual extent and limits of the main components of the development. In other words, the visual exposure of the grid connection infrastructure was equal to but not greater than the expected visual exposure of the WEF or PV Facilities.

Based on the above, this report will utilise the findings associated with the PV Facilities in order to comparatively assess if the findings provided in the initial 2012 assessment remain valid.

In order to determine the potential visual exposure of the PV Facilities and in turn their associated grid connection infrastructure, 'distance bands' were assigned for the PV Facilities. These bands were assigned to each facility largely based on the height of the structures and the fact that very few receptors were spread over a large distance in the study area. The methodology followed applied the concept that the proposed development will be more visible to receptors located within a short distance and that these receptors will experience a higher adverse visual impact than those located at a moderate or long distance from the proposed development. The distance of the potentially sensitive receptors from the development area of the PV Facilities was then considered when rating the visual impact of the development on these receptors. Refer to **Map 6 (**SiVEST, 2012).

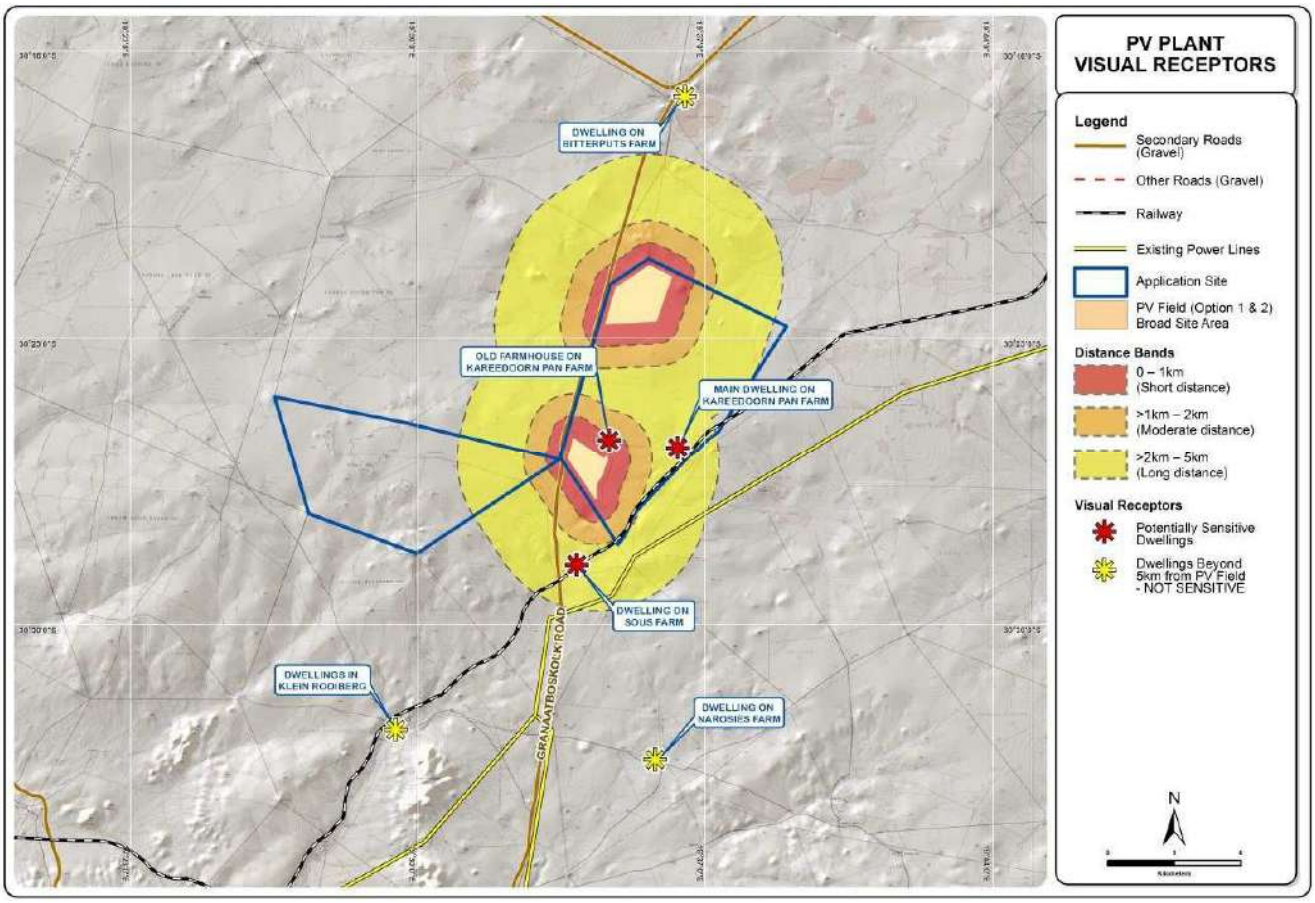
The distance radii chosen was as follows:

- 0 – 1km (Short distance)
- >1km – 2km (Moderate distance)
- >2km – 5km (Long distance)

Based on the application of these 'distance bands', the following visual receptors potentially sensitive to the proposed PV Facilities and their associated grid connection infrastructure were identified:

Table 2: Potential sensitive visual receptors as identified by SiVEST in 2012

Name	Current Use	Coordinates	Distance from the proposed site
Main dwelling on Kareedoorn Pan Farm	Residential dwelling	30°25'40.47"S 19°36'19.62"E	Within proposed site
Old farmhouse on Kareedoorn Pan Farm	Storeroom (will house farm worker in the near future)	30°25'28.59"S 19°34'38.99"E	Within proposed site
Dwelling on Sous Farm	Farm workers dwelling	30°28'32.58"S 19°33'52.36"E	Moderate distance



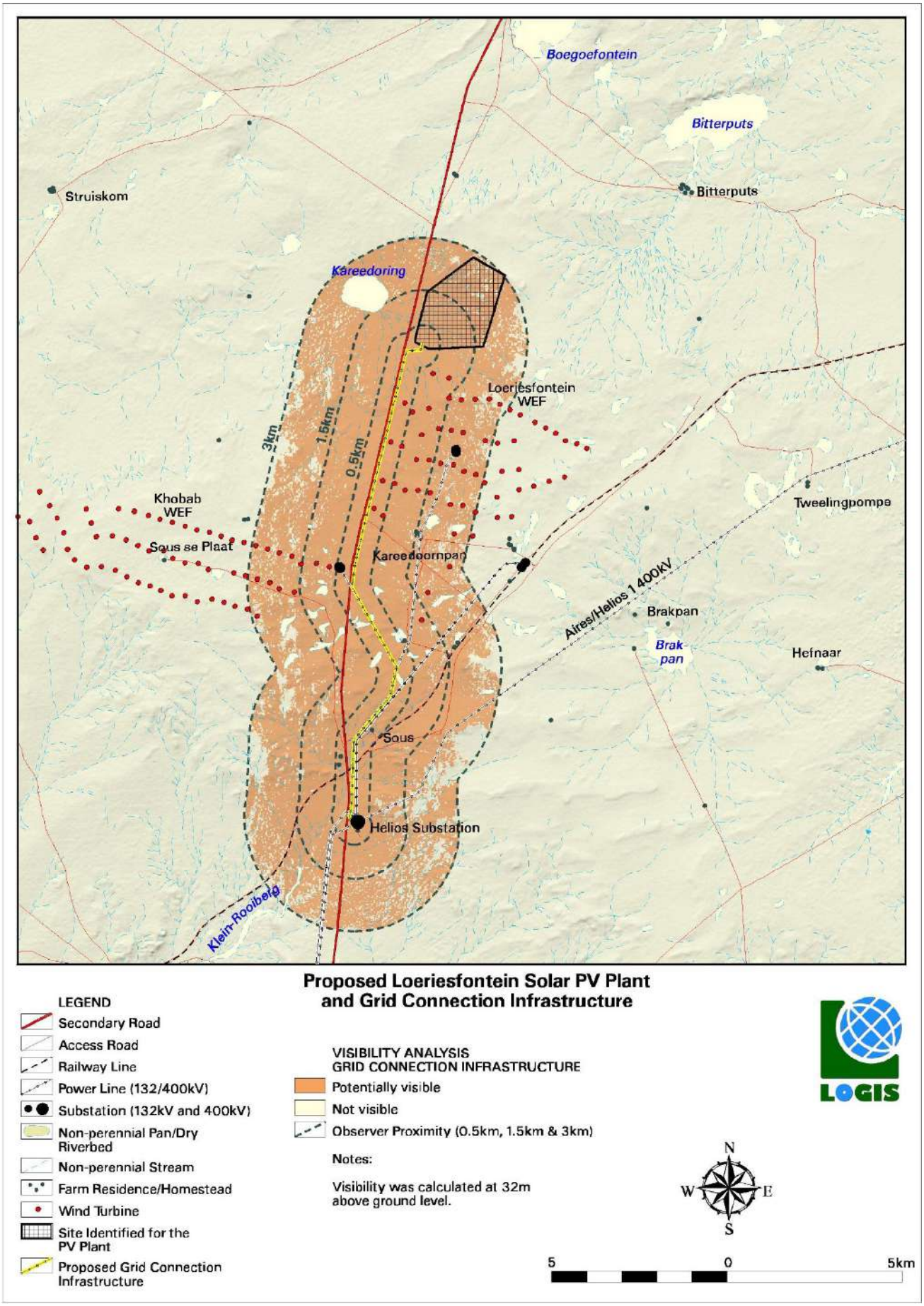
Map 6: Visual receptors potentially sensitive to the PV plants (SiVEST, 2012)

It must be noted that during the initial VIA undertaken by SiVEST in 2012, two site alternatives for the proposed PV Facility were assessed concurrently. As such the above map and identified receptors, as well as the receptors' distance from the proposed site, are based on their proximity to both alternatives. Since the two site alternatives largely cover the proposed grid alignment, this report will base the expected visual exposure of the proposed grid connection infrastructure on the outcome of the assessment of both site alternatives together.

6.2. POTENTIAL VISUAL EXPOSURE - 2023

Subsequently, access to detailed digital data has made visual exposure modelling possible and, as such, a viewshed analysis for the proposed grid alignment was undertaken in order to determine the expected visual exposure of the proposed

grid connection infrastructure. The result of the viewshed analyses for the proposed grid connection infrastructure is shown on **Map 7** that follows.



Map 7: Viewshed analysis of the proposed grid connection infrastructure

An analysis has been undertaken within the proposed development area in order to determine the general visual exposure (visibility) of the area under investigation. 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). The extent of visual exposure within this zone is low. The viewshed analysis does not include the effect of vegetation cover or existing structures on the exposure of the proposed facility, therefore signifying a worst-case scenario.

Map *7* indicates areas from which any number of the proposed infrastructure could potentially be visible, as well as, proximity offsets from the proposed grid alignment. These proximity offsets 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. Therefore, for the purpose of this study, proximity offsets have been calculated from the expected boundary of the site, as indicated on **Map 7** and as follows:

- 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 following is an overview of the findings of the viewshed based on the alignment illustrated on the Map provided:

- The potential visual exposure of the facility is contained to a core area on the site itself and within a 0.5km radius thereof. Sensitive visual receptors are observers travelling along the secondary road running parallel to the proposed grid alignment, as well as, the residents of the homestead Sous.

- Potential visual exposure in the short to medium distance (i.e. between 0.5 and 1.5km offset), the extent of potential visual exposure is slightly more scattered. Sensitive visual receptors include residents of Kareedoornpan, as well as, observers travelling along the secondary road.

- In the medium to long distance (i.e. between 1.5 and 3km offset), the extent of potential visual exposure is even more scattered. Sensitive visual receptors include observers travelling along the secondary road.

- Beyond the 3km offset from the proposed facility, potential visual exposure becomes even more scattered and very low. Sensitive visual receptors are not likely to be visually exposed to the proposed facility, despite lying within the viewshed.

In general, as a result of the scattered and lower population density of the study area, the **proposed grid connection infrastructure may constitute a visual prominence, potentially resulting in a moderate - low visual impact**.

6.3. IMPACT RATINGS - 2012

The VIA undertaken by SiVEST in 2012 did not specifically assess the impact of the grid connection infrastructure. Thereby, giving the author of this report no information on the expected visual impacts ratings associated with the proposed grid connection infrastructure as assessed in 2012. Therefore, it is assumed that since the VIA undertaken in 2012 assessed the visual impacts of various components making up the development (i.e. WEFs and PV) together, it was presumed, by the author of that report, that the visual impacts associated with the associated grid connection infrastructure would fall within the expected visual extent and limits of the main components of the development. In other words, the visual impacts of the grid connection infrastructure was equal to but not greater than the expected visual impact ratings of the WEF or PV Facilities.

Based on the above, this report will utilise the findings associated with the PV Facilities in order to comparatively assess if the findings provided in the initial 2012 assessment remain valid.

In order to assess the impact of the proposed PV Facilities and in turn its associated grid connection infrastructure on the potentially sensitive receptor locations listed above, the VIA undertaken by SiVEST in 2012 utilised a matrix that took into account a number of factors which was then applied to each receptor location. The matrix adopted was based on the factors as listed below:

- Distance of receptor away from the proposed development area (distance banding)
- Primary focus / orientation of the receptor
- Presence of screening factors (topography, vegetation etc.)

Based on the application of this matrix, it was determined that the impact of the PV Facilities (Alternative 1 and 2), and in turn its associated grid connection infrastructure, would be as follows on the identified visual receptors:

Table 3: Impact table summarising the significance ratings on identified sensitive visual receptors in close proximity to the proposed infrastructure in 2012

Receptor Location	Distance	Primary Focus	Screening	Total Score	Visual Impact Score Average	Visual Impact Rating
Main dwelling on Kareedoorn Pan Farm	1	1	2	4	**1.3**	**Low**
Old farmhouse on Kareedoorn Pan Farm	1 / 3	4 / 1	4 / 4	9 / 8	**3 / 2.7**	**Medium**
Dwelling on Sous Farm	1	1	2	4	**1.3**	**Low**

As indicated in the table above, it was determined that the proposed PV Facilities and their associate grid connection infrastructure would impact on three visual receptors, namely the residents of Kareedoorn Pan Farms main dwelling and old farmhouse, as well as Sous farm. Of note is that the visual impacts to the residents of the farm Kareedoorn Pan are likely to be offset by the fact that the farm owner had signed a lease agreement with the Applicant, indicating his willingness to lease his property to them should the project receive an EA and License. The farm owner would therefore benefit from the development, as he would receive revenue from this lease agreement. This is likely to offset the visual impact experienced by the landowner thereby reducing any negative sentiments that he may have towards the development. The low to medium visual impact rating for Kareedoorn Pan farm is therefore not regarded as a realistic representation of the actual impacts likely to be experienced at the receptor location.

Impact ratings for the following were also undertaken and the significance rating determined as below:

Table 4: Impact table summarising the significance ratings as determined in 2012

Significance Ratings Summary (2012)		
	Pre-mitigation impact rating	**Post mitigation impact rating**
Day-time visual impacts of the PV plant during construction	-20 (negative low)	-10 (negative low)
Day-time visual impacts of the PV plant during operation	-34 (negative medium impact)	-28 (negative low impact)
Night-time visual impacts of the PV plant during construction	-7 (negative low)	-6 (negative low)
Night-time visual impacts of the PV plant during operation	-28 (negative low)	-26 (negative low)

The **impact ratings as determined in 2012 were expected to be contained to low to medium for the proposed PV Facilities and by association their proposed grid connection infrastructure**.

6.4. IMPACT RATINGS - 2023

No specific impact ratings were determined in the previous VIA undertaken by SiVEST in 2012 with regards to the proposed grid connection infrastructure. This section will thus attempt to quantify the potential visual impacts in their respective geographical locations and in terms of the identified issues related to the visual impact of the proposed grid connection infrastructure in detail.

The methodology for the assessment of potential visual impacts states the nature of the potential visual impact (e.g., the visual impact on identified sensitive receptors in the vicinity of the proposed infrastructure) and includes a table quantifying the potential visual impact according to the following criteria:

Extent - How far the visual impact is going to extend and to what extent it will have the highest impact. In the case of this type of development the extent of the visual impact is most likely to have a higher impact on receptors closer to the development and decrease as the distance increases.

- (1) Very low: Long distance > 3 Km
- (2) Low: Medium to long 1.5 - 3 Km
- (3) Medium: Short distance 0.5 -1.5 Km
- (4) High: Very Short < 0.5 Km

Duration - The timeframe over which the effects of the impact will be felt.

- (1) Very short: 0-1 years
- (2) Short: 2-5 years
- (3) Medium: 5-15 years
- (4) Long: >15 years
- (5) Permanent

Magnitude - The severity or size of the impact. This value is read off the Visual Impact Index maps.

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

Probability - The likelihood of the impact actually occurring.

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

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

- (0-12) Negligible:
  Where the impact would have no direct influence on the decision to develop in the area. The impact would be of a very low order. In the case of negative impacts, almost no mitigation and or remedial activity would be needed, and any minor steps, which might be needed, would be easy, cheap, and simple.
- (13-30) Low:
  Where the impact would have a very limited direct influence on the decision to develop in the area. The impact would be of a low order and with little real effect. In the case of negative impacts, mitigation and / or remedial activity would be either easily achieved or little would be required, or both.
- (31-60) Moderate:
  Where the impact could influence the decision to develop in the area. The impact would be real but not substantial. In the case of negative impacts, mitigation and / or remedial activity would be both feasible and fairly easily possible.
- (61-80) High:
  Where the impact must have an influence on the decision to develop in the area. The impacts are of a substantial order. In the case of negative impacts, mitigation and / or remedial activity would be feasible but difficult, expensive, time-consuming or some combination of these.

- (81-100) Very High:
  Where the impact will definitely have an influence on the decision to develop in the area. The impacts are of the highest order possible. In the case of negative impacts, there would be no possible mitigation and / or remedial activity possible.

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**).

Status – The perception of Interested and Affected Parties towards the proposed development.
- Positive
- Negative
- Neutral

Reversibility – The possibility of visual recovery of the impact following the decommissioning of the proposed development
- (1) Reversible
- (3) Recoverable
- (5) Irreversible

6.4.1. POTENTIAL VISUAL IMPACT OF CONSTRUCTION ACTIVITIES ON SENSITIVE VISUAL RECEPTORS IN CLOSE PROXIMITY TO THE PORPOSED 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.

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

A mitigating factor within this scenario is the very low occurrence of receptors within the receiving environment, as well as, the presence of the existing power line infrastructure running adjacent to the proposed power line servitude, thereby reducing the probability of this impact occurring.

Table 5: Impact table summarising the significance of the visual impacts of associated infrastructure on sensitive visual receptors in close proximity

Nature of Impact: Visual impact of construction activities on sensitive visual receptors in close proximity to the proposed grid connection infrastructure.		
	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	Probable **(3)**	Improbable **(2)**
Significance	Moderate **(48)**	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: ➢ 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: None, provided rehabilitation works are carried out as specified.

6.4.2. POTENTIAL VISUAL IMPACT ON SENSITIVE VISUAL RECEPTORS LOCATED WITHIN A 0.5KM RADIUS OF THE GRID CONNECTION INFRASTRUCTURE DURING THE OPERATIONAL PHASE

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 visual impact of the power line will largely be absorbed by the presence of the existing power lines and renewable energy facility infrastructure in the study area.

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**.

A mitigating factor within this scenario is the very low occurrence of receptors within the receiving environment, as well as, the presence of the existing power line infrastructure running adjacent to the proposed power line servitude, thereby reducing the probability of this impact occurring. The table below illustrates this impact assessment.

Table 6: Impact table summarising the significance of visual impacts on sensitive visual receptors in close proximity to the proposed grid connection infrastructure

Nature of Impact: Visual impact on observers travelling along the secondary road and 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	High **(8)**	High **(8)**
Probability	Improbable **(2)**	Improbable **(2)**
Significance	Moderate **(32)**	Moderate **(32)**
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.		

6.4.3. 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 on observers traveling along the secondary road within a 1.5 - 3km radius of the infrastructure.

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 7: Impact table summarising the significance of the visual impacts of associated infrastructure on sensitive visual receptors 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	Moderate **(6)**	Moderate **(6)**
Probability	Improbable **(2)**	Improbable **(2)**
Significance	Low **(26)**	Low **(26)**
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.		

6.4.4. POTENTIAL VISUAL IMPACT OF ASSOCIATED INFRASTRUCTURE ON SENSITIVE VISUAL RECEPTORS IN CLOSE PROXIMITY

The height of the proposed new substation will not exceed 25m in height, therefore the visual exposure of this component will fall within the view sheds generated for the power line infrastructure (which is not expected to exceed 25m). 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 the primary infrastructure.

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 pre mitigation and a **low** visual impact post mitigation.

A mitigating factor within this scenario is that observers traveling along the secondary road in close proximity to the proposed grid infrastructure will only be exposed to the visual intrusion for a short period of time. Additionally, the proximity of existing powerlines and substations reduces the probability of this impact occurring as there is already an existing visual intrusion. This reduces the probability of this impact occurring.

Table 8: Impact table summarising the significance of associated infrastructure on sensitive visual receptors in close proximity

Nature of Impact: Potential visual impact of associated infrastructure on sensitive visual receptors in close proximity		
	No mitigation	**Mitigation considered**
Extent	Very short distance **(4)**	Very short distance **(4)**
Duration	Permanent **(5)**	Permanent **(5)**
Magnitude	Very High **(10)**	Moderate **(6)**
Probability	Probable **(3)**	Improbable **(2)**
Significance	Moderate **(57)**	Low **(30)**
Status (positive, neutral 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 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 the grid connection infrastructure is removed. Failing this, the visual impact will remain.		

6.4.5. POTENTIAL VISUAL IMPACT OF LIGHTING ON SENSITIVE VISUAL RECEPTORS IN THE REGION

It can be expected that the light trespass and glare from the security and after-hours operational lighting (flood lights) for the proposed new substation will have some significance on the receiving environment.

Another potential lighting impact known as sky glow. 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, contributes to the increase in sky glow. The substation lighting may contribute to the effect of sky glow.

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 mitigated to **low**.

Table 9: Impact table summarising the significance of lighting on sensitive visual receptors in close proximity

Nature of Impact: Potential visual impact of lighting at night on visual receptors in close proximity to the proposed infrastructure		
	No Mitigation	**Mitigation considered**
Extent	Short **(3)**	Short **(3)**
Duration	Long term **(4)**	Long term **(4)**
Magnitude	Moderate **(6)**	Low **(4)**
Probability	Probable **(3)**	Improbable **(2)**

Significance	Moderate **(39)**	Low **(22)**
Status (positive, neutral or negative)	Negative	Negative
Reversibility	Recoverable **(3)**	Recoverable **(3)**
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation: ➢ Planning & operation: ➢ The possibility of limiting aircraft warning lights to the turbines on the perimeter according to CAA requirements, thereby reducing the overall impact, must be investigated. ➢ 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 grid connection infrastructure is removed. Failing this, the visual impact will remain.		

6.4.6. 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 10: Impact table summarising the significance of the potential impact on the sense of place of the region.

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: <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.		

Residual impacts:
The visual impact will be removed after decommissioning, provided the grid connection infrastructure is removed. Failing this, the visual impact will remain.

6.5. SUMMARY OF THE IMPACT RATINGS FINDINGS

Considering the results and findings of the Visual Impact Assessment undertaken for the proposed grid connection infrastructure, it is acknowledged that the receiving environment will be significantly visually transformed for the entire operational lifespan of the infrastructure. The below table indicates a summary of the impact ratings as determined for the development based on the viewshed modelled, as well as, present day land uses:

Table 11: Impact table summarising the significance ratings as determined in 2023

Significance Ratings Summary (2023)		
	Pre-mitigation impact rating	**Post mitigation impact rating**
Potential visual impact of construction activities on sensitive visual receptors in close proximity to the proposed grid connection infrastructure	Moderate (48) (negative)	Low (24) (negative)
Potential visual impact on sensitive visual receptors located within 0.5km radius of the grid connection infrastructure during the operational phase	Moderate (32) (negative)	N/A
Potential visual impact on sensitive visual receptors within the region (1.5km – 3km radius) during the operation of the grid connection infrastructure	Low (26) (negative)	N/A
Potential visual impact of associated infrastructure on sensitive visual receptors in close proximity	Moderate (57) (negative)	Low (30) (negative)
Potential visual impact of lighting on sensitive visual receptors in the region	Moderate (39) (negative)	Low (22) (negative)
Potential visual impact of the proposed grid connection infrastructure on the sense of place of the region	Low (20) (negative)	N/A

The impact ratings as determined in 2012 were expected to be **contained to low to medium** for the proposed PV Facilities and their associated grid connection infrastructure. In comparison, it is expected that the impact ratings for the grid connection infrastructure alone will also be **medium to low** considering the present-day land uses and expected visual exposure. **Therefore, no increase in the visual impact is anticipated**.

7. POTENTIAL CUMULATIVE VISUAL EXPOSURE

7.1. CUMULATIVE IMPACTS - GENERAL

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 be132kV power line and substation as seen in conjunction with the existing (or proposed/authorised) renewable energy facilities and 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 infrastructure proposed in the area.

7.2. CUMULATIVE IMPACTS - 2012

The cumulative impacts as assessed by SiVEST in the original VIA undertaken in 2012 stated that several renewable energy facilities were proposed within relatively close proximity to the proposed development. These facilities were either in the advanced stages of the EIA process or had already received environmental authorisation. The renewable energy developments that were being proposed at that stage (2012) in the surrounding area, are indicated in the table below.

Table 12: Large-scale renewable energy developments proposed in close proximity to the PV plant as assessed in 2012

Proposed Development	Status of EIA (2012)	Proponent	Proposed Capacity	Approximate Location	Current Status of EIA (2023)[2]
CPV/PV Plant on the Farm Kaalspruit	Environmental Authorisation Issued by DEA	Mainstream Renewable Power	50MW	Approximately 12km north of Loeriesfontein	Approved (Not constructed)
Hantam PV Solar Energy Facility	Draft Environmental Impact Report (comment period ended 17 Feb 2012)	Solar Capital (Pty) Ltd	Up to 525MW	Approximately 47km north of Loeriesfontein (just east of Helios Substation).	In Process
PV Plant on Klein Rooiberg Farm	Draft Scoping Report – comment period	Orlight SA (Pty) Ltd	Up to 150MW	Approximately 41km north of Loeriesfontein (10km south of Helios Substation).	Approved (Not constructed)

The potential for large scale visual impacts as a result of the above proposed developments in 2012 was deemed to significantly alter the sense of place and visual character of the study area, if constructed. The cumulative visual impacts of each visual receptor were then assessed and it was found that the greatest cumulative impact would be experienced by the dwelling on Narosies Farm and the dwellings in Klein Rooiberg as they would be visually exposed to the Hantam PV Solar Energy Facility and the PV Plant on Klein Rooiberg Farm. None of the receptors were found to be visually exposed to the CPV/PV Plant on the Farm Kaalspruit as this proposed development was too far away.

No quantification of the impacts in terms of an impact rating were made.

7.3. CUMULATIVE IMPACTS - 2023

The proposed power line infrastructure and substation is located in an area where there are numerous existing power lines and substations scattered throughout the study area. Additionally, the grid alignment is located adjacent to existing wind energy facilities (i.e. Loeriesfontein and Khobab WEF). The visual amenity along this power line corridor has therefore

[2] As per the latest released Renewable Energy EIA Applications Database (REEA) Quarter 3 2022

already been 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.

Additionally, **Map 5** illustrates that it will contribute to the increased cumulative visual impact of renewable energy facilities and their associated infrastructure in the region in general, assuming that all approved renewable energy applications (i.e. Dwarsrug, Kekerboom 1 and 3 WEFs) are constructed.

It is a requirement that a visual specialist identify and quantify the cumulative visual impacts of a proposed development, propose potential mitigating measures and conclude if the proposed development will result in any acceptable loss of visual resources, taking into consideration the other proposed and operational projects in the area.

The table below illustrates the assessment of the anticipated cumulative visual impact of infrastructure on sensitive visual receptors within the region.

Table 13: Impact table summarising the significance of the cumulative visual impact of the proposed grid connection infrastructure when considered with other development in the area on sensitive visual receptors within the region

Nature of Impact: The potential cumulative visual impact of the grid connection infrastructure on the visual quality of the landscape		
	Overall impact of the 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	High **(8)**	High **(8)**
Probability	Improbable **(2)**	Probable **(3)**
Significance	*Moderate **(32)***	Moderate **(42)**
Status (positive or negative)	Negative	Negative
Reversibility	Recoverable (3)	Recoverable (3)
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	No	
Mitigation potential	Very Difficult	

The cumulative visual impacts of the proposed grid connection infrastructure is ultimately expected to be of **moderate** significance, when considered with other development in the area on sensitive visual receptors within the region. Particularly when considering its remote location and the general low occurrence of potential sensitive visual receptors.

7.4. COMPARATIVE FINDINGS

According to the latest released Renewable Energy EIA Applications Database (REEA) Quarter 3 2022[3], majority of the renewable energy facility EIA applications undertaken fall within the general region surrounding the proposed Loeriesfontein 3 PV SEF.

Comparatively since 2012 many more EIA applications for renewable energy facilities have taken place within the study area, as well as, the general region and none of the proposed facilities as outlined in 2012 (refer to **Table 12**) have been constructed, to date. Subsequently, two WEFs and their associated grid connection infrastructure, not accounted for in the 2012 assessment, have been constructed within the study area, namely, the Loeriesfontein and Khobab WEF. Additionally, no specific cumulative impact ratings were undertaken in the original 2012 VIA undertaken by SiVEST. These variations in data therefore make it difficult to comparatively compare the cumulative impacts expected in 2012 and what can be expected to date (2023). It can however, be stated that cumulatively the construction of these facilities and associated grid connection infrastructure **has altered the sense of place and visual character of the study area** as predicted in the original 2012 assessment.

However, while the construction of these facilities has already altered the sense of place and visual character of the study area (as predicted in 2012 by SiVEST), from a visual perspective it is preferrable that the visual impact of renewable energy

[3] It must be noted that this database is not always updated regularly and therefore some projects listed may no longer be considered for development, or no longer have valid Environmental Authorisations. The data is displayed as provided and the author does not accept responsibility for the accuracy thereof.

facilities and their associated grid connection infrastructure be consolidated in one area in order to contain the visual impact to select areas as opposed to being scattered throughout the country.

The potential cumulative visual impact is therefore expected to be **within acceptable limits**, considering the existing grid connections in the region, as well as, the approved and existing Wind Energy Facilities in the area.

8. MITIGATIONS

The primary visual impact, namely the presence of the proposed grid connection infrastructure, is not possible to mitigate, especially in this receiving environment. Low lying vegetation, the undeveloped nature of the study area, and the high contrast of the infrastructure within the surrounding receiving environment results in a low VAC.

The following is, however, possible and was recommended as general good practice in the VIA undertaken by SiVEST in 2012:

- Carefully plan to reduce the construction period.
- Minimise vegetation clearing and rehabilitate cleared areas as soon as possible.
- Maintain a neat construction site by removing rubble and waste materials regularly.
- Make use of existing gravel access roads where possible.
- Ensure that dust suppression techniques are implemented on all access roads.
- Bury cables under the ground where possible.
- New overhead power lines should be aligned to follow exiting power lines or other infrastructure, such as roads.
- Buildings should be painted with natural tones that fit with the surrounding environment.
- Limit construction activities to day-time hours in order to prevent night lighting during construction.
- Make use of fittings that focus the light and prevent light spill.
- Direct perimeter lighting in a downward direction toward the site.
- Limit the use of flood lighting where possible.

In addition, it is recommended that the following mitigation measure also be included (over and above those already provided as part of the 2012 VIA):

- 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.
    - 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.

- Mitigation of other lighting impacts includes the pro-active design, planning and specification lighting for the facility. The correct specification and placement of lighting and light fixtures will go far to contain rather than spread the light. Additional 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.

The possible mitigation of both primary and secondary visual impacts as listed above should be implemented and maintained on an on-going basis.

9. CONCLUSION AND RECOMMENDATIONS

Since the initial VIA undertaken by SiVEST in 2012, the landscape characteristics comprising the topography and vegetation of the study area have remained unchanged. However, in terms of the land use, while the majority of the land uses noted in 2012 have remained the same (i.e. sheep farming, etc.), some changes have been noted and are as follows:

- In 2012, gypsum mining was noted to have taken place along the railway line within the study area. While these areas of disturbance are still noted on the current land cover / broad land use map (Map 4) and updated Google Earth aerial imagery, a comparison of current aerial imagery to historical aerial imagery take in 2012 indicates that these areas have largely remained unchanged in size and are therefore assumed to be inactive mines.
- The most significant changes in land use noted between 2012 and present day (2023) is the presence of the two operational Wind Energy Facilities (i.e. Loeriesfontein and Khobab WEFs) located to the south and south west of the site. However, it must be noted that while these activities are new land uses within the study area currently, this change in land use was anticipated already in the initial 2012 study undertaken. Therefore, as predicted in the initial assessment, this change in land use is in line with the noted trends in the region at that time.
- Salt mining activities are noted to now be taking place at Boegoefontein Pan and further afield at Dwaggas Pan. These activities were not noted to be taking place in 2012, however, subsequently as of 2017 EIA applications were submitted for these activities.

Overall, despite these changes in land use, the study area has retained its predominately undeveloped, rural and natural character, as well as, low population density. Therefore, in the opinion of the author, the **status of the environment has largely remained the same.**

The impact ratings as determined in 2012 were expected to be contained to **low to medium** for the proposed grid connection infrastructure. In comparison, it expected that the impact ratings will also be **medium to low,** considering the present-day land uses and expected visual exposure. Therefore, **no increase in the visual impact is anticipated**.

The cumulative visual impacts of the proposed grid connection infrastructure is ultimately expected to be of **moderate** significance, when considered with other development in the area on sensitive visual receptors within the region. Particularly when considering its 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 existing grid connections in the region, as well as, the approved and existing Wind Energy Facilities in the area.

No specific mention to visual impact sensitivity was made in the DFFE screening tool report with regards to the grid connection infrastructure.

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

Table 14: Matrix to determine overall visual sensitivity for the proposed grid connection infrastructure

Sensitive Receptor	Very High Sensitivity 4	High Sensitivity 3	Moderate Sensitivity 2	Low Sensitivity 1
Home/farmsteads	Within 500m	Within 500m - 1km	Within 1-2 km	>2 km
Provincial/arterial/ secondary roads	Within 1km	Within 1-3km	Within 3-6 Km	>6 Km
VAC	Low VAC	Moderate VAC	High VAC	Very High VAC
Visual Quality	Natural environment intact with no built infrastructure	Natural environment intact with limited built infrastructure	Natural environment somewhat intact with fair amount of built infrastructure	Built infrastructure is dominant with little to no natural environment remaining
Presence of existing infrastructure	Absent	Very low densities	Present in moderate quantities	High densities
Total	**Very High (17)**			

Overall visual sensitivity rating:

- Low (0-5)
- Moderate (5-10)
- High (10-15)
- Very High (15-20)

The sensitivity of the visual environment for the proposed Grid connection infrastructure is **very high,** owing to the presence of farm/homesteads and a secondary road located within 500 m of the proposed alignments, as well as the low visual absorption capacity of the receiving environment. However, portions of the proposed grid connection alignment follow the alignment of an existing powerline, as well as runs adjacent to the existing Loeriesfontein WEF, meaning that the visual impact is already in place and the proposed line will just contribute to the cumulative impact and existing visual clutter. The overall result is that the visual sensitivity for the grid connection alignment would be **high**.

Based on the above assessment, there has been no changes in the land cover and minimal changes in land uses. Additionally, the impacts as assessed today will be moderate. Therefore, it is **recommended that the proposed Part 1 Amendment extending the validity of the EA for the 132kV Grid Alignment And 132kV Eskom Portion of the shared on-site Substation to service the 100MW Loeriesfontein 3 PV SEF be supported, subject to the conditions and recommendations as stipulated in the current EA, and according to the Environmental Management Programme (EMPr), as well as the suggested mitigation measures, as provided in this and the original Visual Impact Assessment report compiled in 2012**.

10. REFERENCES

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