DRAFT BASIC ASSESSMENT REPORT

Basic Assessment for the proposed development of the 290 MW Volta Solar Photovoltaic (PV) Facility (i.e., Volta PV Facility) and Battery Energy Storage System (BESS) and the proposed development of a 132 kV Power Line and associated EGI (i.e., Volta EGI) to the planned Artemis Main Transmission Substation (MTS) near Dealesville, Free State

APPENDIX C.2

Visual Impact Assessment

CSIR
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Volta PV

VISUAL IMPACT ASSESSMENT
FOR THE PROPOSED DEVELOPMENT OF THE 290MW VOLTA SOLAR PHOTOVOLTAIC (PV) FACILITY AND ASSOCIATED BATTERY ENERGY STORAGE SYSTEM (BESS) NEAR DEALESVILLE, FREE STATE PROVINCE

Produced for:

Volta PV (Pty) Ltd

On behalf of:

CSIR

Produced by:

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Final: 27 March 2023

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DECLARATION

I, **Lourens du Plessis**, as an independent consultant compiled this Scoping 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.

____

Lourens du Plessis
Professional GISc Practitioner
GPr GISc 0147

EXECUTIVE SUMMARY

VOLTA PV (Pty) Ltd is proposing the development of the 290 MW Volta Solar Photovoltaic (PV) Facility (i.e., Volta PV) and Battery Energy Storage Systems (BESS) near Dealesville in the Free State.

The study area occurs on land with an average elevation of approximately 1305 with elevations reaching 1330 on mountain tops such the Grootberg, Spitskop and Rondekop in the west. The entire study area is predominantly flat with low undulating hills. The topography or terrain morphology of the region is broadly described as *Plains and Pans* or *Slightly Undulating Plains*, and is therefore relatively flat.

The site location can be described as fairly remote, with the only populated area being the town of Dealesville. A number of homesteads occur throughout the study area.

Land cover in the study area consists predominately of grasslands and dryland agriculture. Low shrubland and bare sand are associated with the pans scattered throughout the site.

Industrial infrastructure in the region is very prominent and consists of the Perseus substation (located 2 km north east of the proposed sites) and an extensive network of high voltage powerlines that congregate at the substation.

Further to this, the entire proposed Volta PV and BESS site is located within the Kimberley Renewable Energy Development Zone (REDZ).

Overall, the Visual Absorption Capacity (VAC) of the receiving environment is low by virtue of the limited height (or absence) of the vegetation. 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.

The greater environment has been transformed owing to dryland agriculture. Additionally there are numerous existing powerlines that lie in close proximity to the site and traverse the study area, resulting in an overall low to moderate visual quality.

The proposed Volta PV and BESS is located within an area where numerous other PV facilities have been authorized and where a large network of power lines traverse the study area and congregate at the existing Perseus substation. The cumulative visual exposure (and potential cumulative visual impact) is not an unintended consequence of renewable energy facility developments within the region, but rather a concerted effort to concentrate renewable energy facilities within the Kimberley REDZ and electrical grid infrastructure (EGI) corridor. This is an effort to prevent the scattered proliferation of renewable energy generation infrastructure beyond the REDZ and throughout the greater region.

The DFFE screening tool generated for the proposed Volta PV facility indicated that the Volta PV has a **very high** sensitivity owing to the fact that the site is located within 500 m of a town or village and located on mountain tops and high ridges. Based on the site sensitivity verification report, it can be found that the sensitivity of the visual environment for the proposed Volta PV Facility is confirmed to be **moderate** due to the low occurrence of visual receptors within 500m of the proposed facility, mountain tops and ridges located within 500 m from the nearest site and no PV panels located on steep slopes, mountain tops or ridges.

Overall, the significance of the visual impacts is expected to range from **moderate** to **low** as a result of the numerous existing power lines within close proximity to the proposed site and its location within the Kimberley REDZ. There are a fair 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 facility structures. These observers may consider visual exposure to this type of infrastructure to be intrusive. It should be noted that of these receptors located within a 3km radius of the proposed sites, a number of the homesteads are located on farms that already have authorization to construct renewable energy developments.

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 Volta PV facility would be considered to be acceptable from a visual impact perspective and can therefore be authorised.

Table 1: Overall impact significance for solar PV facilities and BESS post mitigation

Phase	**Overall Impact Significance**
Construction	Moderate
Operational	Low to moderate
Decommissioning	Moderate
Nature of Impact	**Overall Impact Significance**
Cumulative - Operational	Moderate

1. INTRODUCTION

1.1. Scope, Purpose and Objectives of the Visual Specialist Report

The Visual Impact Assessment (VIA) is one of several specialist studies being carried out as part of the Basic Assessments (BAs) for the proposed development of the 290 MW Solar Photovoltaic (PV) Facility and Battery Energy Storage System (BESS) near Dealesville, Free State Province.

The VIA includes an assessment of potential visual impacts and risks associated with the proposed solar energy facility and BESS and provides recommended mitigations to minimise potential visual impacts. These are used to inform the siting and layout of the project.

2. STUDY APPROACH

2.1 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 specializes in Environmental Geographical Information Systems (GIS) and Visual Impact Assessments (VIA).

Lourens has been involved in the application of 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).

Curriculum vitae are included in Appendix 2 of this specialist assessment.

1.2. Information Base

This assessment was based on information from the following sources:

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

Quality of the above information bases are rated as Good.

1.3. Assumptions and limitations

To prepare this Report, LoGis utilised only the documents and information provided by CSIR or any third parties directed to provide information and documents by CSIR. LoGis has not consulted any other documents or information in relation to this Report, except where otherwise indicated. The findings, recommendations and conclusions given in this report are based on the author's best scientific and professional knowledge, as well as, the available information. This report is based on survey and assessment techniques which are limited by time and budgetary constraints relevant to the type and level of investigation undertaken. LoGis and its staff reserve the right to modify aspects of the report including the recommendations if and when new information may become available from on-going research or further work in this field, or pertaining to this investigation.

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

No consultation has taken place for this visual assessment to date and it is anticipated that any visual issues will be identified in the Socio-Economic Impact Assessment and the Public Participation Process, and that these will be addressed in the final BA Report.

1.4. 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:

[1] Adapted from Oberholzer (2005).

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

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

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

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**.

1.5. Methodology

The study was undertaken using 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.

The VIA is determined according to the nature, extent, duration, intensity or magnitude, probability and significance of the potential visual impacts, and will propose management actions and/or monitoring programs, and may include recommendations related to the 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, nor had any effect on carrying out a visual assessment.

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.

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.

- **Site visit**

A site visit was undertaken in order to verify the results of the spatial analyses and to identify any additional site-specific issues that may need to be addressed in the VIA report. It should be noted that, from a visual perspective, the different seasons do not influence the results of the impact assessment, and as such regardless of the timing of the site visit, the level of confidence for the assessment and findings is high. A photographic survey was made of the site and surrounding potentially affected area from several selected viewpoints. The site visit was undertaken on the 21 October 2022 and was carried out by the VIA specialist for the duration of a full day.

2. BACKGROUND

VOLTA PV (Pty) Ltd is proposing the development of the 290 MW Volta Solar Photovoltaic (PV) Facility (i.e., Volta PV) and Battery Energy Storage Systems (BESS) near Dealesville in the Free State.

The proposed Volta PV and BESS will be constructed on the following farm portions:

- Mooihoek (RE/1551)
- Cornelia (RE/1550)
- Carlton (RE/74)
- Vadersrust (RE/822)
- Oxford (1/1030)

The study area is situated within the Tokologo Local Municipality, which falls within the Lejweleputswa District Municipality in the Free State Province. The affected farm portions comprise approximately 1 282 ha of which a 520 ha portion of these properties has been earmarked for the proposed Volta PV and BESS project site. Please refer to the maps displayed in this report for the location of the aforementioned Volta PV and BESS and the regional locality.

The proposed project will be comprised of the following:

- Solar PV
  - Panels will have a maximum height of 3.5 m
  - Generating capacity of 290 MW
  - Two collector substation with a capacity of 500 MVA each

- Battery Energy Storage System
  - The BESS will encompass a development footprint of approximately 46 ha and have a maximum height of 3 m;
  - Combined capacity of 4000 MWH
  - Lithium-Ion, Redox Flow, Liquid metal and other technology types are being considered and assessed for this BA;

- Associated Infrastructure
  - Site Access will, where possible, be obtained via existing farm roads that will be upgraded and maintained, where needed;
  - New internal access roads will be constructed where there are no existing roads, whereas existing farm roads will be upgraded and extended, where necessary;
  - Fencing of 2 m high around the entire 5 ha site boundary
  - Warehouse/workshop, guard houses, ablution facilities

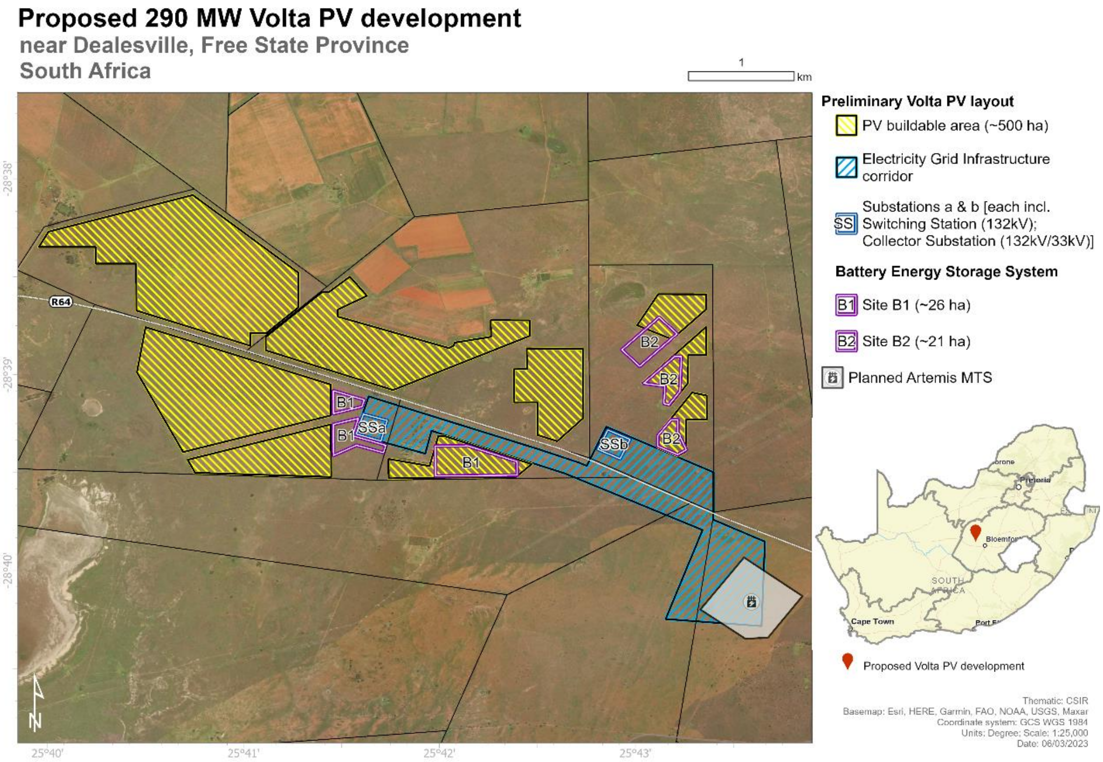


Figure 1: Proposed layout (BESS facilities in purple and PV layouts in yellow)

Sample images of similar Battery Energy Storage System (BESS) facilities and photovoltaic plants are provided below.

Figure 2: Photovoltaic (PV) solar panels. (*Photo: SunPower Solar Power Plant – Prieska)*.

Figure 3: Aerial view of PV arrays. (*Photo: Scatec Solar South Africa*).

Figure 4: Aerial view of a BESS facility

Figure 5: Close up view of a BESS facility *(Photo: Greenbiz.com).*

3. TERMS OF REFERENCE

This report is the undertaking of a VIA of the proposed Volta Solar PV facility and BESS as described above.

The specialist was required to determine the Site Sensitivity Verification Requirements in terms of Government Gazette 43110, Government Notice (GN) 320, and provide a Site Sensitivity Verification Report, including a site visit in order to identify the level of sensitivity assigned to the project area on the Screening Tool, and to verify and confirm this sensitivity and land-use. Following this, prepare a description and mapping baseline of the visual resources and sensitivity of the study area, including viewsheds and recommended buffers, in GIS format.

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. In addition, the determination of impacts must be assessed to determine the potential direct, indirect and cumulative impacts of the proposed development on the receiving environment from a visual perspective, both without and with mitigation, for the construction, operational and decommissioning phases of the project. Any protocols, legal and permit requirements that are relevant to this project and the implications thereof should be identified.

The study area for the visual impact assessment encompasses a geographical area of 265km² (the extent of the full page maps in this report). The study area includes a 6km buffer zone (area of potential visual influence) from the proposed development footprint.

The study area includes the small town of Dealesville, the R64 arterial road, and a number of farm dwellings or homesteads.

Anticipated issues related to the potential visual impact of the proposed Volta PV and BESS include the following:

- The visibility of the facility to, and potential visual impact on, observers travelling along the R64 arterial road and various secondary roads.
- 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, etc.) on observers in close proximity to the facility.
- The visual absorption capacity of the natural vegetation (if applicable).
- 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.

Once impacts have been identified, provide recommendations with regards to potential monitoring programmes and determine mitigation and/or management measures which could be implemented to reduce the effect of negative impacts and enhance the effect of positive impacts including the identification of best practice management actions, monitoring requirements, and rehabilitation guidelines to be included in the Environmental Management Programme (EMPr).

4. RELEVANT LEGISLATION AND GUIDELINES

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. As the site falls within a gazetted REDZ (REDZ 5), a BA is required.

- **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.

5. THE AFFECTED ENVIRONMENT

The study area is situated within the Tokologo Local Municipality, which falls within the Lejweleputswa District Municipality in the Free State Province. The proposed site is located approximately 4 km north west of Dealesville, 42 km south east of Boshof and 66 km north west of Bloemfontein.

The study area occurs on land with an average elevation of approximately 1305 with elevations reaching 1330 on mountain tops such the Grootberg, Spitskop and Rondekop in the west. The entire study area is predominantly flat with low undulating hills. The topography or terrain morphology of the region is broadly described as *Plains and Pans* or *Slightly Undulating Plains*, and is therefore relatively flat.

Figure 6: Flat topography

The surrounding area is known for numerous salt pans of which Klippan and Annaspan to the north east of the proposed sites are the most prominent. See **Map 1** for the shaded relief/topography map of the study area.

The site location can be described as fairly remote, with the only populated area being the town of Dealesville. A number of homesteads occur throughout the study area. Some of these in the study area include:

- Carlton
- Valleidam
- Modderpan
- Gouda
- Beestedam

- Oxford
- Kelverdon

Roosteyn Safari's, who specialise in hunting safaris, is located 2.5 km north west of the proposed site, while Tarentaalrand Safari Lodge, a guesthouse, is located 10 km north west.

It is uncertain whether all of these farmsteads are inhabited or not. It stands to reason that farmsteads that are not currently inhabited will not be visually impacted upon at present. These farmsteads do, however retain the potential to be affected visually should they ever become inhabited again in the future. For this reason, the author of this document operates under the assumption that they are all inhabited. It should be noted that two (2) homesteads located within the farm portions earmarked for the PV development have been confirmed to be uninhabited. These homesteads will not be taken into consideration during the impact assessment.

Figure 7: Typical dwelling in Dealesville

Figure 8: Informal settlements

Land cover in the study area consists predominately of grasslands and dryland agriculture. Low shrubland and bare sand are associated with the pans scattered throughout the site. See **Map 2** for the broad land cover types map of the study area.

The two (2) vegetation types present on the proposed sites are Western Free State Clay Grassland and Vaal-Vet Sandy Grassland.

Figure 9: Grassland vegetation

The R64, which bisects the study area, is a provincial route that connects Bloemfontein with Kimberly via Dealesville and Boshof. Other than this arterial road, a limited number of secondary roads cross the study area.

Figure 10: View of the site from the R64

Industrial infrastructure in the region is very prominent and consists of the Perseus substation (located 2 km north east of the proposed sites) and an extensive network of high voltage powerlines that congregate at the substation. These include:

- Hydra/Perseus 2 400kV Overhead Line
- Hydra/Perseus 3 400kV Overhead Line
- Leander/Perseus 1 400kV Overhead Line
- Perseus/Theseus 1 400kV Overhead Line
- Beta/Perseus 2 400kV Overhead Line
- Beta/Perseus 3 400kV Overhead Line
- Grootvlei/Perseus 1 400kV Overhead Line
- Perseus/Harvard 1 275kV Overhead Line
- Perseus/Harvard 2 275kV Overhead Line
- Everest/Perseus 1 275kV Overhead Line
- Perseus/Boundary 1 275kV Overhead Line
- Perseus/Boundary 2 275kV Overhead Line
- Hydra/Perseus 1 765kV Overhead Line
- Alpha/Beta 2 765kV Overhead Line
- Alpha/Beta 1 765kV Overhead Line
- Mercury/Perseus 1 765kV Overhead Line
- Beta/Perseus 1 765kV Overhead Line
- Gamma/Perseus 1 765kV Overhead Line

Figure 11: Perseus Substation

Figure 12: Example of the numerous power lines that traverse the area

There are no designated protected areas within the region and no major tourist attractions or destinations were identified within the study area. Except for pans, there are no topographic or scenic features of note in the study area.

Further to this, the entire proposed Volta PV and BESS site is located within the Kimberley Renewable Energy Development Zone (REDZ). Refer to **Figure 13** for the regional locality of the site in relation to the Kimberley REDZ. REDZ are described as:

"areas where large scale wind and solar PV energy facilities can be developed in terms of SIP 8 and in a manner that limits significant negative impacts on the environment, while yielding the highest possible socio-economic benefits to the country."[2]

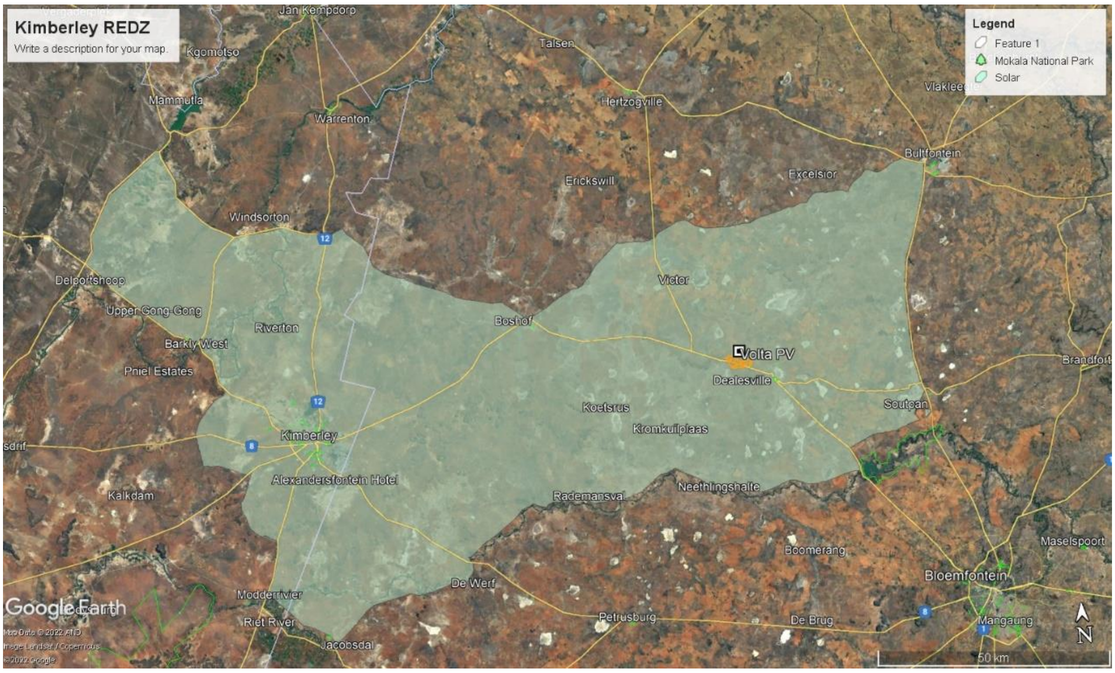


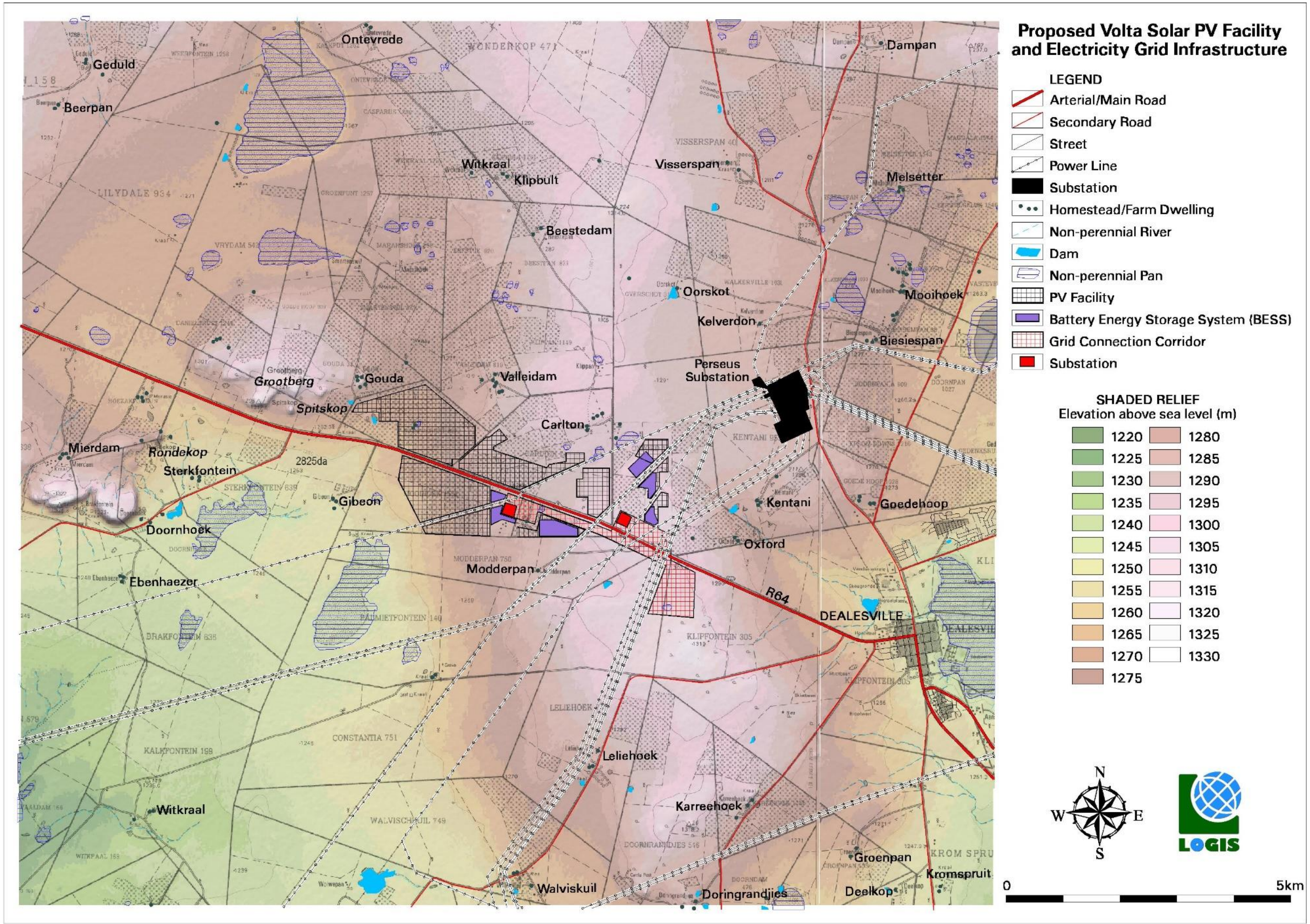
Figure 13: Regional locality of the proposed Volta PV in relation to the Kimberley Renewable Energy Development Zone (REDZ)

Map 4 provides detail as to the approved (Environmentally Authorised) Renewable Energy Environmental Applications (REEA) within the study area (as of 2022 3rd quarter). Applications that have been approved include the following PV facilities (this list is not exhaustive. Refer to Map 4 for the full list):

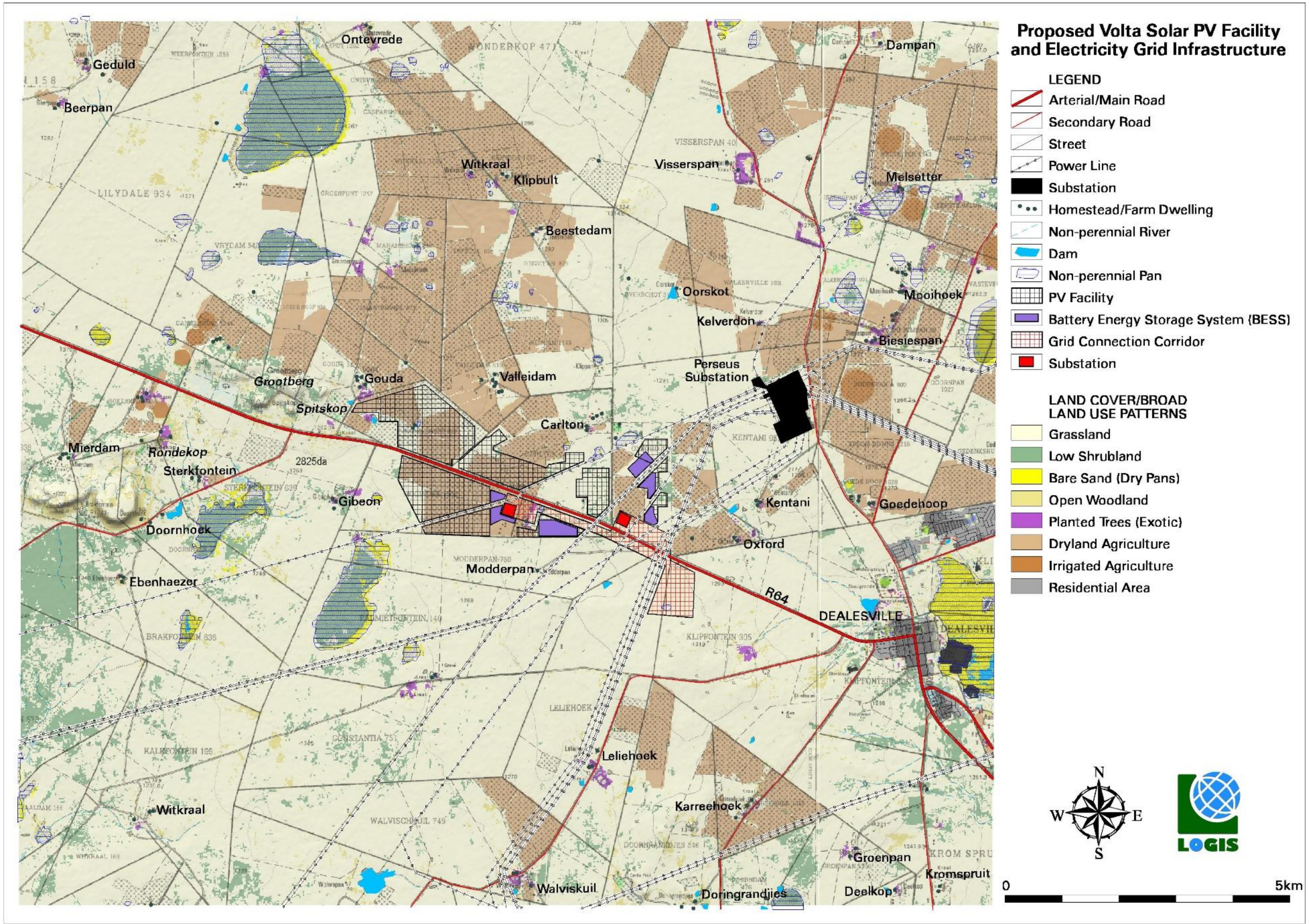
- Boschrand 2
- Braambosch
- Edison, Indlovu
- Faraday, Umkhombe
- Good Hope 1 and 2
- Kentani
- Klipfontein 1 and 2
- Leliehoek
- Maxwell, Ngonyama
- Springhaas x7
- Visserpan 1-4

[2] Source: https://redzs.csir.co.za

Error! Reference source not found. further provides for the location of the REEA_OR_2022_Q3 applications listed above. It must be noted that the database is not always updated regularly and therefore some projects shown on **Error! Reference source not found.** 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.



Map 1: Shaded relief map of the study area



Map 2: Land cover and broad land use patterns

6. RESULTS

6.1 Sensitivities identified by the National Web-Based Environmental Screening Tool

A screening report was compiled using the Department of Forestry, Fisheries and the Environment (DFFE) Screening Tool based on the assessed area for all the solar PV facilities and BESS. The Screening Report includes a 'Map of Relative Landscape (Solar) Theme Sensitivity', indicated in Figure 14 below.

The Screening Tool shows that the site for the proposed Volta PV and BESS facility contains sensitivities ranging from medium to very high owing to the fact that the site is located within 500 m of a town or village and located on mountain tops and high ridges.

The current visual sensitivity mapping undertaken in this VIA is in greater detail at the site scale for the proposed solar PV facilities and BESS infrastructure, and takes into account detailed viewshed mapping and local site conditions**.**

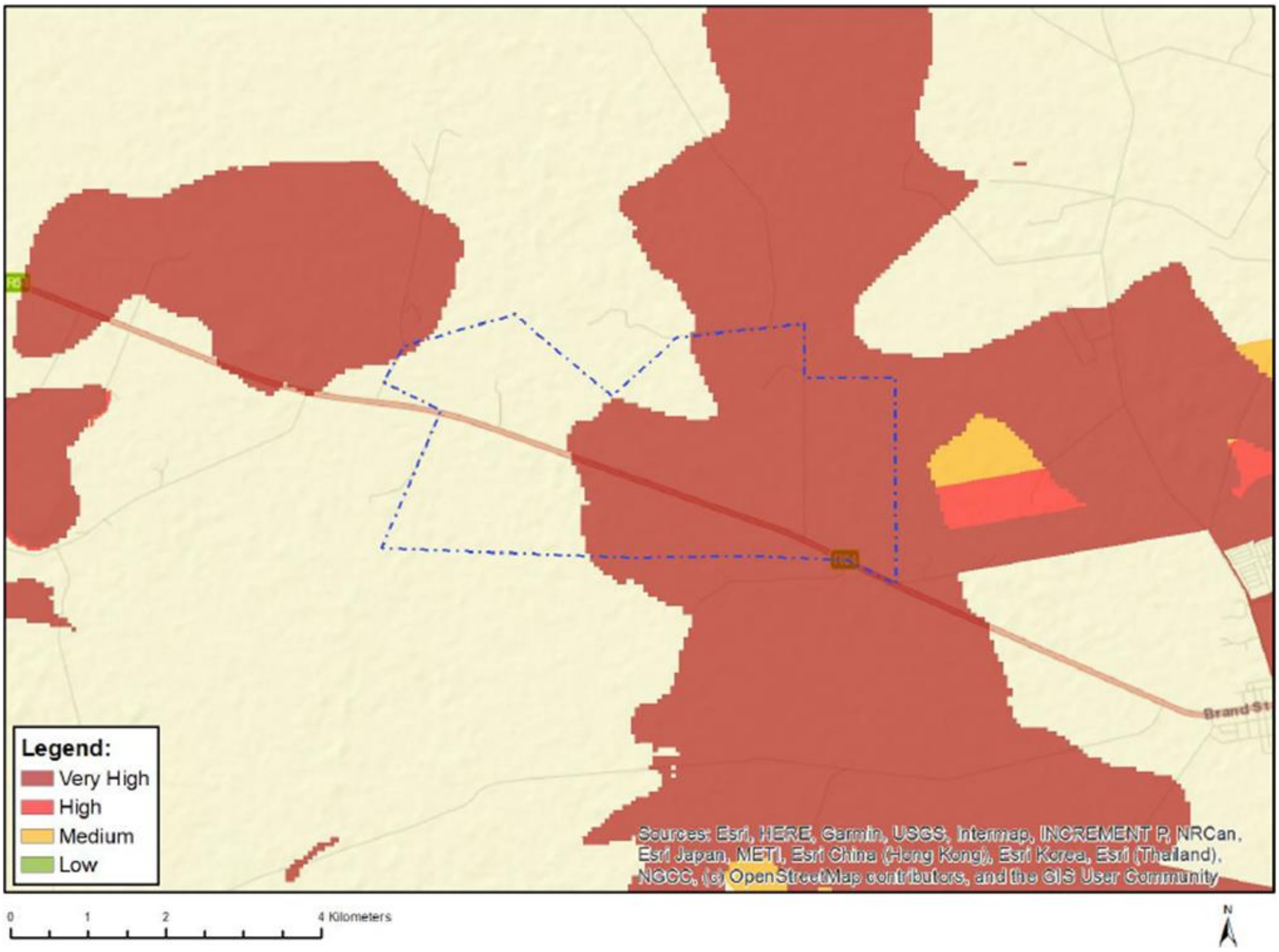


Figure 14: DFFE screening tool for the Landscape Theme

6.2 Potential visual exposure

The result of the viewshed analysis for the proposed Volta PV and BESS is shown on the map below (**Map 3**). The viewshed analysis was undertaken from a representative number of vantage points within the development footprint at an offset of 5m above ground level. This was done in order to determine the general visual exposure (visibility) of the area under investigation, simulating the maximum height of the proposed facility.

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

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

Results

Owing to the predominately flat topography of the study area, the potential visual exposure of the Volta PV and BESS is quite widespread. However, it should be noted that the potential visual exposure will not occur in isolation, but rather in conjunction with the existing substation and network of power lines adjacent to the PV site.

The following is evident from the viewshed analyses:

0 – 1km

It is expected that the facility would be highly visible within this zone. The potential sensitive visual receptors within this zone include residents of the following homesteads:

- Gouda
- Valleidam
- Carlton
- Modderpan

The 2 unknown homesteads (located on Cornelia and Vadersrust farm portions) have been confirmed to be uninhabited.

The R64 arterial road runs through the proposed PV Facility and it is expected that the PV facility and BESS would be highly visible to observers travelling along this road.

1 – 3km

Visual exposure within this zone becomes slightly scattered with visually screened areas to the north west due to the Grootberg hill and south east.

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

- Oorskot
- Kelverdon
- Kentani
- Oxford
- Sterkfontein
- Gibeon

Observers travelling along small sections of the R64 and various secondary roads.

3 - 6km

Within a 3 – 6km radius, the visual exposure is quite fragmented. Large visually screened areas are found to the north west, north, east and south east.

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

- Ebenhaezer
- Doornhoek
- Mierdam
- Unknown
- Witkraal
- Klipbult
- Beestedam
- Visserspan
- Melsetter
- Mooihoek
- Biesiespan
- Goedehoop
- Dealesville (outlying)

Observers travelling along small sections of the R64 and various secondary roads.

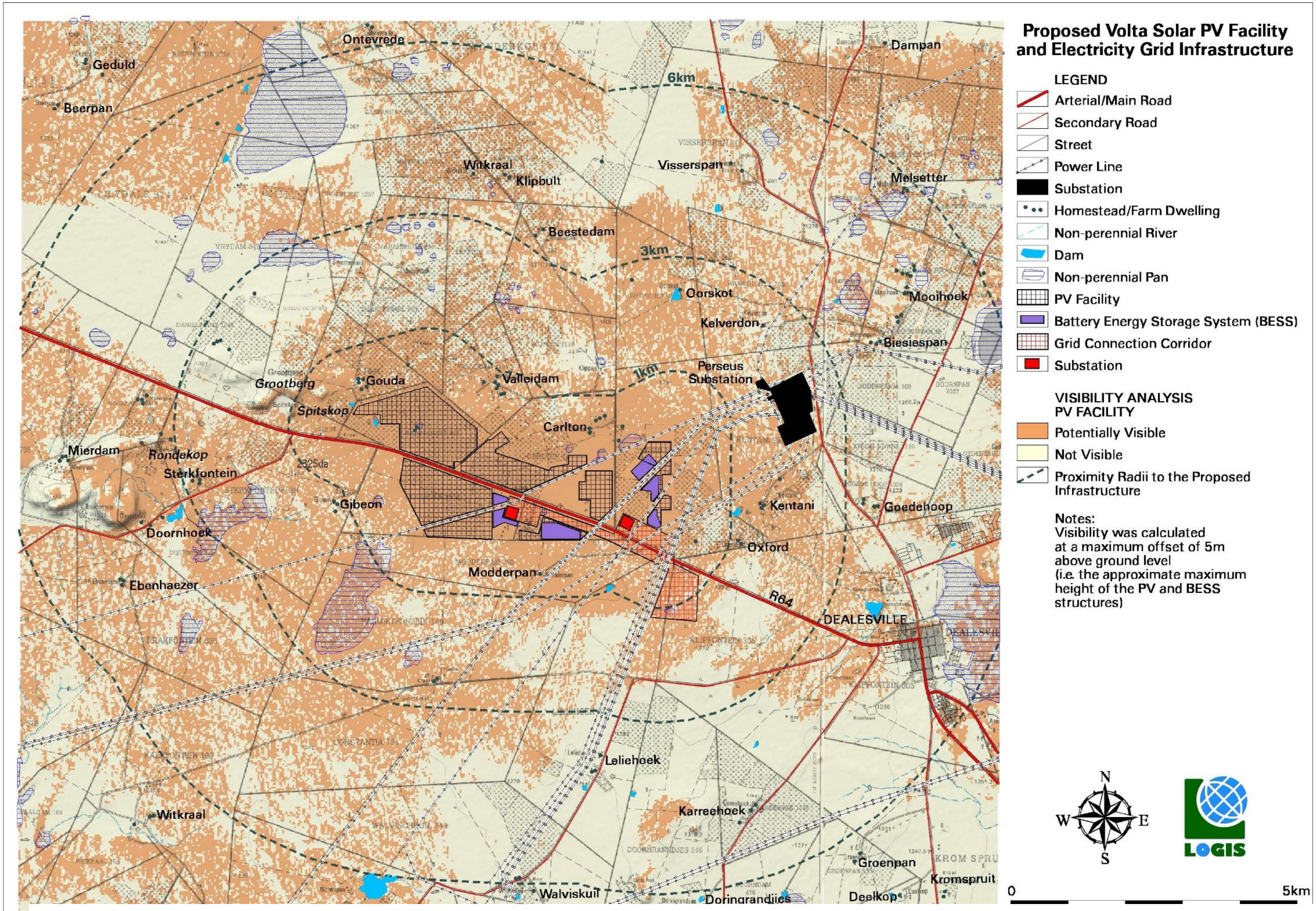
> 6km

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.

Conclusion

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

It should also be noted that a large portion of the potential visual exposure falls over areas that have already been approved for solar energy facilities.



Map 3: Viewshed analysis of the proposed Volta PV and BESS

6.2. Cumulative visual assessment

Cumulative visual impacts can be defined as the additional changes caused by a proposed development in conjunction with other similar developments or as the combined effect of a set of developments. In this case the 'development' would the proposed Volta PV and BESS as seen in conjunction with the existing (or proposed/authorised) renewable energy projects within the region. Refer to **Map 4.**

Cumulative visual impacts may be:

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

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

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

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

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

The specialist is required to conclude if the proposed development will result in any unacceptable loss of visual resource considering the industrial infrastructure proposed in the area.

The approach for this assessment includes all renewable energy and EGI projects within 30 km that have received an EA at the time of starting the BA (i.e. Oct 2022), as well as the proposed project. The information was collected from the National DFFE Renewable Energy EIA Application (REEA) database, 2022 Quarter 3; as well as from the South African Heritage Resources Information System (SAHRIS), and Eskom's Generation Connection Capacity Assessment (2020).

This is the most accurate and up-to-date data available to the project team. There may be some projects with "in-process" applications for which data is not yet publicly available. This is the data found to be available and efforts were made to determine recent amendments. The REEA database contains land parcels, and not the footprints. In most cases the actual development footprint of the nearby Renewable Energy developments could not be easily quantified or accessed spatially. Hence the land parcels considered, are larger than the land the PV will occupy. Some of the projects may not get developed. For these reasons this data tends towards a worst-case scenario.

Map 4 below details the approved (Environmentally Authorised) Renewable Energy Environmental Applications (REEA) within the study area (as of 2022 3rd quarter) within a 30 km radius from the proposed Volta PV and BESS. Applications that have been approved include the following PV facilities:

Table 2: List of approved renewable energy projects within 30 km from the proposed Volta site

Technology	MW/ kV	Status	Project Title
Solar PV	100	Approved	The development of 100 MW Visserpan solar photovotaic facility project 2 on the farm Visserspan No.40 in the Free State Province
Solar PV	100	Approved	The development of 100 MW Visserpan solar photovotaic facility project 2 on the farm Visserspan No.40 in the Free State Province
Solar PV	100	Approved	The proposed Visserpan solar photovotaic facility project 3 on the farm Visserspan No.40 in the Free State Province
Solar PV	100	Approved	The proposed up to 100 MW Visserpan solar photovotaic facility project 4 on the farm Visserspan No.40 in the Free State Province
Solar PV	75	Approved	The eleven (11) Kentani solar PV facility and supporting electrical infrastructure in Dealesville, Free State Province: Eksteen
Solar PV	200	Approved	The eleven (11) Kentani solar PV facility and supporting electrical infrastructure in Dealesville, Free State Province: Irene
Solar PV	100	Approved	The eleven (11) Kentani solar PV facility and supporting electrical infrastructure in Dealesville, Free State Province: Meeding
Solar PV	150	Approved	The eleven (11) Kentani solar PV facility and supporting electrical infrastructure in Dealesville, Free State Province: Boschrand 2
Solar PV	100	Approved	The eleven (11) Kentani Photovoltaic solar Energy Facilities and Supporting Electrical Infrastructure Proposed by South Africa mainstream renewable power developments (pty) ltd near Dealesville in the Free State Province: Klipfontein 1

Solar PV	100	Approved and Preferred Bidder (BW5)	The eleven (11) Kentani solar PV facility and supporting electrical infrastructure in Dealesville, Free State Province: Klipfontein. 75 MW in initial application , upgraded to 100MW
Solar PV	75	Approved and Preferred Bidder (BW5)	The eleven (11) Kentani Photovoltaic solar Energy Facilities and Supporting Electrical Infrastructure Proposed by South Africa mainstream renewable power developments (pty) ltd near Dealesville in the Free State Province: Sonoblomo
Solar PV	100	Approved and Preferred Bidder (BW5)	The eleven (11) Kentani Photovoltaic solar Energy Facilities and Supporting Electrical Infrastructure Proposed by South Africa mainstream renewable power developments (pty) ltd near Dealesville in the Free State Province: Kentani
Solar PV	75	Approved	The eleven (11) Kentani Photovoltaic solar Energy Facilities and Supporting Electrical Infrastructure Proposed by South Africa mainstream renewable power developments (pty) ltd near Dealesville in the Free State Province: Braambosch
Solar PV	100	Approved and Preferred Bidder (BW5)	The eleven (11) Kentani Photovoltaic solar Energy Facilities and Supporting Electrical Infrastructure Proposed by South Africa mainstream renewable power developments (pty) ltd near Dealesville in the Free State: Klipfontein 2
Solar PV	100	Approved and Preferred Bidder (BW5)	The eleven (11) Kentani Photovoltaic solar Energy Facilities and Supporting Electrical Infrastructure Proposed by South Africa mainstream renewable power developments (pty) ltd near Dealesville in the Free State Province: Boschrand 1 (Now Braklaagte)
Solar PV	100	Approved and Preferred Bidder (BW5)	The eleven (11) Kentani Photovoltaic solar Energy Facilities and Supporting Electrical Infrastructure Proposed by South Africa mainstream renewable power developments (pty) ltd near Dealesville in the Free State: Leliehoek
Solar PV	75	Approved and Operational	Proposed 75MW Sebina Letsatsi Solar PV Facility near Dealesville, Free State Province

Solar PV	290	Approved	Photovoltaic (Pv) Solar Facility and shared electricity Infrastructure near Dealesville within the Tokologo Local Municipality in the Free State Province: Edison (Now Indlovu)
Solar PV	125	Approved	Photovoltaic (Pv) Solar Facility and shared electricity Infrastructure near Dealesville within the Tokologo Local Municipality in the Free State Province: Maxwell (Now Ngonyama) 240Mw was approved. 125 was awarded for bid round 6
Solar PV	125	Approved	Photovoltaic (Pv) Solar Facility and shared electricity Infrastructure near Dealesville within the Tokologo Local Municipality in the Free State Province: Marconi (Now Amagama)
Solar PV	125	Approved	Photovoltaic (Pv) Solar Facility and shared electricity Infrastructure near Dealesville within the Tokologo Local Municipality in the Free State Province: Watt (Now Leopard Ingwe)
Solar PV	125	Approved	Photovoltaic (Pv) Solar Facility and shared electricity Infrastructure near Dealesville within the Tokologo Local municipality in the Free State Province: Faraday (Now Umkhombe)
Solar PV	1000?	Pre-application	Basic Assessment Processes for the proposed Notsi PV Cluster and Notsi Grid Connection, near Dealesville, Free State Province
Solar PV	250	To be confirmed	The proposed development of the Springhaas Solar Facility 1 and associated infrastructure near Dealesville, Bloemfontein.

Solar PV	150	To be confirmed	The proposed development of the Springhaas Solar Facility 3 and associated infrastructure near Dealesville, Bloemfontein.
Solar PV	150	To be confirmed	The proposed development of the Springhaas Solar PV facility 4 and associated infrastructure near Dealesville, Bloemfontein.
Solar PV	150	To be confirmed	The proposed development of the Springhaas Solar Facility 5 and associated infrastructure near Dealesville, Bloemfontein
Solar PV	250	To be confirmed	The proposed development of the Springhaas Solar Facility 6 and associated infrastructure near Dealesville, Bloemfontein.
Solar PV	150	To be confirmed	The proposed development of Springhaas Solar Facility 8 and associated infrastructure near Dealesville, Bloemfontein.
Solar PV	150	To be confirmed	The proposed development of Springhaas Solar Facility 9 and associated infrastructure near Dealesville, Bloemfontein.
Solar PV	100	Approved and Preferred Bidder (BW6)	Proposed IPP Renewable Energy Projects located on the Farm Goede Hoop 1028, Boshof RD and Farm Epsom Downs 1216, Boshof RD (Good Hope 1 Solar Park), within the Tokologo Local Municipality, Lejweleputswa District Municipality, Free State Province.
Solar PV	100	Approved and Preferred Bidder (BW6)	Proposed IPP Renewable Energy Projects located on the Farm Gedenksrust 1029, Boshof RD and Farm De Werf 1013, Boshof RD (Good Hope 2 Solar Park), within the Tokologo Local Municipality, Lejweleputswa District Municipality, Free State Province.

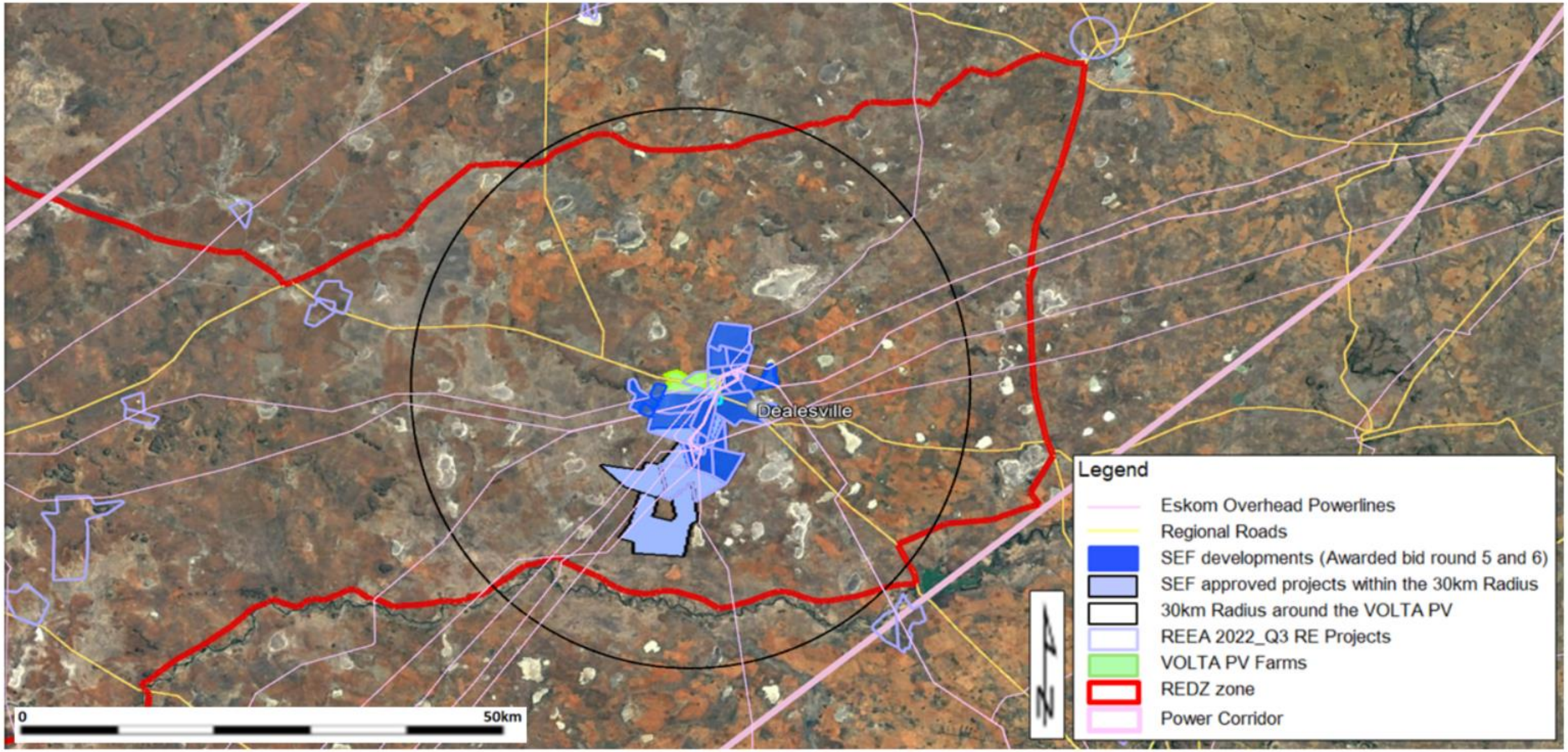
It should be noted that Springhaas has now been approved.

These facilities all surround the proposed Volta PV site, whereby even portions of the Volta PV site are located within these approved areas.

Conclusion

The proposed Volta PV and BESS is located within an area where numerous other PV facilities have been authorized as seen in the table above and where a large network of power lines traverse the study area and congregate at the existing Perseus substation. It should be kept in mind however, that the cumulative visual exposure (and potential cumulative visual impact) is not an unintended consequence of renewable energy facility developments within the region, but rather a concerted effort to concentrate renewable energy facilities within the Kimberley REDZ and electrical grid infrastructure (EGI) corridor. This is an effort to prevent the scattered proliferation of renewable energy generation infrastructure beyond the REDZ and throughout the greater region.

In light of this, and the generally remote location of the REDZ, the potential cumulative visual impact is considered to be within acceptable limits



The Volta PV site (Green) within the Kimberley REDZ and the Central Power Corridor. The 30km radius (black circle)- EA approved projects (light blue) are differentiated from the preferred bid round winners (dark blue).

Credits/ Metadata SEF projects: DFFE :REEA 2022 Q3, Basemap: Google Earth: Image 2023: Maxar Technologies, CNES/Airbus, Coordinate System: CGS WGS 1984

Map 4: Authorized renewable energy projects within a 30 Km radius from the proposed facility

6.3. Visual distance/observer proximity to the facility

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

The principle of reduced impact over distance is applied in order to determine the core area of visual influence for these types of structures.

The proximity radii for the proposed Volta PV and BESS 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 5**, and include the following:

- 0 - 1km. Very short distance view where the 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 grid connection 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.

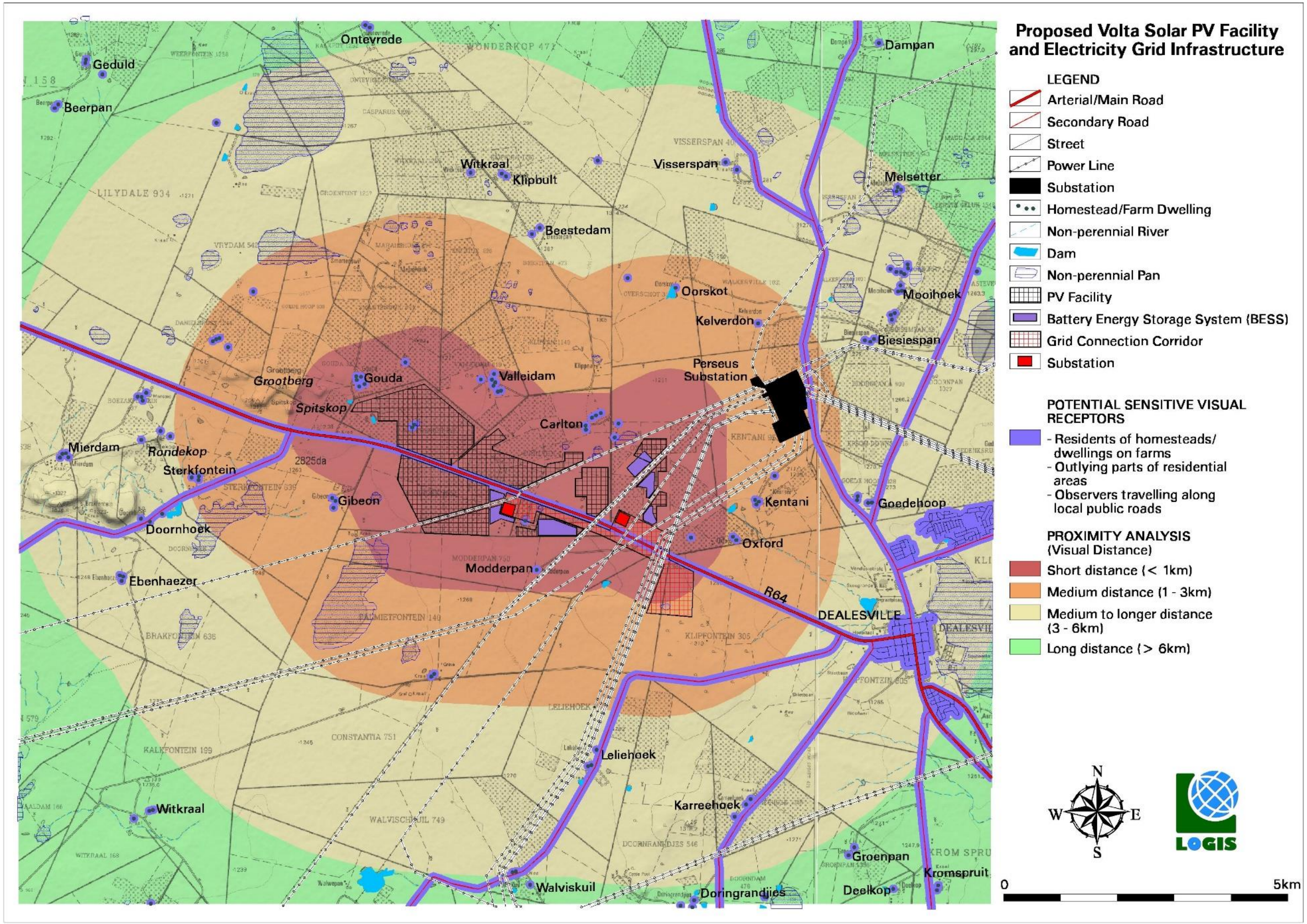
Viewer incidence within the study area is anticipated to be the highest along the R64 arterial road that runs through the proposed Volta PV sites. Travellers using this road may be negatively impacted upon by visual exposure to the facility infrastructure.

Additional sensitive visual receptors are located at the farm residences (homesteads) throughout the study area. It is expected that the viewer's perception, unless the observer is associated with (or supportive of) the facility, would generally be negative.

Due to the fairly remote location of the proposed Volta PV, 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 6.2**.

The potential sensitive visual receptor sites and areas of higher viewer incidence are indicated on **Map 5**.

The author (at the time of the compilation of this report) is not aware of any objections raised against the proposed Volta PV and BESS.



Map 4: Proximity analysis and potential sensitive visual receptors

6.5. Visual absorption capacity

Land cover is predominantly *grassland* and dryland agriculture which is and area dominated by nearly continuous grasses often devoid of taller plants such as trees and shrubs.

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 very flat topography. 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.

Figure 15: Grasslands devoid of trees and shrubs- low VAC

6.6. Visual impact index

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

Likely areas of potential visual impact and potential sensitive visual receptors located within a 6km radius of the proposed Volta PV and BESS are displayed on **Map 7**.

Magnitude of the potential visual impact

0 – 1km

The Volta PV and BESS may have a visual impact of **very high** magnitude on the following observers:

Residents of/visitors to:

- Gouda (site 1)
- Valleidam (site 2)
- Carlton (site 3)
- Modderpan (site 4)

Note: Residents of Carlton and Modderpan are located on farms earmarked for approved solar energy facilities and thereby reduces the probability of this impact occurring on these receptors i.e. it is assumed that the landowners are supportive of PV developments within the region based on their involvement with the already authorised solar energy development.

Observers travelling along the R64 arterial road.

1 – 3km

The Volta PV and BESS may have a visual impact of **high** magnitude on the following observers:

Residents of/visitors to:

- Unknown (site 5)
- Marashoek (site 6)
- Oorskot (site 7)
- Kelverdon (site 8)
- Kentani (site 9)
- Oxford (site 10)

- Gibeon (site 11)
- Sterkfontein (site 12)

Note: Residents of Oorskot, Kelverdon, Kentani, Oxford, Gibeon and Sterkfontein are located on farms earmarked for approved solar energy facilities and thereby reduces the probability of this impact occurring on these receptors i.e. it is assumed that the landowners are supportive of PV developments within the region based on their involvement with the already authorised solar energy development.

Observers travelling along the R64 arterial Road and various secondary roads.

3 – 6km

The Volta PV and BESS may have a visual impact of **moderate** magnitude on the following observers:

Residents of/visitors to:

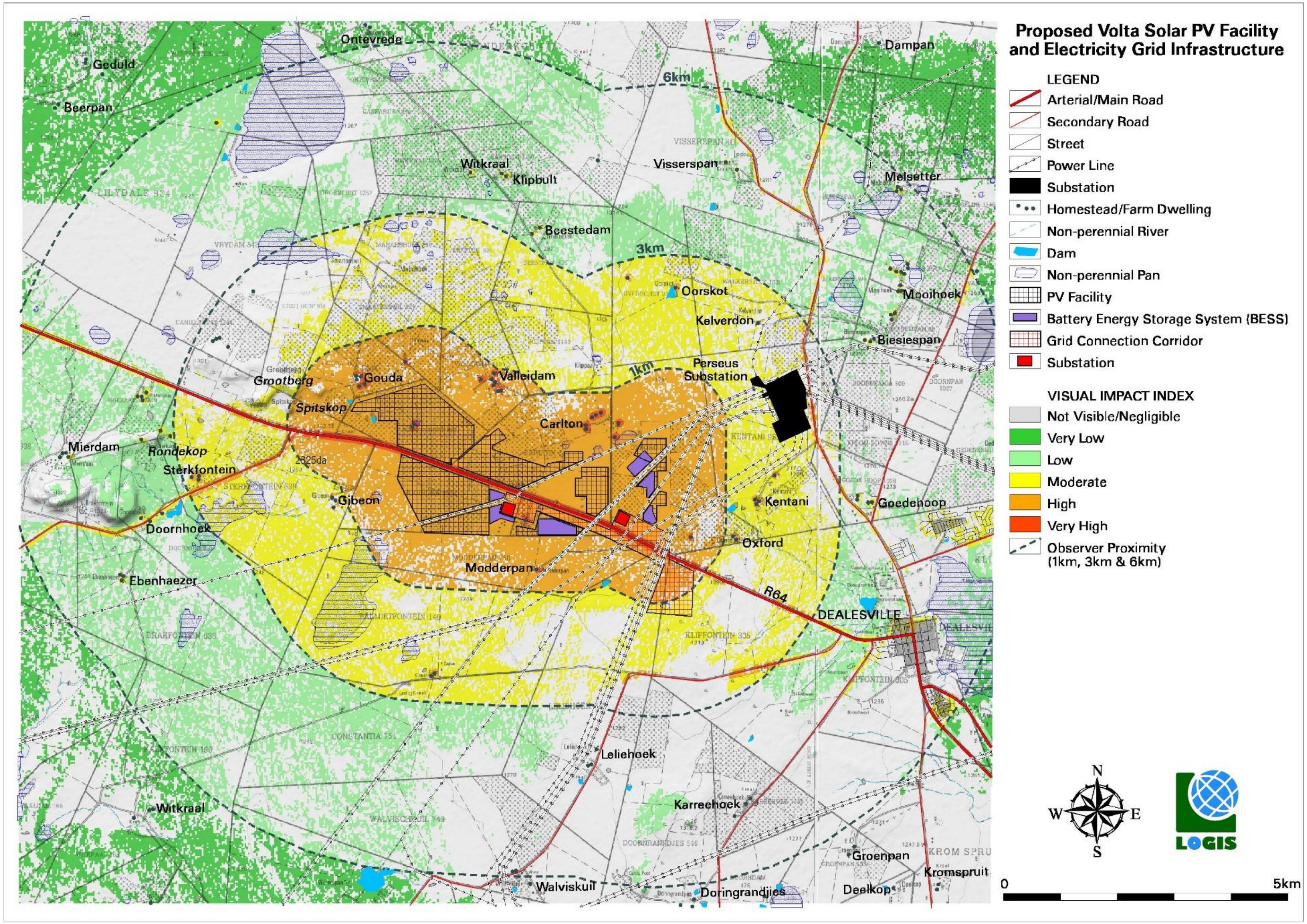
- Ebenhaezer (site 13)
- Doornhoek (site 14)
- Mierdam (site 15)
- Unknown (site 16)
- Witkraal (site 17)
- Klipbult (site 18)
- Beestedam (site 19)
- Visserpan (site 20)
- Melsetter (site 21)
- Mooihoek (Site 22)
- Biesiespan (site 23)
- Goedehoop (site 24)
- Dealesville outlying areas (site 25)

Note: Residents of Visserpan and Dealesville are located on farms earmarked for approved solar energy facilities and thereby reduces the probability of this impact occurring on these receptors i.e. it is assumed that the landowners are supportive of PV developments within the region based on their involvement with the already authorised solar energy development.

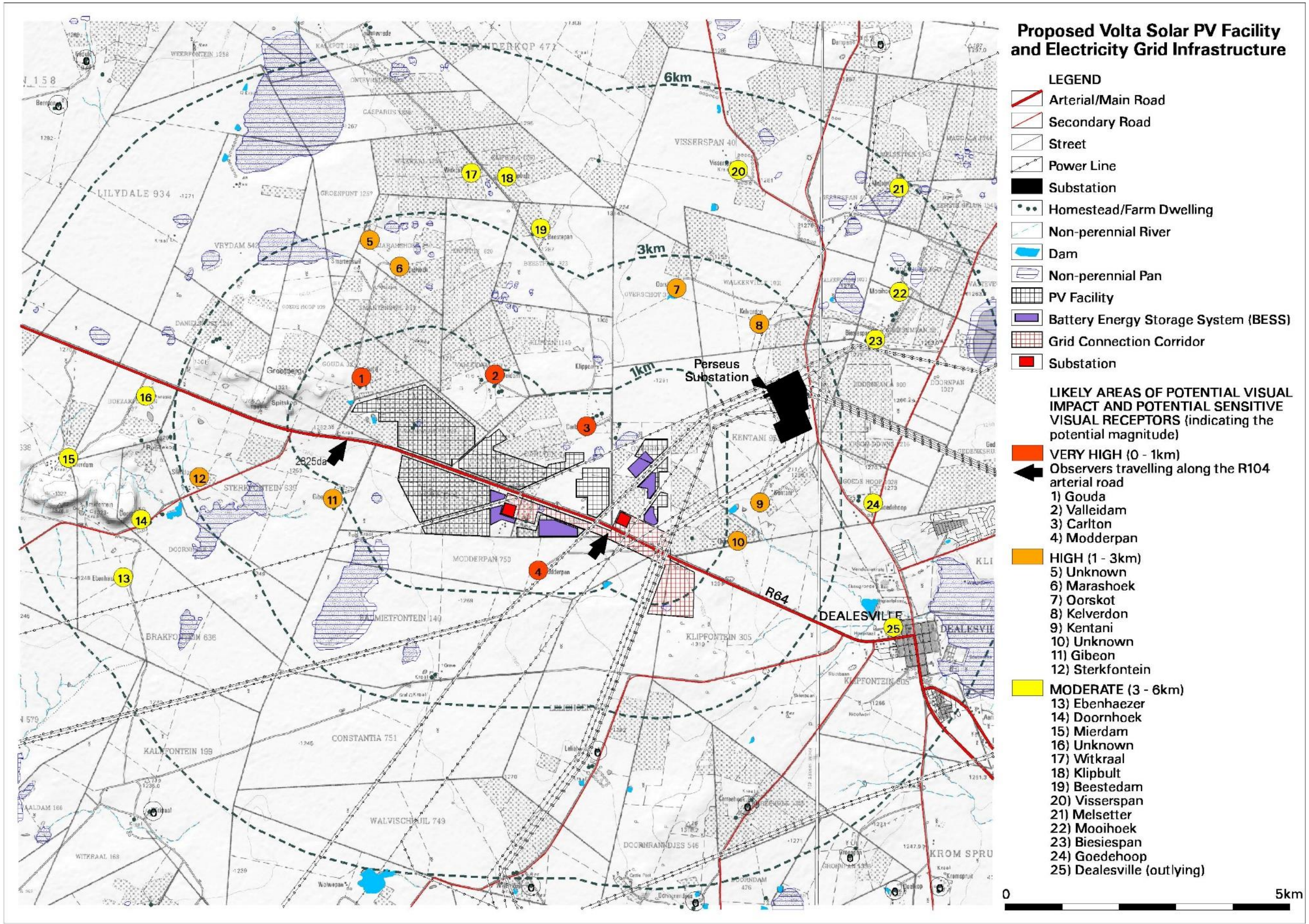
Observers travelling along the R64 arterial Road and various secondary roads.

Notes:

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



Map 5: Visual impact index



Map 6: Likely areas of potential visual impact and potential sensitive visual receptors

6.7. Visual impact assessment: impact rating methodology

The previous section of the report identified specific areas where likely visual impacts would occur and indicated 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:** Terms of Reference) 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)[3].
- **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)[4].
- **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)

6.8. Visual impact assessment

The primary visual impacts of the proposed Volta PV infrastructure and BESS infrastructure are assessed below.

Direct Impacts

6.8.1. Construction impacts

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

[4] 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.

6.8.1.1. Potential visual impact of construction activities on sensitive visual receptors in close proximity to the proposed 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 closer proximity (< 1 km) to the construction activities.

Construction activities may potentially result in a **high** (significance rating = 80), temporary visual impact, that may be mitigated to **moderate** (significance rating = 48).

A mitigating factor in this scenario is the low occurrence of receptors within the receiving environment and the fact that residents of Carlton and Modderpan are located on farms earmarked for approved solar energy facilities which reduces the probability of this impact occurring on these receptors. Additionally observers travelling along the R64 will only experience a visual impact for a brief period of time.

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

Nature of Impact: Visual impact of construction activities on sensitive visual receptors in close proximity to the proposed facility.		
	Without mitigation	***With mitigation***
Extent	Very short distance **(4)**	Very short distance **(4)**
Duration	Short term **(2)**	Short term **(2)**
Magnitude	Very High **(10)**	Moderate **(6)**
Probability	Definite **(5)**	Highly probable **(4)**
Significance	High **(80)**	Moderate **(48)**
Status (positive or negative)	Negative	Negative
Reversibility	Reversible **(1)**	Reversible **(1)**
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation: 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. Decommissioning: ➢ Remove infrastructure not required for the post-decommissioning use of the site. ➢ Rehabilitate all areas as per the rehabilitation plan undertaken. Consult an ecologist regarding rehabilitation specifications. ➢ Monitor rehabilitated areas post-decommissioning and implement remedial actions as required.
Residual impacts: None, provided rehabilitation works are carried out as specified.

6.8.2. Operational impacts

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

The facility is expected to have a **high** visual impact (significance rating = 90) pre-mitigation and a **moderate** visual impact (significance rating = 36) post mitigation on residents of Gouda and Valleidam and observers travelling along the R64.

A mitigating factor within this scenario is the very low occurrence of receptors within close proximity to the proposed site and the fact that residents of Carlton and Modderpan are located on farms earmarked for approved solar energy facilities which reduces the probability of this impact occurring on these receptors. Additionally, observers traveling along the roads will only be exposed to the visual intrusion for a short period of time. This reduces the probability of this impact occurring.

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

Table 3: Visual impact on observers in close proximity to the proposed PV facility.

Nature of Impact: Visual impact on residents of Gouda and Valleidam and observers travelling along the R64 within a 1km radius of the PV Facility		
	Without mitigation	***With mitigation***
Extent	Very short distance **(4)**	Very short distance **(4)**
Duration	Long term **(4)**	Long term **(4)**
Magnitude	Very high **(10)**	Moderate **(6)**
Probability	Definite **(5)**	Probable **(3)**
Significance	High **(90)**	Moderate **(36)**
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.
Residual impacts: The visual impact will be removed after decommissioning, provided the 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 facility could have a **moderate** visual impact (significance rating = 45) on observers (road users and resident/visitors to homesteads) within 1 – 3km radius of the facility structures. This impact may be mitigated to **low** (significance rating = 26).

A mitigation factor is that residents of Oorskot, Kelverdon, Kentani, Oxford, Gideon and Sterkfontein are located on farms earmarked for approved solar energy facilities and thereby reduces the probability of this impact occurring on these receptors.

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 facility structures within a 1 – 3km radius.

Nature of Impact: Visual impact on observers travelling along the R64, secondary roads and residences within a 1 – 3km radius of the PV facility structures		
	Without mitigation	***With mitigation***
Extent	Short distance **(3)**	Short distance **(3)**
Duration	Long term **(4)**	Long term **(4)**
Magnitude	High **(8)**	Moderate **(6)**
Probability	Probable **(3)**	Improbable **(2)**
Significance	Moderate **(45)**	Low **(26)**
Status (positive, neutral or negative)	Negative	Negative
Reversibility	Reversible **(1)**	Reversible **(1)**
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	No, however best practice measures are recommended.	

Mitigation / Management: Planning: ➢ Retain/re-establish and maintain natural vegetation (if present) immediately adjacent to the development footprint. 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 facility infrastructure is removed. Failing this, the visual impact will remain.

6.8.2.3. Potential visual impact on sensitive visual receptors within a 3 – 6km radius

The operational facility could have a **moderate** visual impact (significance rating = 36) on observers (road users and resident/visitors to homesteads) within 3 – 6km radius of the facility structures. This impact may be mitigated to **low** (significance rating = 20).

A mitigation factor is that residents of Visserpan and Dealesville are located on farms earmarked for approved solar energy facilities and thereby reduces the probability of this impact occurring on these receptors.

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

Table 5: Visual impact of the proposed facility structures within a 3 – 6km radius.

Nature of Impact: Visual impact on observers travelling along the R64, secondary roads and residences within a 3 – 6km radius of the PV facility structures		
	Without mitigation	***With mitigation***
Extent	Med to long distance **(2)**	Med to long distance **(2)**
Duration	Long term **(4)**	Long term **(4)**
Magnitude	Moderate **(6)**	Low **(4)**
Probability	Probable **(3)**	Improbable **(2)**
Significance	Moderate **(36)**	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, however best practice measures are recommended.	
Mitigation / Management: Planning: ➢ Retain/re-establish and maintain natural vegetation (if present) immediately adjacent to the development footprint. Operations: ➢ Maintain the general appearance of the facility as a whole.		

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

6.8.2.4. Lighting impacts

Potential visual impact of operational, safety and security lighting of the facility at night on observers in close proximity to the proposed 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 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 **high** significance, and may be mitigated to **moderate**.

Table 6: Impact table summarising the significance of visual impact of lighting at night on visual receptors in close proximity to the proposed facility.

Nature of Impact: Visual impact of lighting at night on sensitive visual receptors in close proximity to the proposed facility.		
	Without mitigation	***With mitigation***
Extent	Very short distance **(4)**	Very short distance **(4)**
Duration	Long term **(4)**	Long term **(4)**
Magnitude	Very High **(10)**	Moderate **(6)**
Probability	Highly probable **(4)**	Probable **(3)**
Significance	High **(72)**	Moderate **(42)**
Status (positive 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.
Cumulative impacts: The light generated at night locally is moderate. The impact of the proposed Volta PV Energy Facility although in line with current development and land use trends in the region, will certainly will contribute to a regional increase in lighting impact.
Residual impacts: The visual impact will be removed after decommissioning, provided the facility and ancillary infrastructure is removed. Failing this, the visual impact will remain.

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

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

PV panels are designed to generate electricity by absorbing the rays of the sun and are therefore constructed of dark-coloured materials, and are covered by anti-reflective coatings. Indications are that as little as 2% of the incoming sunlight is reflected from the surface of modern PV panels especially where the incidence angle (angle of incoming light) is smaller i.e. the panel is facing the sun directly. This is particularly true for tracker arrays that are designed to track the sun and keep the incidence angle as low as possible.[5]

There are no major roads within a 1km radius of the proposed PV facility. An arterial road is located within 1km 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.[6] The potential visual impact related to solar glint and glare as a road travel hazard is therefore expected to be of **moderate** significance pre mitigation and **low** post mitigation.

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

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

Table 7: Impact table summarising the significance of the visual impact solar glint and glare as a visual distraction to users of the arterial 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)**	Very short distance **(4)**
Duration	Long term **(4)**	Long term **(4)**
Magnitude	Moderate **(6)**	Low **(4)**
Probability	Probable **(3)**	Improbable **(2)**
Significance	Moderate **(42)**	Low **(24)**
Status (positive or negative)	Negative	Negative
Reversibility	Reversible **(1)**	Reversible **(1)**
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	N.A.	
Mitigation: Planning: ➢ Retain/re-establish and maintain natural vegetation (if present) immediately adjacent to the development footprint. Operations: ➢ Maintain the general appearance of the facility as a whole. ➢ Create berms or provide screening to shield the R64 from any potential glare.		
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 four (4) 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 **moderate** significance before mitigation and **low** post mitigation.

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

Table 8: Impact table summarising the significance of the visual impact of solar glint and glare on static ground receptors.

Nature of Impact: The visual impact of solar glint and glare on residents of homesteads in closer proximity to the PV facility		
	Without mitigation	**_With mitigation_**
Extent	Very short distance **(4)**	Very short distance **(4)**
Duration	Long term **(4)**	Long term **(4)**
Magnitude	High **(8)**	Moderate **(6)**
Probability	Probable **(3)**	Improbable **(2)**
Significance	Moderate **(48)**	Low **(28)**
Status (positive or negative)	Negative	Negative
Reversibility	Reversible **(1)**	Reversible **(1)**
Irreplaceable loss of	No	No

resources?		
Can impacts be mitigated?	Yes	

Mitigation:

Planning & operation:

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

Residual impacts:

The visual impact will be removed after decommissioning, provided the PV facility infrastructure is removed. Failing this, the visual impact will remain.

6.8.3. Decommissioning impacts

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

Decommissioning activities may potentially result in a **high** (significance rating = 65), temporary visual impact, that may be mitigated to **moderate** (significance rating = 48).

A mitigating factor in this scenario is the low occurrence of receptors within the receiving environment and the fact that residents of Carlton and Modderpan are located on farms earmarked for approved solar energy facilities which reduces the probability of this impact occurring on these receptors. Additionally observers travelling along the R64 will only experience a visual impact for a brief period of time.

Table 9: Visual impact of decommissioning activities on sensitive visual receptors in close proximity to the proposed facility.

Nature of Impact: Visual impact of construction activities on sensitive visual receptors in close proximity to the proposed facility.		
	Without mitigation	***With mitigation***
Extent	Very short distance **(4)**	Very short distance **(4)**
Duration	Very Short term **(1)**	Very Short term **(1)**
Magnitude	High **(8)**	Moderate **(6)**
Probability	Definite **(5)**	Highly probable **(4)**
Significance	High **(65)**	Moderate **(48)**
Status (positive or negative)	Negative	Negative
Reversibility	Reversible **(1)**	Reversible **(1)**
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	

Mitigation:

Decommissioning:

- Remove infrastructure not required for the post-decommissioning use of the site.
- Rehabilitate all areas as per the rehabilitation plan undertaken. Consult an ecologist regarding rehabilitation specifications.
- Monitor rehabilitated areas post-decommissioning and

implement remedial actions as required.
Residual impacts: None, provided rehabilitation works are carried out as specified.

6.8.2.6. Indirect Impacts

The potential visual impact of the proposed facility on the sense of place of the region during operational lifespan.

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 been transformed owing to dryland agriculture. Additionally there are numerous existing powerlines that lie in close proximity to the site and traverse the study area, resulting in an overall low to moderate visual quality.

The anticipated visual impact of the proposed 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.

Table 10: 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: Planning: ➢ Retain/re-establish and maintain natural vegetation (if present) immediately adjacent to the development footprint/servitude, where possible. Operations: ➢ Maintain the general appearance of the facility as a whole.		
Residual impacts: The visual impact will be removed after decommissioning, provided the facility infrastructure is removed. Failing this, the visual impact will remain.		

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

The construction of the Volta PV and BESS may increase the cumulative visual impact of industrial type infrastructure within the region.

The anticipated cumulative visual impact of the proposed facility is expected to be of **moderate** significance. This is considered to be acceptable from a visual impact perspective due to its location within the Kimberley REDZ.

Table 11: The potential cumulative visual impact of the renewable energy facility on the visual quality of the landscape.

Nature of Impact: The potential cumulative visual impact of the 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	Medium to longer distance **(2)**	Medium to longer distance **(2)**
Duration	Long term **(4)**	Long term **(4)**
Magnitude	Low **(4)**	Moderate **(6)**
Probability	Probable **(3)**	Probable **(3)**
Significance	Low **(30)**	Moderate **(36)**
Significance Ranking	**3**	**3**
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.		
Residual impacts: The visual impact will be removed after decommissioning, provided the facility infrastructure is removed. Failing this, the visual impact will remain.		

6.9. The potential to mitigate visual impacts

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

The following mitigation is however possible:

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

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

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

- Mitigation of lighting impacts includes the pro-active design, planning and specification of lighting for the facility. The correct specification and placement of lighting and light fixtures for the proposed PV facility and ancillary infrastructure will go far to contain rather than spread the light. Mitigation measures include the following:

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

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

    - Ensure that vegetation adjacent to the development footprint (if present) is not unnecessarily cleared or removed during the construction period.
    - Reduce the construction period through careful logistical planning and productive implementation of resources wherever possible.
    - Plan the placement of laydown areas and any potential temporary construction camps in order to minimise vegetation clearing (i.e. in already disturbed areas) wherever possible.
    - Restrict the activities and movement of construction workers and vehicles to the immediate construction site and existing access roads.
    - Ensure that rubble, litter, and disused construction materials are appropriately stored (if not removed daily) and then disposed regularly at licensed waste facilities.
    - Reduce and control construction dust through the use of approved dust suppression techniques as and when required (i.e. whenever dust becomes apparent).
    - Restrict construction activities to daylight hours in order to negate or reduce the visual impacts associated with lighting wherever possible.

- Rehabilitate all disturbed areas (if present/if required) immediately after the completion of construction works.

- Glint and glare impact mitigation measures include the following:

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

- During operation, the maintenance of the PV arrays and ancillary structures and infrastructure will ensure that the facility does not degrade, therefore avoiding aggravating the visual impact.

- Roads must be maintained to forego erosion and to suppress dust, and rehabilitated areas must be monitored for rehabilitation failure. Remedial actions must be implemented as and when required.

- Once the facility has exhausted its life span, the main facility and all associated infrastructure not required for the post rehabilitation use of the site should be removed and all disturbed areas appropriately rehabilitated, unless a new authorisation is granted for the plant to continue a new cycle. An ecologist should be consulted to give input into rehabilitation specifications.

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

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

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

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

7. IMPACT STATEMENT

The findings of the Visual Impact Assessment undertaken for the proposed Volta PV Facility and BESS 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).

No-go Alternative

In the no-go alternative, there would be no PV facility and associated BESS and therefore no additional visual intrusion on the landscape and on surrounding farmsteads. At the same time no renewable energy would be produced at the site for export to the national grid.

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

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

- The operation of the PV facility is expected to have a **high** visual impact pre-mitigation and a **moderate** visual impact post mitigation on observers within a 1km radius i.e. residents of Gouda and Valleidam and observers travelling along the R64.

- The operational facility could have a **moderate** visual impact on observers (road users and resident/visitors to homesteads) within 1 – 3km radius of the facility structures. This impact may be mitigated to **low**.

- The operational facility could have a **moderate** visual impact on observers (road users and resident/visitors to homesteads) within 3 – 6km radius of the facility structures. This impact may be mitigated to **low.**

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

- The potential visual impact related to solar glint and glare as a road travel hazard is expected to be of **moderate** significance pre mitigation and **low** post mitigation.

- The potential visual impact related to solar glint and glare on static ground-based receptors (residents of homesteads) is expected to be of **moderate** significance before mitigation and **low** post mitigation.

- During decommissioning there may be a noticeable increase in heavy vehicles utilising the roads to the site that may cause, at the very least, a visual nuisance to other road users and landowners in closer proximity (< 1 km) to the decommissioning activities. Decommissioning activities may potentially result in a **high** (significance rating = 65), temporary visual impact, that may be mitigated to **moderate** (significance rating = 48).

- The anticipated visual impact of the proposed 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 anticipated cumulative visual impact of the proposed facility is expected to be of **moderate** significance. This is considered to be acceptable from a visual impact perspective due to its location within the Kimberley REDZ.

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 facility.

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 6.9.**) and management programme (**Section 9.**).

8. CONCLUSION AND RECOMMENDATIONS

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

The greater environment has been transformed owing to dryland agriculture. Additionally there are numerous existing powerlines that lie in close proximity to the site and traverse the study area, resulting in an overall low to moderate visual quality.

There are no protected areas and the area is not a known tourist destination.

The proposed Volta PV and BESS is located within an area where numerous other PV facilities have been authorized and where a large network of power lines traverse the study area and congregate at the existing Perseus substation. The cumulative visual exposure (and potential cumulative visual impact) is not an unintended consequence of renewable energy facility developments within the region, but rather a concerted effort to concentrate renewable energy facilities within the Kimberley REDZ and electrical grid infrastructure (EGI) corridor. This is an effort to prevent the scattered proliferation of renewable energy generation infrastructure beyond the REDZ and throughout the greater region.

The DFFE screening tool generated for the proposed Volta PV facility indicated that the Volta PV has a very high sensitivity owing to the fact that the site is located within 500 m of a town or village and located on mountain tops and high ridges. Based on the site sensitivity verification report, it can be found that the sensitivity of the visual environment for the proposed Volta PV Facility is confirmed to be moderate due to the low occurrence of visual receptors within 500m of the proposed facility, mountain tops and ridges located within 500 m from the nearest site and no PV panels located on steep slopes, mountain tops or ridges. Refer to Appendix 1 for the full site sensitivity verification report.

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

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

In terms of the above and to the knowledge of the author, the proposed development is compliant with all Acts, Ordinances, By-laws and adopted policies in terms of visual impacts, as well as, conditions of existing Records of Decisions.

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

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

Overall, the significance of the visual impacts is expected to range from **moderate** to **low** as a result of the numerous existing power lines within close proximity to the proposed site and its location within the Kimberley REDZ. There are a fair 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 facility structures. These observers may consider visual exposure to this type of infrastructure to be intrusive. It should be noted that of these receptors located within a 3km radius of the proposed sites, a number of the homesteads are located on farms that already have authorization to construct renewable energy developments.

A number of mitigation measures have been proposed (**Section 6.9.**). 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.

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

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 Volta PV facility would be considered to be acceptable from a visual impact perspective and can therefore be authorised.

9. MANAGEMENT PROGRAMME

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

Table 12: Management programme – Planning.

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

<table>
<tr><td>Project Component/s</td><td colspan="2">The Volta PV and BESS.</td></tr>
<tr><td>Potential Impact</td><td colspan="2">Primary visual impact of the facility due to the presence of the battery energy facility and associated infrastructure as well as the visual impact of lighting at night.</td></tr>
<tr><td>Activity/Risk Source</td><td colspan="2">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.</td></tr>
<tr><td>Mitigation: Target/Objective</td><td colspan="2">Optimal planning of infrastructure to minimise the visual impact.</td></tr>
<tr><td>Mitigation: Action/control</td><td>Responsibility</td><td>Timeframe</td></tr>
<tr><td>Use anti-reflective panels and dull polishing on structures where possible and industry standard.</td><td>Project proponent / contractor</td><td>Early in the planning phase.</td></tr>
<tr><td>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.</td><td>Project proponent / contractor</td><td>Early in the planning phase.</td></tr>
<tr><td>Retain and maintain natural vegetation (if present) immediately adjacent to the development footprint.</td><td>Project proponent/ design consultant</td><td>Early in the planning phase.</td></tr>
<tr><td>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.</td><td>Project proponent/ design consultant</td><td>Early in the planning phase.</td></tr>
<tr><td>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.</td><td>Project proponent/ design consultant</td><td>Early in the planning phase.</td></tr>
<tr><td>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 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.</td><td>Project proponent / design consultant</td><td>Early in the planning phase.</td></tr>
<tr><td>Performance Indicator</td><td colspan="2">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.</td></tr>
<tr><td>Monitoring</td><td colspan="2">Monitor the resolution of complaints on an ongoing basis (i.e. during all phases of the project).</td></tr>
</table>

Table 13: Management programme – Construction.

OBJECTIVE: The mitigation and possible negation of visual impacts associated with the construction of the proposed 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 14: Management programme – Operation.

OBJECTIVE: The mitigation and possible negation of visual impacts associated with the operation of the proposed PV facility.	
Project	The solar energy facility and ancillary infrastructure (i.e. access roads,

Component/s	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**
Use vegetation screening 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 the general appearance of the facility as a whole.		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 15: Management programme – Decommissioning.

OBJECTIVE: The mitigation and possible negation of visual impacts associated with the decommissioning of the proposed PV facility.			
Project Component/s	The Volta PV and BESS.		
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.

10. REFERENCES/DATA SOURCES

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APPENDIX 1: SITE SENSTIVITY VERIFICATION REPORT