Visual Site Sensitivity Verification Report for the Proposed Akkerboom Solar Powered EV Charging Station and PV Facility near Kakamas, Northen Cape Province

SUBMITTED FOR ENVIRONMENTAL AUTHORISATIONS IN TERMS OF THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998 (ACT NO. 107 OF 1998) (NEMA) AND THE NATIONAL ENVIRONMENTAL MANAGEMENT WASTE ACT, 2008 (ACT NO. 59 OF 2008) (NEM:WA) IN RESPECT OF LISTED ACTIVITIES THAT HAVE BEEN TRIGGERED BY APPLICATIONS IN TERMS OF THE MINERAL AND PETROLEUM RESOURCES DEVELOPMENT ACT, 2002 (ACT NO. 28 OF 2002) (MPRDA) (AS AMENDED).

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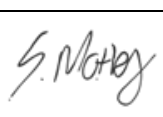
	Signature:	
	Date:	21 September 2023
Revision Number:	002	
Date Issued:	21 September 2023	

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LIST OF ABBREVIATIONS

Abbreviation	Description
EIA	Environmental Impact Assessment
ETC	Eco Thunder Consulting (Pty) Ltd
VAC	Visual Absorption Capacity
VIA	Visual Impact Assessment
ZCC	Zero Carbon Charge (Pty) Ltd

GLOSSARY LIST

Glossary Item	Description
Aesthetic Value	Aesthetic value is the emotional response derived from the experience of the environment with its natural and cultural attributes. The response can be either to visual or non-visual elements and can embrace sound, smell and any other factor having a strong impact on human thoughts, feelings, and attitudes (Ramsay, 1993). Thus, aesthetic value encompasses more than the seen view, visual quality, or scenery, and includes atmosphere, landscape character and sense of place (Schapper, 1993).

Glossary Item	Description
Aesthetically significant place	A formally designated place visited by recreationists and others for the express purpose of enjoying its beauty. For example, tens of thousands of people visit Table Mountain on an annual basis. They come from around the country and even from around the world. By these measurements, one can make the case that Table Mountain (a designated National Park) is an aesthetic resource of national significance. Similarly, a resource that is visited by large numbers who come from across the region probably has regional significance. A place visited primarily by people whose place of origin is local is generally of local significance. Unvisited places either have no significance or are "no trespass" places. (after New York, Department of Environment 2000).
Aesthetic impact	Aesthetic impact occurs when there is a detrimental effect on the perceived beauty of a place or structure. Mere visibility, even startling visibility of a Project proposal, should not be a threshold for decision making. Instead a Project, by its visibility, must clearly interfere with or reduce (i.e. visual impact) the public's enjoyment and/or appreciation of the appearance of a valued resource e.g. cooling tower blocks a view from a National Park overlook (after New York, Department of Environment 2000).
Cumulative Effects	The summation of effects that result from changes caused by a development in conjunction with the other past, present, or reasonably foreseeable actions.
Glare	The sensation produced by luminance within the visual field that is sufficiently greater than the luminance to which the eyes are adapted, which causes annoyance, discomfort, or loss in visual performance and visibility. See Glint. (USDI 2013:314)
Glint	A momentary flash of light resulting from a spatially localized reflection of sunlight. See Glare. (USDI 2013:314)
Landscape Character	The individual elements that make up the landscape, including prominent or eye-catching features such as hills, valleys, woods, trees, water bodies, buildings, and roads. They are generally quantifiable and can be easily described.
Landscape Impact	Landscape effects derive from changes in the physical landscape, which may give rise to changes in its character and how this is experienced (Institute of Environmental Assessment & The Landscape Institute 1996).
Study area	For the purposes of this report this Project the study area refers to the proposed Project footprint / Project site as well as the ‘zone of potential influence’ (the area defined as the radius about the centre point of the Project beyond which the visual impact of the most visible features will be insignificant) which is a 5,0km radius surrounding the proposed Project footprint / site.
Project Footprint / Site	For the purposes of this report the Project site / footprint refers to the actual layout of the Project as described.
Sense of Place (Genius loci)	Sense of place is the unique value that is allocated to a specific place or area through the cognitive experience of the user or viewer. A genius locus literally means ‘spirit of the place’.

Glossary Item	Description
Sensitive Receptors	Sensitivity of visual receptors (viewers) to a proposed development.
Viewshed analysis	The two-dimensional spatial pattern created by an analysis that defines areas, which contain all possible observation sites from which an object would be visible. The basic assumption for preparing a viewshed analysis is that the observer eye height is 1,8m above ground level.
Visibility	The area from which Project components would potentially be visible. Visibility depends upon general topography, aspect, tree cover or other visual obstruction, elevation, and distance.
Visual Exposure	Visibility and visual intrusion qualified with a distance rating to indicate the degree of intrusion and visual acuity, which is also influenced by weather and light conditions.
Visual Impact	Visual effects relate to the changes that arise in the composition of available views because of changes to the landscape, to people's responses to the changes, and to the overall effects with respect to visual amenity available views because of changes to the landscape, to people's responses to the changes, and to the overall effects with respect to visual amenity.
Visual Intrusion	The nature of intrusion of an object on the visual quality of the environment resulting in its compatibility (absorbed into the landscape elements) or discord (contrasts with the landscape elements) with the landscape and surrounding land uses.
VAC	VAC is defined as the landscape's ability to absorb physical changes without transformation in its visual character and quality. The landscape's ability to absorb change ranges from low- capacity areas, in which the location of an activity is likely to cause visual change in the character of the area, to high-capacity areas, in which the visual impact of development will be minimal (Amir & Gidalizon 1990).
Worst-case Scenario	Principle applied where the environmental effects may vary, for example, seasonally or collectively to ensure the most severe potential effect is assessed.
Zone of Potential Visual Influence	By determining the zone of potential visual influence, it is possible to identify the extent of potential visibility and views which could be affected by the proposed development. Its maximum extent is the radius around an object beyond which the visual impact of its most visible features will be insignificant primarily due to distance.

1 Background

1.1 Scope and Objective of the Specialist Study

The main aim of the study is to document the baseline and to ensure that the visual/aesthetic consequences of the proposed Akkerboom Solar Powered EV Charging Station and PV Facility Project are understood. The report therefore aims to identify scenic resources, and visually sensitive areas or receptors. It also aims to identify key concerns or issues relating to potential visual impacts arising from the Project, and which must be addressed in the assessment phase.

1.2 Seasonal Change

In terms of Appendix 6 of the 2014 EIA Regulations, a specialist report must contain information on "the date and season of the site investigation and the relevance of the season to the outcome of the assessment". The site visit was undertaken in **Early Spring (7th of September 2023).** The season in which the site visit was undertaken does not have any considerable effect on the significance of the impacts identified, the mitigation measures, or the conclusions of the assessment.

1.3 Terms and Reference

A specialist study is required to establish the visual baseline and to identify and potential visual impacts arising from the proposed development based on the general requirements for a comprehensive VIA.

The following terms of reference were established:

- Data collected allows for a description and characterisation of the receiving environment;
- Describe the landscape character, quality and assess the visual resource of the study area;
- Describe the visual characteristics of the components of the Project;
- Identify issues that must be addressed in the impact assessment phase; and
- Propose mitigation options to reduce the potential impact of the Project.

1.4 Specialist Details

ETC is a privately owned company fully owned by women. We specialize in a wide range of specialized studies, including Visual Impact Assessment (VIA), socio-economic research, economic development planning, development program design and implementation, as well as community trust management. Our expertise extends to conducting VIAs across Africa and optimizing projects in the environmental sector. Our work encompasses landscape

characterization studies, end-use studies for quarries, and computer modelling and visualization.

Based in Johannesburg, South Africa, Eco Thunder has built a reputation as a leading authority on the conditions, needs, and assets of communities associated with independent power generation facilities. Additionally, ETC actively implements development programs in energy communities, ensuring a comprehensive understanding of how to drive positive social impact.

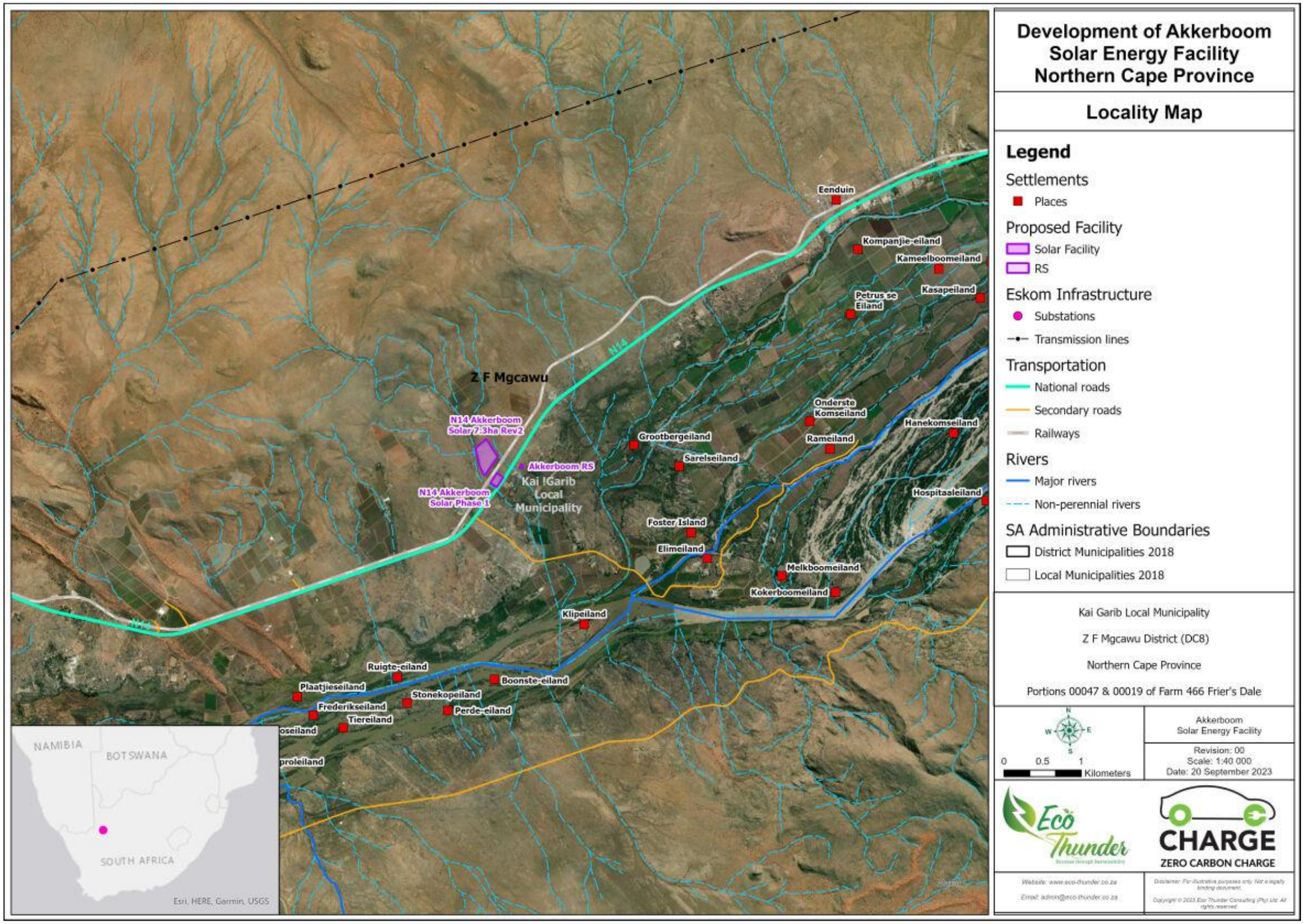


Figure 1: Locality Map

2 Project Information

2.1 Project Description

Zero Carbon Charge (ZCC) is advancing its initiative to establish a network of ultra-fast electric vehicle (EV) charging stations, all powered by renewable energy, specifically solar PV. This network will enable South African drivers to confidently travel across the country, knowing that they can access charging stations every 150 km along the major roads. These charging facilities are designed to integrate with existing infrastructure, such as farm stalls, shops, and guest houses located next to National and Provincial roads throughout South Africa. In locations where such infrastructure is lacking, ZCC will take the initiative to erect new farm stalls to complement these charging facilities. More about this initiative can be found on their website (https://charge.co.za/about/about-zero-carbon-charge/).

One of the sites under consideration is the ZCC Akkerboom Solar Powered EV Charging Station and PV Facility. It's situated on Portion 47 of Farm Frier's Dale No. 466, adjacent to the N14 Highway. This place it approximately 14.39km east of Kakamas and 6.69km west of Loxtonvale, within the Kai !Garib Local Municipality in the ZF Mgcawu District of the Northen Cape province.

South Africa's commitment to environmental sustainability is underscored by its alignment with the Paris Agreement. The country has set ambitious targets to reduce its greenhouse gas emissions (GHG) to 398-510 MtCO2e by 2025 and 350-420 MtCO2e by 2030. To support this mission, the government has introduced the Green Transport Strategy for South Africa (2018-2050). A key component of this strategy is the promotion and adoption of electric vehicles (EVs) to mitigate emissions from the Transport sector, which currently accounts for 10.8% of the country's total GHG emissions.

At present, the market share of EVs in South Africa is relatively small, with around 2300 vehicles on the roads. To see a significant increase in this number, the availability and accessibility of EV charging infrastructure are paramount. While urban centers are making strides in this direction, rural South Africa faces challenges, primarily due to the lack of charging infrastructure, which remains a barrier to widespread EV adoption.

Solar-powered truck charging stations, given their design, require substantial areas (about 40Ha) for the necessary infrastructure. A notable advantage of these solar stations is that they eliminate the need for extensive overhead supply equipment, which would traditionally connect them to the national Eskom Grid. This design approach not only minimizes environmental impact but also ensures that the charging process does not add to the GHG emissions typically associated with electricity generation by Eskom.

Zero Carbon Charge (Pty) Ltd has engaged EnviroAfrica CC to conduct the required Basic Assessment Process for the proposed ZCC Akkerboom Solar Powered EV Charging Station and PV Facility near Kakamas, Northen Cape. This report encapsulates the findings of a site sensitivity

verification for the proposed EnviroAfrica ZCC EV Charging Station and Solar PV Facility, a project with a potential generating capacity of up to 7MWac.

2.2 Project Technical Details

The proponent intends to establish a fully renewable energy-powered electric vehicle (EV) charging facility at the Akkerboom Farm Stall. The project site is situated on Portions 19 & 47 of Farm Frier's Dale, No. 466, along the N14, between Kakamas and Keimoes, in the Northern Cape. The project will encompass the development of a solar photovoltaic (PV) plant, a battery energy storage system (BESS), and associated infrastructure to enable sustainable energy generation in order to efficiently charge EV's.

Project Components:

1. Solar PV Plant:
    - The PV plant will consist of an array of solar panels installed in 2 steps: Stage 1 and stages 2-7 (Appendix 12). The development will take place in stages as the demand for electricity increases. The solar panels (of the entire development) are expected to generate an electrical output of approximately 7 megawatts (MW) (approximately 1 MW per ha), which will be transmitted to the battery storage units and the EV charging infrastructure. The solar panels will be strategically placed to optimize energy capture, considering site-specific environmental factors such as solar irradiation levels and shading.
2. Battery Energy Storage System (BESS):
    - The project will incorporate battery energy storage units that will store the electricity generated by the solar PV plant. These batteries will be housed in secure containers alongside other energy management equipment to ensure optimal efficiency and safety. The storage system will provide consistent power to the EV charging infrastructure, ensuring uninterrupted service even during periods of low solar generation or high demand.
3. Electric Vehicle Charging Infrastructure:
    - The EV charging facility will accommodate approximately six electric vehicles at any given time. This infrastructure will be powered entirely by the solar PV plant and the energy stored in the BESS, making it a sustainable and eco-friendly solution for travellers and locals using electric vehicles along the N14 corridor. The facility will be equipped with fast-charging stations, designed to minimize downtime for EV users.
4. Electricity Transmission Infrastructure:
    - The electricity transmission infrastructure will connect the solar PV plant and the battery storage units to the EV charging stations. The initial stage of the project will involve the installation of approximately 300 meters of transmission cabling, with additional stages extending the cabling by a further 450 meters to support the expansion (stages 2-7).

5. Development Footprint:

- The total development footprint of the project, including the solar PV plant, BESS, and EV charging infrastructure, will cover approximately 7 hectares at the Akkerboom Farm Stall. This footprint includes the installation of necessary utilities, access roads, and support structures, ensuring seamless integration of the renewable energy generation systems with the EV charging facility.

Table 1, Table 2 and Figure 2 provides the details of the project, including the main infrastructure components and services that will be required during the project life cycle.

Table 1: Details of the Study Area

Component	Description/Dimensions
District Municipality	ZF Mgcawu District Municipality
Local Municipality	Kai !Garib Local Municipality.
Ward Number(s)	7
Nearest Town(s)	Kakamas (14.39 km)

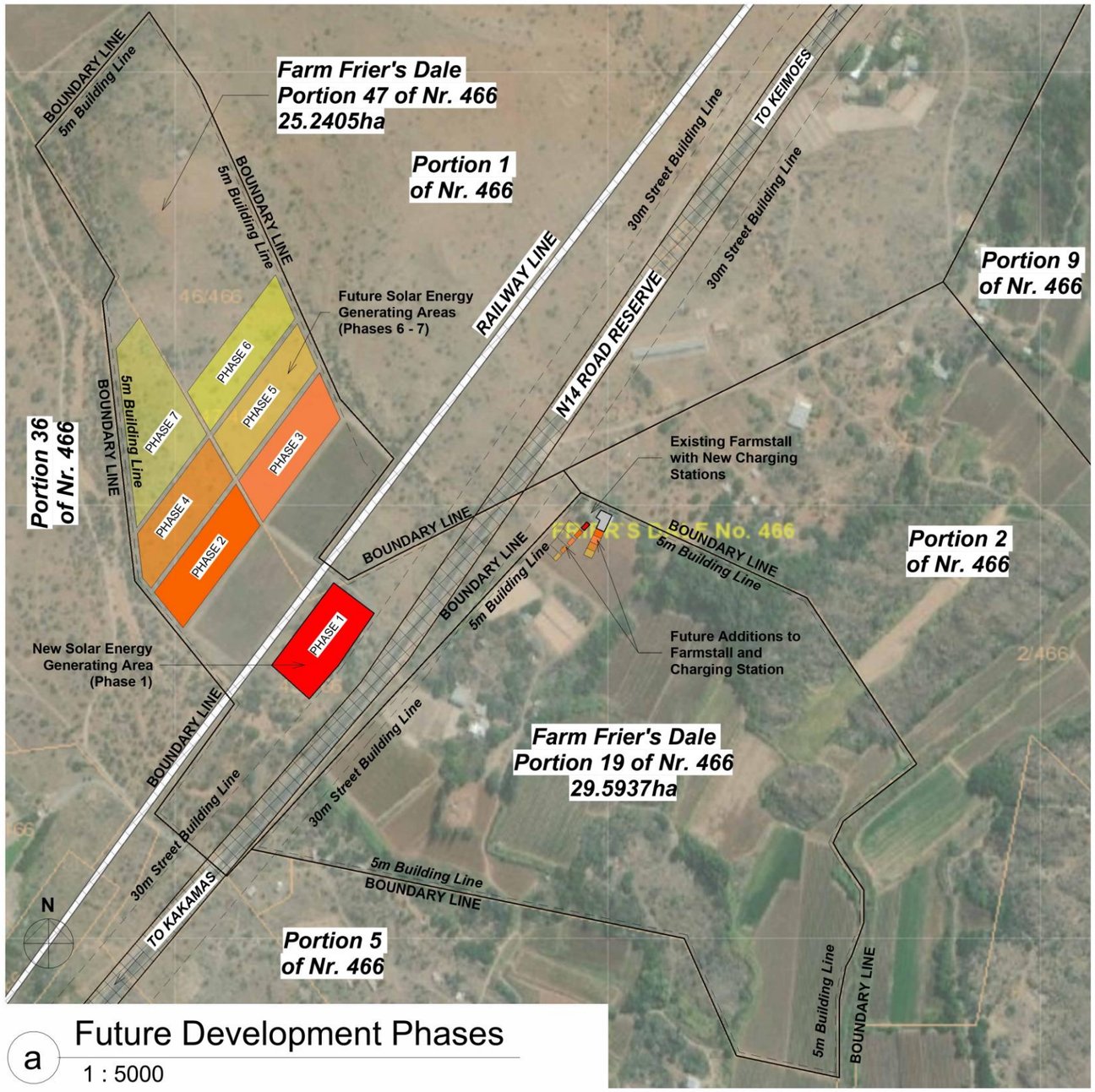
The proposed EV charging station and solar PV facility would be accessed through development of a new access road from the N14 highway with the location and extent thereof provided in the indicative layout. The details of the access would be as per the recommendations in the Transport Impact Assessment. Access roads would be developed both to the site and within the site (i.e., between project components), inclusive of stormwater infrastructure.

Table 2: Technical Details of the Proposed Project

Component	Description/Dimensions
Farm Name(s) and Number(s) of Properties Affected by the PV Facility, incl. SG 21 Digit Code (s)	Below are the properties affected: Portion 19 of the Farm Frier's Dale No. 466 (C02800000000046600019) Portion 47 of the Farm Frier's Dale No. 466 (C02800000000046600047)
Current zoning	Agricultural
Site Coordinates (centre of development area)	Future Development: • Latitude: 28°44'16.22"S • Longitude: 20°49'30.24"E Current Development: • Latitude: 28°44'26.36"S • Longitude: 20°49'34.87"E

Component	Description/Dimensions
Affected Properties Area	The proposed future development area is approximately 7.26 hectares. The currently proposed development area is approximately 1.53 hectares.
EV Station and Rest stop	Current proposed development • EV Charging Bays 52m2 • Parking Area 580m2 • Storage Container 36m2 • Existing infrastructure to be used for Farmstall
Access Roads and Internal Roads	• Main site access: up to 12m, during construction and up to 10m wide after construction. • Internal roads: up to 8m wide corridor during construction and up to 5m wide after construction. • Existing roads will be utilised as far as reasonably possible and upgraded where necessary.
Fencing	• Height: Up to 3m • Type: Could be Palisade or mesh or fully electrified. • The entire perimeter of the proposed facility will be secured.
Site Access	See location on layout provided.

The operational requirements of the proposed project include nominal electrical usage supplied on-site, water sourcing from the local municipality for sanitation, panel washing, and dust control, and minimal sanitation needs for a small operational staff. If municipal approval or capacity is not available, alternative water sourcing and sewage disposal methods such as storage tanks or contracted services will be explored. During the construction phase, water and sanitation responsibilities would primarily fall on the contractor, preferably utilising municipal resources if feasible, and solid waste management would adhere to Environmental Management Programme Report (EMPr) requirements.



LEGEND		
Phase 1	Solar panels	8500m²
	Charging bays	52m²
	Parking	580m²
	Storage Container	36m²
	Total Phase 1	9168m²
Phase 2	Solar panels	9000m²
	Charging bays	52m²
	Parking	300m²
	Addition to Farmstall	100m²
	Storage Container	36m²
	Total Phase 2	9488m²
Phase 3	Solar panels	9000m²
	Charging bays	52m²
	Parking	260m²
	Addition to Farmstall	100m²
	Storage Container	36m²
	Total Phase 3	9448m²
Phase 4	Solar panels	9000m²
	Charging bays	52m²
	Parking	245m²
	Addition to Farmstall	100m²
	Storage Container	36m²
	Total Phase 4	9433m²
Phase 5	Solar panels	9000m²
	Charging bays	52m²
	Parking	200m²
	Addition to Farmstall	100m²
	Storage Container	36m²
	Total Phase 5	9388m²
Phase 6	Solar panels	9400m²
	Storage Container	36m²
	Total Phase 6	9436m²
Phase 7	Solar panels	15000m²
	Storage Container	36m²
	Total Phase 7	15036m²
	Total Future Development	**71 397m²**

CONSULTANT:

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Project Title

Farm Frier's Dale Nr 466, Portions 47&19

New Energy Generating Area on Portion 47, and New Charging Station on Portion 19 of Farm 466

Drawing Title

Basic Application_Proposed Future Phases

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Figure 2: Proposed Development Layout

2.3 Site Photos

Photograph 1: Natural Grassland in the Development Area with Distant Hills.

Photograph 2: Example of Electrical Infrastructure within the Development Area

Photograph 3: Cultivated Cropland within the Development Area

Photograph 4: Farm within the Development Area.

Photograph 5: Rocky Terrain Evident within the North-Western Portion Proposed Development Site.

Photograph 6: Industrail Businesses on Neighbouring Properties of the Proposed Development Area.

Photograph 7: Graves on the Border of the Neihbouring Property of the Proposed Development Area.

Photograph 8: Access road to Proposed Development Area

Photograph 9: Farm within the Development Area

Photograph 10: Vegitation Profile within the Development Area

Photograph 11: Surrounding Industrail Businesses within the Development Area.

Photograph 12: Vegitation Profile within the Development Area.

Photograph 13: Topography profile and Hills within the Development Area.

Photograph 14: Slopes and Hills within the Development Area

Photograph 15:Railway Tracks Parallel to the Development Area

Photograph 16: Cultivated Vineyard within the Development Area

Figure 3: Proposed Development Site Photos

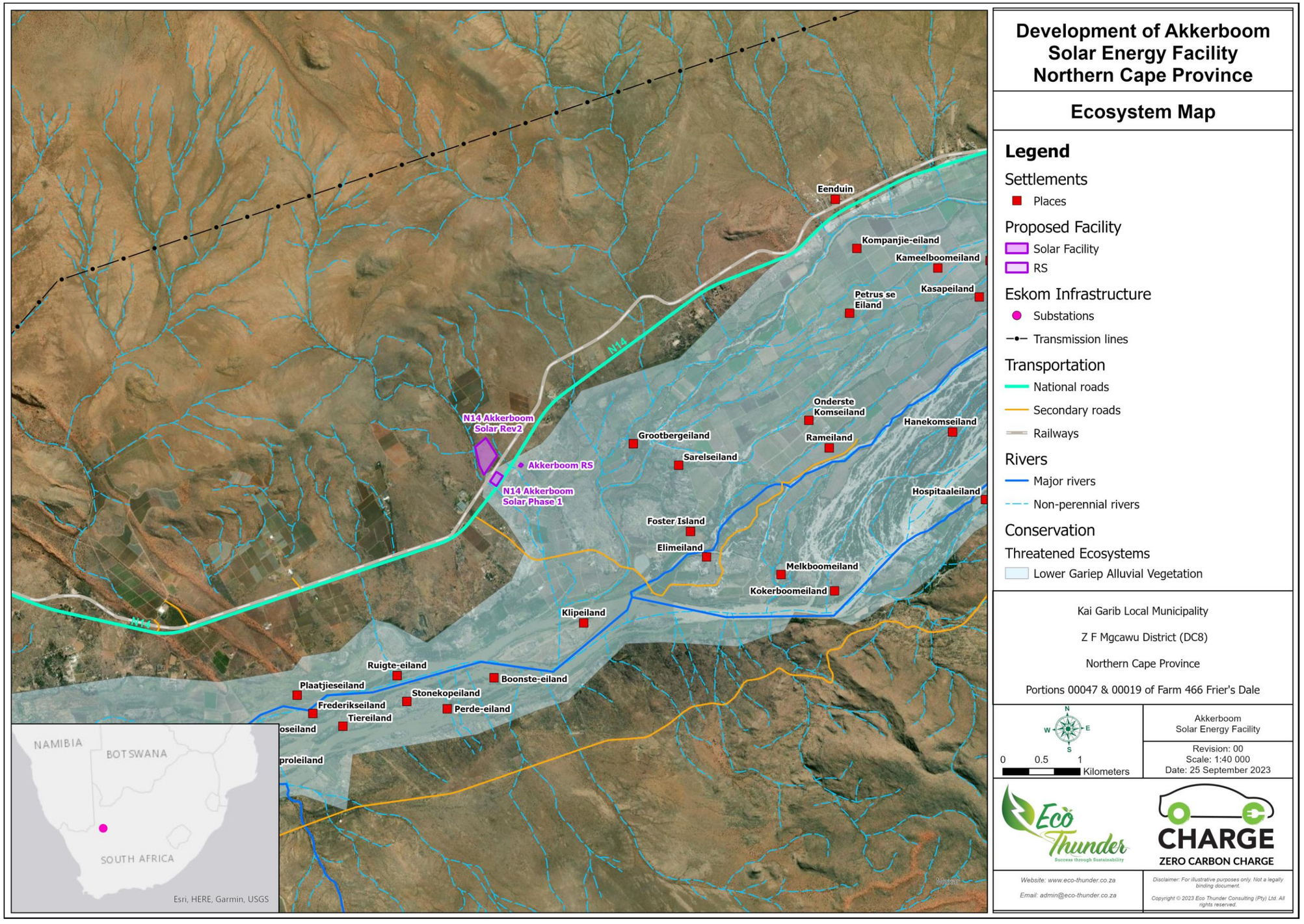

Figure 4: Proposed Development Conservation Area Map

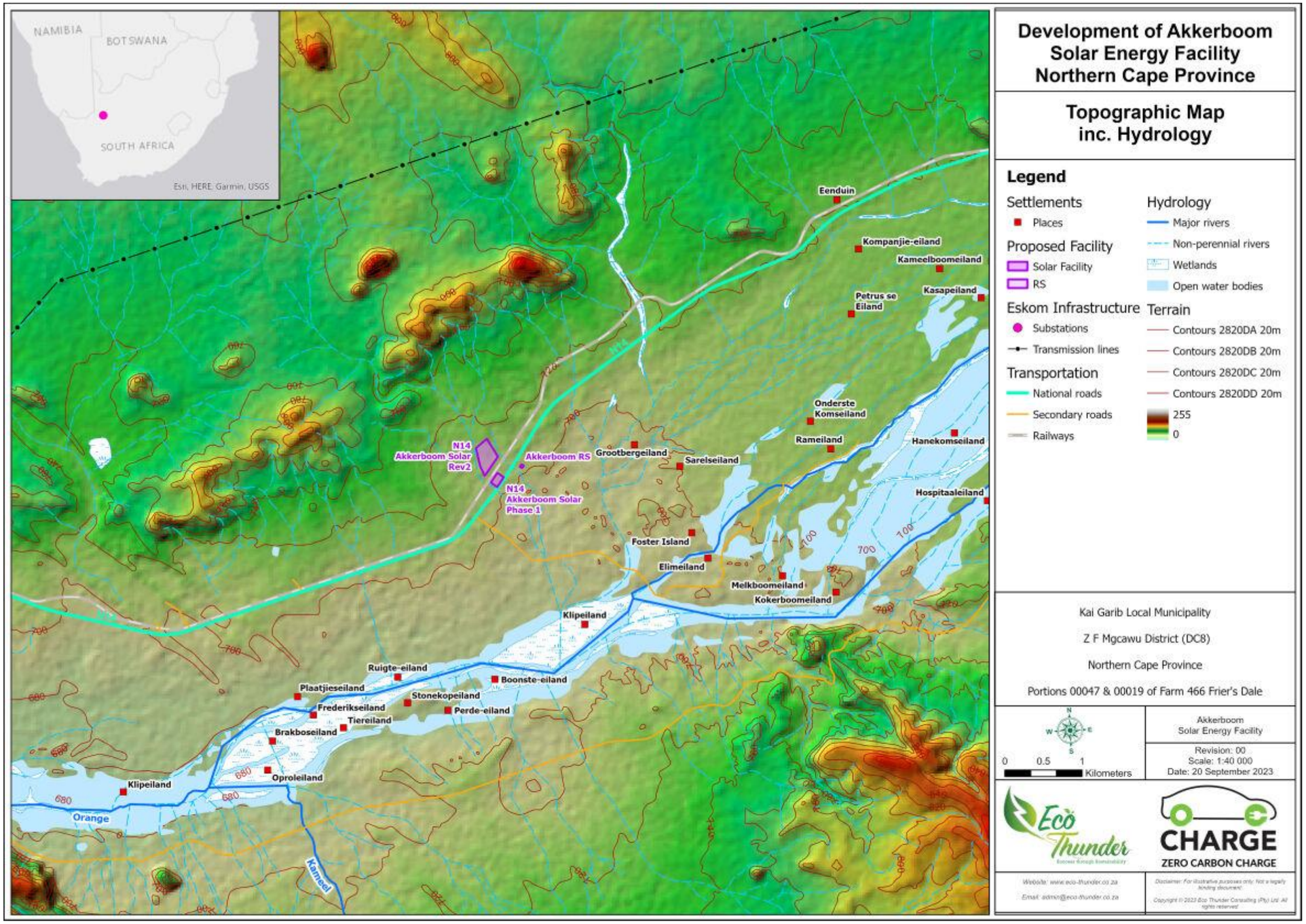

Figure 5: Topography and Hydrology of Study Area

3 Legislation and Policy Review

A vital aspect of this process involves assessing the suitability of a proposed development in relation to key planning and policy documents.

It is worth noting the following points:

- The African Development Bank (AfDB) do not provide guidelines for VIAs.

Although there is limited legislation specifically addressing VIAs, there exist guidelines that offer guidance for conducting visual assessments. Additionally, several laws are in place to safeguard visual resources, as well as regulations applicable to specialists in various fields.

This report adheres to the following legal requirements and guideline documents:

- International Good Practice;
- National Legislation and Guidelines; and
- Policy Fit.

3.1 International Good Practice

The following documentation provides good practice guidelines, specifically:

- Guidelines for Landscape and VIA;
- International Finance Corporation (IFC);
- Millennium Ecosystem Assessment (MEA);
- United Nations Educational, Scientific and Cultural Organisation (UNESCO);
- World Heritage Convention (WHC); and
- AfDB - While they do not provide specific guidelines for VIAs, their general environmental and social guidelines may be relevant.

3.2 National Legislation and Guidelines

To comply with the Visual Resource Management requirements, it is necessary to clarify which National and Regional planning policies govern the proposed development area to ensure that the scale, density and nature of activities or developments are harmonious and in accordance with the sense of place and character of the area.

3.2.1 National Environmental Management Act (Act 107 of 1998), EIA Regulations

The specialist report is in accordance with the specification on conducting specialist studies as per Government Gazette (GN) R 982 of the National Environmental Management Act (NEMA)

(Act 107 of 1998). The mitigation measures as stipulated in the specialist report can be used as part of the EMPr and will be in support of the EIA and Appendix 6 of the EIA Regulations 2014, as amended on 7 April 2017.

Specialist Screening Protocols are also required by the 2014 EIA Regulations. These were taken into consideration for the project.

3.2.2 NEMA: Protected Areas Act 57 of 2003

The Protected Areas Database contains spatial information for the conservation estate of South Africa. This database contains information which includes spatial and attribute information for formally protected areas and areas that have less formal protection, and is updated on a continual basis. The spatial data forms the basis for the Register of Protected Areas which is a legislative requirement under the National Environmental Management: Protected Areas Act (NEM:PAA) (Act 57 of 2003).

3.2.3 Western Cape DEA: Guideline for Involving Visual and Aesthetic Specialists in EIA Processes Edition 1 (CSIR, 2005)

Although the guidelines were specifically compiled for the Province of the Western Cape[4], they provide guidance that is appropriate for any EIA process. According to the Western Cape Department of Environmental Affairs & Development Planning's guideline on involving visual and aesthetic specialists in EIA processes.

Specialists should refer to the relevant provincial or local authority to determine the existence of policies, by-laws, or other restrictions regarding visual impact or the protection of scenic, rural, or cultural resources.

3.3 Policy Fit

Policy fit refers to the extent to which the proposed changes to the landscape align with planning and policy at the International, National, Provincial, and Local levels.

Regarding international best practices, the proposed landscape modifications do not meet the criteria for triggering best practice guidelines, as there are no significant cultural or landscape resources within the site or its immediate surroundings.

ETC followed the United States Bureau of Land Management's Visual Resource Management method (USDI, 2004) to determine the significance of the landscape. This method, based on mapping and Geographical Information System (GIS) techniques, enhances objectivity and consistency by utilizing standardized assessment criteria.

4 Fieldwork and Site Assessment

Selecting the appropriate approach for a VIA is a crucial step in the process. The approach should be determined based on the expected level of visual impact, the nature of the project, and the characteristics of the receiving environment.

The initial step in any landscape or VIA is to review the existing landscape and visual resource in the vicinity of the proposed development – that is the baseline landscape and visual conditions.

Preliminary information collected and reviewed is used to determine the approach to the site visit, including:

- Plan of study and reviewing information;
- Additional information required from the site visit;
- Points of interest / viewpoints to investigate; and
- Specific stakeholders to consult.

4.1 Categories of Development

Guided by the "Guideline for Involving Visual and Aesthetic Specialists in EIA Processes Edition 1" from the Western Cape Department of Environmental Affairs & Development Planning (CSIR, 2005), it's clear that the development category significantly influences the expected level of visual impact. This classification system is instrumental in assessing potential environmental impacts of various developments. It aids in the evaluation of site sensitivity, providing a comprehensive understanding of the site's environmental context and potential visual impacts.

Table 3: The Five Categories of Development as per WCDEA&DP

Category of Development	Examples
Category 1	Nature reserves, nature-related recreation, camping, picnicking, trails and minimal visitor facilities.
Category 2	Low-key recreation / resort / housing/farming type development, small-scale agriculture / nurseries, narrow roads and small-scale infrastructure
Category 3	Low density resort / housing/farming type development, golf or polo estates, low to medium-scale infrastructure
Category 4	Medium density housing/farming development, sports facilities, small-scale commercial facilities / office parks, one-stop petrol stations, light industry, medium-scale infrastructure.

Category of Development	Examples
Category 5	High density township / housing/farming development, retail and office complexes, industrial facilities, refineries, treatment plants, power stations, wind energy farms, powerlines, freeways, toll roads, large-scale infrastructure generally. Large-scale development of agricultural land and commercial tree plantations. Quarrying and mining activities with related processing plants.

It is anticipated that the development (once all phases have been constructed) will be seen as a category 4 development as it is similar to a one stop petrol station. Based on the broad level site analysis it was noted that the site is within an ‘’areas or routes of medium scenic, cultural or historical significance’’ as per the Western Cape guidelines.

4.1.1 Preparation for Field Survey

Table 4: Approach and Method

Approach and Method	Type of Issue				
	Little or No Visual Impact Expected	Minimal Visual Impact Expected	Moderate Visual Impact Expected	High Visual Impact Expected	Very High Visual Impact Expected
Level of Visual Assessment Recommended	Level 1 Visual Assessment	Level 2 Visual Assessment	Level 3 Visual Assessment	Level 4 Visual Assessment	

4.2 Confirmation of the Current Use of the Land and the Environmental Sensitivity

The site verification report encapsulates the findings from an exhaustive site visit. The primary objective of this visit was to evaluate the potential visibility of the proposed solar structures and to document the receiving environment, offering a first-hand understanding of the site and its surroundings.

The site is situated near Kakamas, a town in the north-western region of Northen Cape Province, South Africa. As depicted in Sections 2.4 and 2.5, this region is characterized by its moderate topography and agricultural landscapes. The area, part of the ZF Mgcawu District Municipality, is known for its low shrubland, rolling hills, and a mix of farmlands and natural vegetation.

During the field study, the assessment involved travelling on both tarred and gravel roads, including the N14 and existing main access road which is an unnamed gravel road that intersect and envelop the study area. This approach facilitated an evaluation of potential visibility from various viewpoints.

The report also identifies landscape receptors - areas or features that are visually appealing and contribute to the sense of place and ambience. These include grasslands, drainage infrastructure, mountains, and other significant features. Recognising these elements is crucial as they enhance the aesthetic appeal of the area and should be considered during the development process.

Key features that could impact the visual exposure of the solar structures were identified during the site visit. These observations are summarised in Table 5.

This site verification report provides a comprehensive account of the site's visual sensitivity and the potential impacts of the proposed solar structures. It serves as a foundational resource for understanding the site's characteristics and will inform the necessary mitigation measures to minimise visual impacts.

Table 5: Site Findings

Feature	Site Findings
Scenic Resources	
Topographical Features	The ZCC Akkerboom project is situated near Kakamas, a town in the western region of the Northern Cape Province in South Africa. The site itself is located on a flat, lower-elevated plane, distinct from the surrounding topography which includes a mix of flat agricultural lands and distant rolling hills. The site is flanked by low hills to the south, opposite the N14 highway, and low mountains to the north. The northern corner of the site has a higher elevation compared to the lower elevation of the Orange River, providing a unique vantage point. The N14 highway itself is slightly more elevated than the development area, offering an open road view where the facility will be easily visible. In terms of specific elevation profiles, the West to East elevation across the main site ranges from 710m to 712m, while the North to South elevation profile varies from 714m to 707m. For Phase 1 of the project, which is located next to the N14, the West to East elevation profile is between 705m and 703m, and the North to South elevation profile ranges from 703m to 705m. These elevation gradients are crucial for future development planning, as they offer insights into drainage, visibility, and the overall aesthetic integration of the project into the existing landscape.
Water Features	Significant water features Kameel River and Orange river in surrounding area and non-perennial rivers run close to the site. It is strongly recommended that appropriate buffers and exclusion zones be established in accordance with environmental guidelines. This will ensure the preservation and protection of the natural balance and ecological health for the benefit of future generations.

Feature	Site Findings
Vegetation	The site's vegetation is identified as the Northen Cape Highland Thornveld in the Sub-Escarpment Grassland Bioregion and is primarily characterized by a series of several patches in the central-northern regions of Northen Cape, where it occurs on both dry valleys and moist upland. These grasslands contribute to the site's visual uniformity, aligning with the broader landscape of the area. The settlement on the site has limited vegetation, mainly consisting of sparse grassy areas. In contrast, the farming area features a more diverse vegetation profile. This pattern of vegetation distribution and density is indicative of the site's water distribution, particularly in areas where the non-perennial rivers runs, which is crucial for sustaining the unique biodiversity of the area. The farming area, in particular, exhibits a higher concentration of clustered trees compared to the broader landscape. This variation in vegetation plays a significant role in the site's visual sensitivity and should be carefully considered in the development process. Nama Karoo vegetation, cultivated commercial crops, subsistence farming in surrounding area, cultivated vines in surrounding area.
Historical features	Graves noted on neighbouring farm. Portion 1 of the Farm Frier's Dale No. 466. It should be noted that a detailed Heritage Impact Assessment (HIA) will be conducted by specialists to determine additional historical or cultural features that may be present in the vicinity of the proposed development site. The outcomes of the HIA will provide further insights into the historical features that could influence the site's visual sensitivity and will be considered in the planning and development process.
Cultural / Living Landscape	The site is situated in a region with a dual-component cultural landscape. The first component is rural, with a history of both pre-colonial and colonial occupation. The second component is urban, consisting of smaller towns that have developed over the last 150 years. No specific cultural or living heritage sites were identified within the immediate vicinity of the proposed project site.
Presence of livestock / other animals / wildlife	No livestock noted during the site visit, no additional animals.
Scenic / tourism features	Die Akker Gastehuis, Die Punk Caravan, Elim Guesthouse, Da Villa Lodge, Keimoes Hotel, Tkabies Camping & Self Catering, Kokerboom Lodge, La Palma Lodge. The predominant land use for the area is agriculture. The agricultural sector contributed 47% to the Kai !Garib Local Municipality economy. As one moves further away from the Orange River, livestock grazing becomes the main activity.) the agricultural sector in the Northern Cape contributes to the tourism sector in the form of game farms/ reserves and wine farms that offer tours and tastings. tourism is one of the most important economic sectors in the Northern Cape as well as within the Kai !Garib Local Municipality.

Feature	Site Findings
Distinctive landscape features	The Orange River creates a broad, verdant corridor that cuts across the arid desert terrain, primarily flowing from east to west. The area's vegetation is best characterized as Sandy Grassland, featuring plains of dense, sandy grassland dominated by white grass species, as well as numerous drought-tolerant shrubs. Following a season of ample winter rainfall, the landscape is adorned with striking floral displays,
Ancillary Infrastructure	The proposed Akkerboom Solar PV Facility is situated in an area rich in existing ancillary infrastructure, which includes not only high and medium voltage overhead lines but also railway tracks and Eskom infrastructure. The Rostrata Substation is strategically located just 7.84 kilometers west from the site border. Moreover, the region is already a hub for renewable energy projects, further reinforcing its suitability for the proposed facility. Agriculture-related infrastructure is also prevalent in the area. These existing features collectively offer the potential to integrate the new Akkerboom development seamlessly, minimizing the need for extensive new construction or modifications to the existing landscape and infrastructure
Sensitive Receptor	
Protected Area	There are no nature reserves or other protected areas within 10km of the study area. The closest reserve is Spioenkop Nature Reserve, approximately 17km northwest of the site.
Land use / Development theme (rural, agricultural, etc)	While agricultural activities are prevalent, with vast grasslands being a notable feature. The Rostrata Substation and high to medium voltage overhead lines are indicative of the area's role in the electrical grid network.
Condition of landscape (degraded, moderate, etc)	The area can no longer be regarded as ‘pristine’, preserving the existing landscape quality and character should be part of the goals for the area.
Viewpoints	Viewpoints in the vicinity of the proposed Akkerboom development are homogenously active as agricultural farms. Additionally, no townships are situated within a 10km radius, providing more distant viewpoints. These varying perspectives will experience different levels of visual impact from the proposed project, depending on their proximity and land use context.
Towns	Kakamas and Loxtonvale
Roads	The N14 Highway is the main access route to the site. N14, unnamed gravel main access road.
Airports / Airfields	Closest airport is in Upington 50km away.

4.3 Anticipated Issues Related to the Visual Impact

- **Altered Landscape and Sense of Place**: The introduction of solar panels and EV charging stations will transform the existing landscape, which is currently characterized by flat plains, agricultural lands, and natural water features. This could disrupt the area's visual harmony and alter the sense of place for both local residents and visitors.
- **Visibility of the Facility**: Given the site's flat terrain and the elevated N14 highway, the solar panels and EV charging stations could be highly visible from various vantage points. This visibility could affect the visual amenity for local residents and travelers on the N14.
- **Impact on Water Features**: The presence of significant water features like the Kameel River and Orange River adds to the area's visual appeal. The construction of solar panels and EV charging stations near these water features could affect their aesthetic value and the overall visual integrity of the landscape.
- **Impact on Vegetation**: The construction of the facility could disrupt the existing Northen Cape Highland Thornveld vegetation and grasslands, affecting both the site's visual sensitivity and local biodiversity.
- **Impact on Existing Infrastructure**: The area is already rich in ancillary infrastructure, including railway tracks and Eskom infrastructure. The addition of solar panels and EV charging stations could result in cumulative visual impacts, especially when viewed in conjunction with existing high and medium voltage overhead lines.
- **Dust and Construction Impact**: Given that the site is accessible via gravel roads, construction activities could generate dust, affecting the visual quality of the area temporarily.
- **Visual Exposure**: The flat nature of the site could increase the visual exposure of the solar panels and EV charging stations, making them more noticeable in the landscape, especially from the elevated N14 highway.
- **Potential Impact on Cultural/Living Landscape**: During the initial assessment, graves were identified on a neighbouring farm, adding a significant layer of cultural complexity to the site's visual sensitivity. This discovery necessitates that any development on the site be conducted with heightened sensitivity to these cultural elements. The presence of graves in the nearby area underscores the importance of preserving the integrity of the broader cultural and living landscape, requiring that future development plans be carefully designed to mitigate any adverse impacts.
- **Impact on Tourism and Scenic Features**: The area is known for its scenic resources and tourism features like Die Akker Gastehuis, Die Punk Caravan, Elim Guesthouse, Da Villa Lodge, Keimoes Hotel, Tkabies Camping & Self Catering, Kokerboom Lodge, and La Palma Lodge.

5 National Environmental Screening Tool

The Department of Forestry, Fisheries and the Environment (DFFE) Screening Tool was employed to assess the potential environmental impact of the proposed Akkerboom Solar Powered EV Charging Station and PV Development. According to this tool, the Landscape (Solar PV) Theme received a Very High Sensitivity Rating indicating significant landscape sensitivities within the proposed development site and its surroundings that could be impacted by a solar powered EV charging station and PV development.

The Screening Tool includes a map that delineates the relative sensitivity of the landscape theme in relation to solar developments.

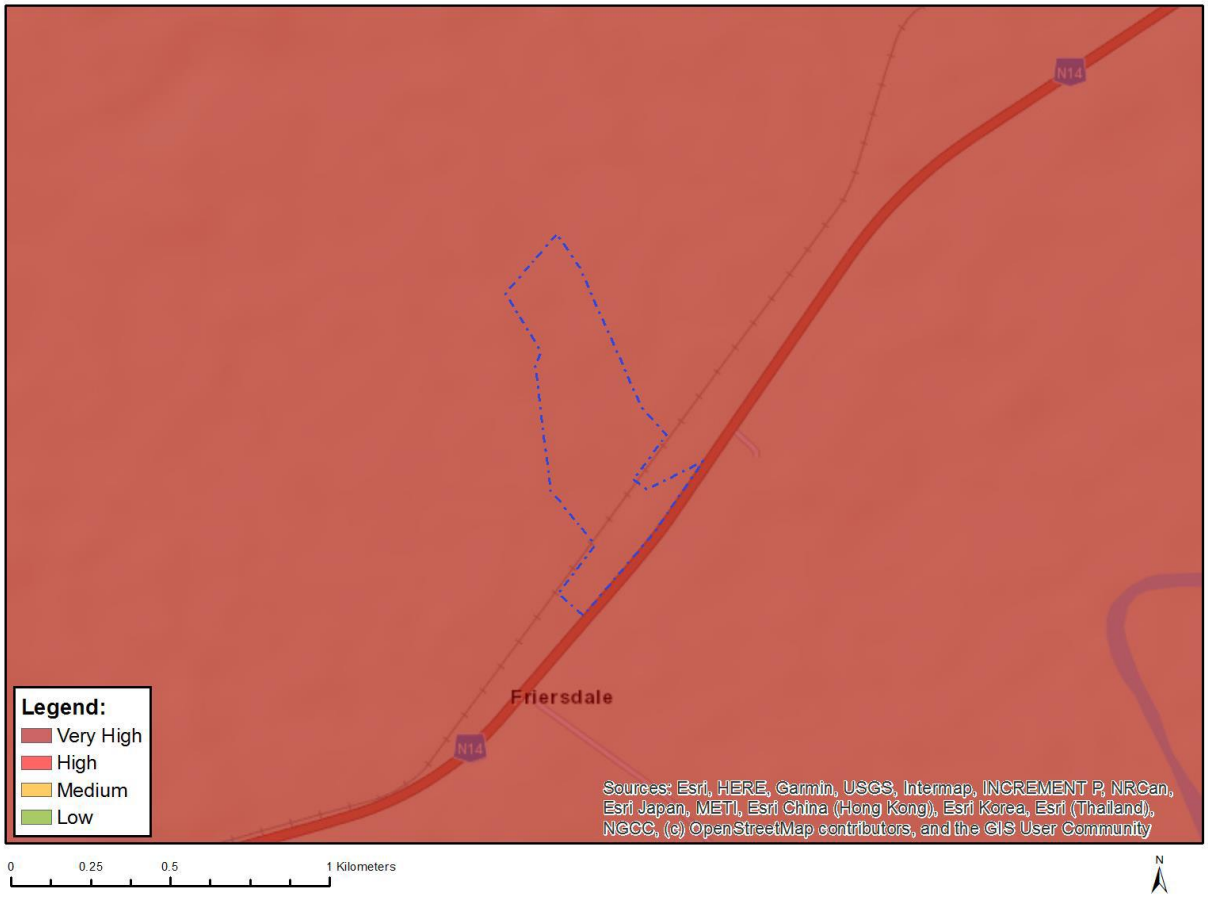

Figure 6: Map of Relative Landscape Solar Sensitivity

The feature and its corresponding sensitivity level, as per the DFFE Screening Tool, is as follows:

- Sensitivity: Very High – South African Large Telescope

Motivation: To safeguard the unique scientific attributes of the Northern Cape Province for future optical and radio astronomical research, the South African government enacted the Astronomy Geographic Advantage (AGA) Act (Act No. 21 of 2007). This legislation was promulgated on June

17, 2008. The Act mandates the protection, preservation, and meticulous maintenance of areas possessing astronomical advantages. These advantages are defined as features that render an area conducive for astronomical and related scientific activities, including but not limited to high atmospheric transparency, minimal light pollution, low population density, and reduced radio frequency interference. Karoo Central Astronomy Advantage Areas comprises three partially overlapping zones with shared internal boundaries that align with the external boundaries of the Karoo Core Astronomy Advantage Area. The external boundaries of these three zones vary based on the specific propagation conditions for different frequency bands and other pragmatic considerations.

However, despite the initial classifications, the site verification visit suggests a reduction in the overall sensitivity rating for the proposed project site. This reduction is motivated by several factors:

- During the formulation of the Karoo Central Astronomy Advantage Areas (KCAAA) Regulations in 2007, the precise locations for the final placement of the SKA_MID antennas had not been established. Protection corridors were thus utilized to represent potential areas for antenna placement, including the KCAAA 1 (or Kakamas region) which was designated for radio astronomy observations within the frequency band ranging from 100 to 2170 MHz. As of July 2023, the final servitudes for the spiral arm SKA_MID antennas have been definitively determined. It has been ascertained that no SKA stations will be situated within a minimum distance of 10 km from the designated site.
- The area already hosts various types of infrastructure, including railway tracks, Eskom infrastructure, and other renewable energy projects. These existing developments suggest that the area is not as pristine as initially considered, thereby reducing its sensitivity rating.
- The site's VAC is moderate to high, given the flat terrain and the existing ancillary infrastructure The area is already accustomed to industrial and energy-related developments, which suggests that the introduction of a Solar PV and EV Charging Facility may not drastically alter the VAC.
- Local Context and Sense of Place: The site is characterised by a blend of natural and man-made elements, and the sense of place is already influenced by existing infrastructure and agricultural lands. The proposed Solar PV and EV Charging Facility would not drastically alter this existing balance.
- Nature of the EV Charging Station and PV Facility: Given that the area is already a hub for renewable energy projects, the scale of the proposed facility is unlikely to be a significant visual intrusion.
- Preliminary consultations suggest that the local community and stakeholders do not perceive the proposed development as a significant intrusion, further supporting a lower sensitivity rating.

In light of these factors, the site verification findings convincingly argue for a "Medium to Low" sensitivity rating, contrary to the initial "Very High" rating as per the DFFE Screening Tool. The site's characteristics and the broader contextual factors demonstrate its suitability for the proposed development, provided that recommended mitigation measures are implemented. This rating suggests that a visual impact assessment is not required, however, appropriate measures must still be taken to minimise the visual impact.

6 Recommendations

- Implement natural vegetative buffers or earth berms around the facility to minimize its visual impact, especially near water features and residential areas.
- Use non-reflective, earth-toned materials for all built structures to blend them into the natural landscape and reduce glare.
- Post-construction, undertake a re-vegetation program using indigenous plant species to restore any disrupted areas and enhance the site's Visual Absorption Capacity (VAC).
- Implement dust control measures and restrict construction activities to daylight hours to minimize visual and atmospheric impacts.
- Develop and implement a traffic management plan to control construction-related traffic, minimizing visual and safety impacts on the N14 highway and other local roads.
- Conduct a comprehensive Heritage Impact Assessment (HIA) that specifically includes the graves identified on the neighboring farm to evaluate their cultural significance and potential visual impact. Based on the findings, implement protective measures that may include demarcation, buffering zones, or even relocation, if feasible and culturally appropriate. This will ensure that the development is sensitive to the newly identified cultural elements and maintains the integrity of the broader cultural and living landscape.
- Install educational signage that explains the environmental benefits of the solar PV and EV charging facility, turning a potential visual intrusion into an educational opportunity if feasible.
- Design the layout of solar panels to follow the natural contours of the land, reducing the visual impact and need for extensive land grading.

7 Conclusion

The Visual SSV for the proposed Akkerboom Solar Powered EV Charging Station and PV Facility has confirmed the site's suitability for the intended development, subject to the implementation of recommended mitigation measures. The site is situated within a landscape characterised by a mix of agricultural and natural elements, alongside existing infrastructure such as power lines and the N14 Highway. The flat terrain and sparse vegetation contribute to moderate visibility of the proposed development, particularly from elevated viewpoints along the highway. However, the site's moderate VAC, combined with its compatibility with existing land uses, suggests that potential visual impacts can be effectively mitigated. Key receptors include travellers along the N14, nearby agricultural properties, and tourism establishments, with no protected areas or significant cultural landmarks identified within the immediate viewshed. Temporary visual impacts during the construction phase, such as dust and increased activity, will require management through standard mitigation practices. Long-term impacts can be minimised through measures such as vegetative screening, the use of non-reflective, earth-toned materials, and careful site design to blend the development with the surrounding environment. Overall, the visual impacts associated with the proposed project are considered manageable and align with the existing landscape character, supporting the broader objective of advancing sustainable energy infrastructure in the region.

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