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List of Abbreviations

BA	Basic Assessment
BESS	Battery Energy Storage System
DEM	Digital Elevation Model
DFFE	Department of Forestry, Fisheries and the Environment
EAP	Environmental assessment practitioner
EGI	Electricity Grid Infrastructure
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
GN	Government Notice
GPS	Global Positioning System
NEMA	National Environmental Management Act
NFEPA	National Freshwater Ecosystem Priority Areas
REEA	Renewable Energy EIA Application Database
SAPAD	South African Protected Areas Database
SEA	Strategic Environmental Assessment
SPV	Solar Photovoltaic
VIA	Visual Impact Assessment

Glossary

Definitions	
Receptor	Individuals, groups or communities who are subject to the visual influence of a particular project.
Viewpoint	A selected point in the landscape from which views of the project are ascertained.
Viewshed	The outer boundary defining a view catchment area, used to determine the zone of visual influence.
View shadow	An area within the view catchment visually obscured from the project, usually by topography.
Visual absorption capacity	The ability of an area to visually absorb development by means of screening topography, vegetation or buildings.

VISUAL IMPACT ASSESSMENT

1. Introduction

1.1. Scope, Purpose and Objectives of this Specialist Input to the EIA Report

This report serves as the Visual Impact Assessment (VIA) as part of the Environmental Impact Assessment (EIA) Process for the proposed development of a Solar Photovoltaic (SPV) Facility (Kudu Solar Facility 1) and associated infrastructure, near De-Aar, Northern Cape Province (**Map 1**).

The purpose of the VIA is to provide inputs to the Scoping and EIA Reports for the Kudu Solar PV project as required by the National Environmental Management Act (Act 107 of 1998, as amended) (NEMA) EIA Regulations (2014, as amended). The intention is that the VIA used to determine layouts for the Solar PV site based on the visual sensitivities identified, as well as those by other specialists.

During the scoping phase, the specialists considered the entire study area, which included the Original Scoping Buildable Areas that included the development of up to 14 Solar PV Facilities. However, following the identification of sensitivities, discussions with landowners and other considerations such as the capacities of the upcoming Bidding Windows, the proposed projects were re-clustered and a total of up to 12 Solar PV Facilities are now being proposed.

Separate reports have been compiled for each PV facility. This report covers the Kudu Solar Facility 1 and associated infrastructure.

1.2. Details of Specialist

The visual specialist assessment has been undertaken by Bernard Oberholzer (BOLA) and Quinton Lawson (QARC). BOLA is registered with the South African Council for the Landscape Architectural Profession (SACLAP), with Registration Number 87018, and QARC with the South African Council for the Architectural Profession (SACAP), with Registration Number 3686. A curriculum vitae is included in Appendix A of this specialist input report and a signed specialist statement of independence is included in Appendix B.

1.3. Terms of Reference

The Terms of Reference for the visual scoping and EIA specialist studies include the following:

- Undertake a site inspection to identify existing scenic resources/visual characteristics on and around the proposed project sites.
- Determine visual constraints and sensitivity levels in terms of solar PV development. Verify these in terms of the National Screening Tool to confirm or dispute identified environmental sensitivities.
- Determine viewsheds, view corridors and important viewpoints in order to assess the visual influence of the proposed project.
- Review the legal framework that may have implications for visual/scenic resources.
- Identify and assess possible visual impacts that could result from the proposed project.
- Determine possible cumulative visual impacts in relation to other renewable energy projects in the region.
- Identify possible mitigation measures to reduce the significance of negative visual impacts for inclusion into the project design.

2. Approach and Methodology

The approach and methodology for the VIA specialist study includes the following:

- A 3D digital terrain model of the study area is used to determine the viewshed of the proposed project.
- Potential sensitive receptors, such as farmsteads and settlements in the surrounding area, are identified using the viewshed map and Google Earth.
- Landscape features and sensitive receptors are mapped together with recommended buffers.
- Field work is used to verify the existence and significance of landscape features and receptors.
- A photographic record is made with the emphasis on views from potential sensitive receptors of the proposed project at varying distances.
- The panoramic photographs, which include GPS positions, are then used to create the post-mitigation photomontages.

A Site visit was carried out on 15 and 16 March 2022. The track used during the fieldwork is indicated on **Map 3**. The season was not a consideration for the visual survey, but clear visibility was required.

The methodology is based on the 'Guideline for Involving Visual and Aesthetic Specialists in EIA Processes' (Oberholzer, 2005).

Potential visual impacts identified in this specialist study have been assessed based on the criteria and methodology provided by the CSIR as outlined in Appendix D. Refer to Appendix E for table of compliance with Appendix 6 of the 2014 NEMA EIA Regulations (as amended).

2.1. Information Sources

A List of the main databases and information sources is given in Table 1 below. The quality of base data was considered adequate for the visual assessment.

Table 1: Sources of information

Data / Information	Source	Date	Type	Description
Project Data	ABO Wind Renewable Energies (PTY) LTD	2023	Vector Digital Spatial Data	Project Component Layout provided by proponent
South African National Protected Areas Database (SAPAD)	Department of Forestry, Fisheries and the Environment (DFFE)	2022, Q1	Vector Digital Spatial Data	Spatial delineation of protected areas in South Africa, updated quarterly
South African Renewable Energy EIA Application Database (REEA)	Department of Forestry, Fisheries and the Environment (DFFE)	2022, Q2	Vector Digital Spatial Data	Spatial delineation of Renewable Energy EIA Applications in South Africa, updated quarterly
ESKOM EGI Power Corridors	Department of Forestry, Fisheries and the Environment (DFFE)	2015	Vector Digital Spatial Data	Spatial delineation of EGI Power Corridors in South Africa
ESKOM Infrastructure Spatial Data	ESKOM: Electricity Grid Infrastructure (EGI) Database	2008	Vector Digital Spatial Data	Spatial delineation of ESKOM EGI Transmission, Distribution and Substation Data
Geological Data	Council for Geoscience	2011	Vector Digital Spatial Data	Geological Map of South Africa: Spatial Dataset

Data / Information	Source	Date	Type	Description
1:50 000 Topographic Series GIS Data	Chief Directorate National Geo-spatial Information (CDNGI)	2008	Vector Digital Spatial Data	Spatial Data of the 1:50 000 Topographic Series including elevational data (20m contours)
1:50 000 Topographic Series Maps	Chief Directorate National Geo-spatial Information (CDNGI)	2005	Georeferenced Raster Data	3024AA Potfontein, 3024AB Jakkalskuil 3024AC Houtkraal, 3024AD Philipstown
South Africa Road and Terrain Data	Google Maps (maps.google.com)	2022	Online Data	South Africa Road and Terrain Data
South Africa Satellite Imagery	Google Earth Pro	2022	Online Data	South Africa Satellite Imagery

2.1.1. Assumptions, Knowledge Gaps and Limitations

The detailed design of the solar arrays that may be used have not been determined at this stage, but a height of 3,5m was used to prepare the viewshed map.

Assumptions were made regarding the configuration and finishes of the proposed substation and battery energy storage system (BESS), as well as lighting related to the proposed project.

3. Description of Project Aspects relevant to the Visual Assessment

The Kudu project will entail the proposed development of up to 12 Solar PV Facilities ranging from up to 50 MWac to 350 MWac, as well as associated infrastructure, near De Aar, Northern Cape. This report focuses on Kudu Solar PV Facility 1.

The proposed project will make use of PV solar technology with the solar PV facility having associated infrastructure, including, but not limited to, an on-site substation complex and BESS (+-1 ha and max. height 10m). Each On-Site Substation Complex (extending up to 8 ha) could include an on-site Independent Power Producer (IPP) or Facility Substation (+-1 ha), and O&M buildings (up to 0,5 ha), as well as other infrastructure that would be subjected to separate assessment processes. **Maps 2 and 3** indicate the affected farm portions, as well as the proposed PV areas for all 12 projects.

Various Electrical Grid Infrastructure (EGI) are being proposed to enable and facilitate connection of the proposed projects to the national grid, and that these EGI will be assessed as part of separate Basic Assessment processes or similar[1].

4. Baseline Environmental Description

4.1. Study Area Definition

The study area for all the proposed Kudu Solar Facilities is the full extent of the eight affected farm properties on which the proposed PV Facilities will be constructed. The full extent of these properties has been assessed in this study in order to identify environmental sensitivities and no-go areas. The total **study area** for all the Kudu Solar Facilities is approximately 8 150 hectares (ha).

At the commencement of this Scoping and EIA Process, the **Original Scoping Buildable Areas,** which fall within the study area, were identified by the Project Developer, following the completion of high-level environmental screening based on the Screening Tool.

[1] However, for completeness, the external EGI corridor and power lines (Projects 13 to 26) are shown on some of the maps in this report. Note these are not part of this current assessment, and are still to be finalised.

Following the identification of sensitivities during the Scoping Phase, the Project Developer has considered such sensitivities and formulated the **Revised Buildable Areas**. The Revised Scoping Buildable Areas were used to inform the design of the layout, and further assessed during this EIA Phase of the project in order to identify the preferred development footprint of the proposed project on the approved site as contemplated in the accepted Scoping Report. The development footprint is where the actual development will be located, i.e. the footprint containing the PV solar arrays and associated infrastructure.

4.2. General Description

A brief description of scenic features and receptors in the surrounding area that can potentially be affected by visual impacts arising from the proposed project are described below. These are indicated on **Map 9** together with the proposed development, and in the photographs below.

The study area lies within an expansive flattish landscape, composed of Ecca Group shales, interspersed with dolerite-capped koppies, providing topographic relief, these being the main scenic features of the area (**Map 5** and Figure 1). The elevation ranges from 1000 to 1500m in the region.

The vegetation is Northern Upper Karoo type (Mucina and Rutherford, 2006), consisting of dwarf shrubland and grassland. The grassland was unusually lush after the good summer rains experienced during 2022 in the region, (Figure 2), and the local district roads were very muddy. The dolerite koppies are covered with open shrubland along with grasses.

The main agricultural activity is open-range sheep farming with both merino and dorper sheep occurring, along with cattle farming and some horses. A main Eskom powerline (i.e. Hydra/Perseus 1 765kV) traverses several of the proposed Kudu Solar PV sites, constituting an existing visual impact.

Farmsteads nestled among tree copses in the surrounding area tend to be 2 km or more apart (Figures 4 and 5). Three of the farmsteads, Louwsvilla, Zionsheuwel and Rooidam, were derelict and not occupied (Figure 3). Two farmsteads, Wolwekuil farmstead (situated on Farm 42/RE), and Basberg, are located within the overall project area, and it was therefore assumed that these are not sensitive receptors. Furthermore, the area around the Basberg Mountain, being a scenic feature, has been excluded from the proposed PV development area.

Figure 1: Grass-covered dolerite koppies provide the main landscape relief in the area

Figure 2: The grassland plains near Louwsvilla are used for sheep grazing

Figure 3: Louwsvilla farmstead to the south of the proposed Kudu Solar PV facilities is derelict

Figure 4: Karee Kloof farmstead, surrounded by tall cypresses, would be 2,8km from the proposed Kudu project

Figure 5: View towards Middelplaas-Noord farmstead and the flat-topped Basberg in the middle distance

The only known guest farm / game farm in the area, which provides visitor facilities, is Jakkalskuil, and the nearest nature reserves are in the vicinity of the Van Der Kloof Dam more than 30km to the north-east (**Map 1**). According to the Social Impact Assessment (SIA), game occurs on most of the study area properties, several of which offer annual (winter) hunting opportunities. There are no known airfields in the local area.

The viewshed, or zone of visual influence of the proposed solar PV site potentially extends for some 5km, but is partly restricted by the Basberg to the east, creating a view shadow. Given the height of the solar arrays (about 3,5m), the viewshed of the proposed solar facility would be fairly localised (see **Map 6**). Estimated degrees of visibility, based on the scale and height of all the PV facilities and related infrastructure, and on the distance from various viewpoints, are indicated in Tables 2 and 3 below.

Table 2: Degrees of Visibility of Proposed PV Facilities

Very high visibility	0-500m	Prominent feature within the observer's view frame
High visibility	500m-1km	Relatively prominent within observer's view frame
Moderate visibility	1-2km	Only prominent as part of the wider landscape
Low visibility	2-4km	Visible as a minor element in the landscape
Very low visibility	>4km	Hardly visible with the naked eye in the distance

Table 3: Viewing Distances and Potential Visibility from Receptors

View-point	Receptor	Latitude	Longitude	Distance to PV arrays	Potential Visibility/ Closest PV Project
VP1	Bokkraal	30.318559 S	24.354662 E	9.66 km	Not Visible
VP2	Zionsheuwel (derelict)	30.267535 S	24.374876 E	6.94 km	Not Visible
VP3	Rooidam (derelict)	30.281976 S	24.362026 E	6.82 km	Very Low visibility. Beyond 5km
VP4	Louwsvilla (derelict)	30.294538 S	24.308752 E	5.49 km	Very Low visibility. Beyond 5km
VP5	Karee Kloof (Swartkoppies)	30.281137 S	24.276414 E	4.52 km	Very Low visibility
VP6	Vrede	30.256084 S	24.270718 E	2.97 km	Low visibility
VP7	Tafelkop	30.185034 S	24.234760 E	8.83 km	Very Low visibility. Beyond 5km
VP8	Middelplaas-Noord	30.187386 S	24.300348 E	5.76 km	Very Low visibility. Beyond 5km
VP9	Jakobsrus	30.161906 S	24.328036 E	8.74 km	Very Low visibility. Beyond 5km
VP10	Wolwekuil (Farm 42/1)	30.167089 S	24.410270 E	12.56 km	Not Visible
VP11	Grasbult	30.149474 S	24.418840 E	14.47 km	Not Visible

4.3. Project Specific Description

The description of the baseline environment for Kudu Solar Facility 1 is similar to the general description given above. Landscape and scenic features have generally been avoided in the proposed solar PV layout and features of 'very high' visual sensitivity have been avoided.

4.4. Identification of Environmental Sensitivities

4.4.1. Sensitivities identified by the National Web-Based Environmental Screening Tool

The proposed project study area has been overlaid on the landscape sensitivity map generated by the Department of Forestry, Fisheries and the Environment (DFFE) Screening Tool, and on a more detailed project-scale sensitivity map, that has been verified by the specialists, (see Appendix C).

The Screening Tool 'Landscape' Sensitivity Map indicates areas of ridges and steep slopes in the northern and southern parts of the study area (**Map 8**). These were, however, mapped at the regional scale linked to the Phase 1 Wind and Solar 2015 Strategic Environmental Assessment (SEA), and a more accurate map of landscape features with recommended buffers has been prepared at the local project scale by the specialists, (see **Map 10** and Tables 4 and 5).

4.4.2. Visual Sensitivity Analysis and Verification

Landscape features of visual or scenic value, along with potential sensitive receptors in the surroundings, are listed in Table 4 below. Visual features are indicated on **Map 9**.

Table 4: Scenic Features and Sensitive Receptors

Landscape features within or adjacent to the study area.	
Topographic features	Characteristic landforms include the dolerite *koppies* contributing to the scenic value of the area, and providing visual interest or contrast to the flat grassy plains.
Water Features	In the dry landscape, drainage features and larger dams provide scenic and amenity value.
Cultural landscapes	The area contains modest farmsteads with tree copses, grazing pasture and minimal cultivation.
Receptors adjacent to the PV project or in the local surroundings.	
Protected Areas	There are no known proclaimed nature reserves or private reserves in close proximity to the study area, the nearest being Van der Kloof Nature reserve some 30km away.
Human settlements	The nearest settlements are Philipstown and Petrusville, over 20 km away, and De Aar about 50 km away.
Scenic and arterial routes	There are no major arterial or scenic routes within the vicinity of the solar PV site.

Scenic resources and sensitive receptors within the study area have been categorised into no-go (very high), high, medium and low visual sensitivity zones, for the proposed solar PV facility, as indicated in Tables 5 and 6 below. The visual sensitivity mapping categories are spatially indicated on **Map 10**.

Substations, BESS, internal power lines and access roads would have minor buffers. The buffers in Table 5 are based on those for landscape resources in the National Wind and Solar SEA (Lawson and Oberholzer, 2014).

Table 5: Visual Sensitivity Mapping Categories for the Proposed Kudu Solar Facility 1

Scenic Resources	Very high sensitivity	High visual sensitivity	Medium visual sensitivity	Low visual sensitivity
Topographic features	Feature	Within 250m	-	-
Steep slopes	Slopes > 1:4	Slopes > 1:10	-	-
Drainage courses	Feature	Within 50m	-	-
Cultural landscapes	within 250m	within 500m	-	
Protected Landscapes / Sensitive Receptors				
Nature reserves / game farms	within 500m	within 1 km	within 2 km	-
Farmsteads outside site	within 500m	within 1 km	within 2 km	-
Farmsteads inside site	within 250m	within 500m	-	
Arterial routes n/a	within 250m	within 500m	within 1km	-
District roads	within 50m	within 100m	within 250km	-

Table 6: Visual Sensitivity Categories

Very high	Areas or features considered of such sensitivity or importance that any adverse effects upon them may be regarded as a fatal flaw.
High	Development to be limited and remain within acceptable limits of change determined by the specialist, and comply with restrictions or mitigation measures identified by the specialist.
Medium	Areas considered to be developable, but to remain within acceptable limits of change as determined by the specialist, and comply with restrictions or mitigation measures identified by the specialist.
Low	Low sensitivity areas that are considered to be developable. However, specialists may still wish to define acceptable limits of change where necessary.

4.4.3. Sensitivity Analysis Summary Statement

More accurate mapping of landscape features has been provided at the detailed project scale, being a refinement of the DFFE's Screening Tool Landscape Sensitivity Map. No significant landscape or scenic features would be affected by the currently proposed Kudu Solar facility. The sensitivities noted below are based on the identified 'Buildable Areas'.

Table 7: Visual Sensitivity Analysis of the Proposed Solar Facility

Kudu Solar Facility	Scenic Resources / Receptors	Sensitivity
Kudu Solar Facility 1 related infrastructure	The proposed solar PV borders on a drainage feature and local road but outside the no-go buffer areas. The nearest surrounding farmstead, Vrede, is about 2,97 km away, and well outside the buffer area.	Low visual sensitivity

As indicated above, following the identification of sensitivities during the Scoping Phase, the Project Developer considered such sensitivities and formulated the Revised Buildable Areas. The Revised Scoping Buildable Areas led to the identification of the development footprints and detailed layouts in the EIA Phase which are considered suitable from a visual perspective, as the sensitivities identified above have been taken into consideration as shown on **Map 10**.

Changes to the detailed layouts are deemed acceptable if the changes remain within the approved buildable areas / development footprints assessed during the Scoping and EIA Process with no-go sensitive areas avoided.

5. Issues, Risks and Impacts

5.1. Identification of Potential Impacts/Risks

Potential visual impacts arising from the proposed Kudu Solar PV Facility and associated infrastructure on landscape features and receptors identified above are listed below for each of the project phases, including cumulative impacts. No indirect impacts have been identified.

Construction Phase

- Impact 1: Potential effect of dust and noise from trucks and construction machinery during the construction period, and the effect of this on nearby farmsteads and visitors to the area.
- Impact 2: Potential visual effect of haul roads, access roads, stockpiles and construction camps in the visually exposed landscape.

Operational Phase

- Impact 1: Potential visual intrusion of solar arrays and related infrastructure on receptors including glint and glare.
- Impact 2: Potential visual impact of an industrial type activity on the pastoral / rural character and sense of place of the area.

Decommissioning Phase

- Impact 1: Potential visual effect of any remaining structures, platforms and disused roads on the landscape.

Cumulative Impacts

- Impact 1: Potential combined visual effect of the proposed 12 solar PV facilities in the study area, seen together with other existing and proposed renewable energy facilities in the area, are indicated on **Map 11** and could potentially increase the overall cumulative visual impact.

5.2. Summary of Issues identified during the Public Consultation Phase

Visual related issues were raised by Interested and Affected Parties (I&APs) and Stakeholders during the 30-day review period on the Draft Scoping Report. A summary of these issues is listed below, together with responses from the Visual Specialists.

KEY ISSUE	RESPONSE
Requests for information on the visual impact of the development on neighbouring farm portions as relating to farming and tourism activities. Specifically: • Please provide information and sketches about the visual impact that this development will have on farm Vanwyngaardspan and farming. • Please provide information and sketches about the visual impact that this development will have on farm Jakkalskuil and farming activities like the offering of hunting- and photographic safaris to clients from all over the world.	• The location of farm Vanwyngaardspan was confirmed with the landowner during the EIA Phase. Farm Vanwyngaardspan is more than 25 km away from the northern-most corner of Kudu Solar Facility 11 (and even further from the Kudu Solar Facility 1). The proposed Kudu Solar Facilities would not be visible from this area. There are also two koppies - Aasvoëlkop and Ongelukskop, which are 85m higher than the Kudu Solar Facility 11, which would block the line of sight of the proposed Kudu Solar Facilities. Refer to the VIA for Kudu Solar Facility 11 for additional information. • The Jakkalskuil farmstead is 5,84 km from the proposed project area and the Kudu Solar Facility would therefore not be visible. Refer to the VIA for Kudu Solar Facility 12 for additional information. However, the farm boundary is directly adjacent to the Kudu Solar Facility 12 and the visibility would be very high at 360m distance. The viewshed, or zone of visual influence, potentially extends for some 5 km, hence the Jakkalskuil farmstead was not included in the Visual Scoping Level Assessment. Impacts on adjacent farmsteads have therefore been identified and considered in the VIA specialist study.
Request to ensure that the visual impact on the nearest farmstead, Vrede, is adequately assessed.	Various impacts are identified and assessed in the VIA, such as the potential effect of dust and noise from trucks and construction machinery during the construction period, and the effect of this on nearby farmsteads and visitors to the area, as well as the potential visual impact of a solar energy facility on the pastoral / rural character and sense of place of the area. The Vrede farmstead is located 2,97 km away from the proposed Kudu PV 1 project, assessed as 'low' visibility and is also outside the visual buffer area as shown on Map 10.

Minor comments related to visual impacts associated with the proposed project were raised by Interested and Affected Parties during the review period of the Draft EIA Report. These comments mainly related to clarification of high sensitivity areas being slightly encroached for Kudu Solar Facility 1, 2, 3 and 4 (which do not need to be avoided) and dust generation. Responses have been provided in Appendix H.7 of the Final EIA Report.

6. Visual Impact Assessment

This section provides an assessment of the potential visual impacts of the proposed project. Comment on the no-go alternative is also provided.

Criteria for determining visual impact included the following:

Visual Exposure: (**Map 6**)
The viewshed, or zone of visual influence, potentially extends for some 5km, but is partly restricted by the Basberg to the east and low koppies to the south-west, where parts of the surrounding area are in a view shadow.

Visibility:
Possible degrees of visibility from a number of viewpoints are indicated on **Map 3** and Table 3. (See also photo-montages). Visibility of lights at night would not be significant because of the localised need for lighting and the distance of receptors. Visibility for Kudu SPV 1 varies from not visible to low visibility.

Landscape Integrity:
The natural landscape intactness of the area, and its pastoral sense of place, has been altered to some extent by the main Eskom powerline (i.e. Hydra/Perseus 1 765kV) that runs close to the study area (**Map 3**). The character and sense of place of the rural landscape would potentially be affected by the proposed solar PV development.

Visual Absorption Capacity:
The area around the proposed site is generally flat to gently undulating with scattered koppies, and low grass vegetation cover. It is therefore relatively visually exposed, with low to moderate visual absorption capacity, i.e. little potential to screen any proposed structures.

Visually Sensitive Resources:
Natural and cultural landscapes, or scenic resources, form part of the 'National Estate' and may have local or regional significance. However, the study area has few significant features, most of these being minor dolerite koppies, which have been avoided in the layout**.**

Visual Impact Intensity:
The overall potential visual impact intensity (magnitude) is determined in Table 8 below by combining the above criteria. Visual impact intensity is in turn used to assess impact consequence.

No-go Alternative

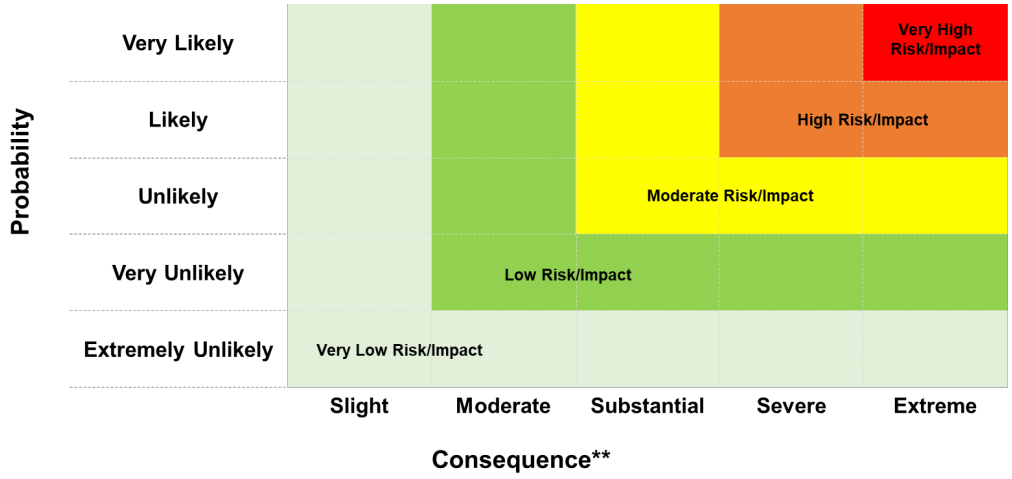
The ‘no-go’ alternative is the option of not constructing the Project in which case the *status quo* of the current landscape character would prevail, the disadvantage being that no solar energy would be produced for export to the national grid. The potential visual impact would be neutral where the *status quo* is maintained, with neither impacts or benefits occurring.

Table 8: Visual Impact Intensity for Kudu Solar Facility 1

Visual Criteria	Comments	Intensity
Visual exposure	Viewshed is related to the height of the solar arrays. Some areas are in a view shadow.	Medium-low
Visibility	Visible mainly from nearby farmsteads and local district roads. Distance is a mitigatory factor in most cases.	Low
Visual absorption capacity (VAC)	Visually exposed landscape with some undulations. Generally low VAC.	Medium

Landscape integrity / intactness	Effect on landscape character / sense of place.	Medium-high
Landscape / scenic sensitivity	Landscape features are generally avoided.	Low
Impact intensity	Summary	**Medium**

The quantification of overall visual impact significance for the proposed Kudu Solar Facility is based on the methodology provided by the CSIR (2022), as used in Tables 9 to 12 below. The assessment criteria are included in Appendix D of this report, and the significance rating is based on Figure 6 below.



[Qualitatively determined based on Spatial Extent, Duration, Reversibility and Irreplaceability]

Figure 6: Visual impact risk chart

6.1. Potential Visual Impacts during the Construction Phase

This section includes a description of the potential visual impacts during the Construction Phase.

- ***Impact 1: Potential effect of dust and noise from trucks and construction machinery during the construction period, and the effect of this on nearby farmsteads and visitors to the area.***

The above impact is rated as a negative, direct impact that extends locally and is of a short-term duration. The consequence is rated as moderate, and the probability identified as very likely, resulting in an impact significance of low, without the implementation of mitigation measures. With mitigation, the significance would remain low significance. Mitigation measures include ensuring that the Environmental Management Programme (EMPr) is implemented during the construction phase via the appointment of an Environmental Control Officer (ECO); and ensuring that construction camp and other facilities are located in visually unobtrusive areas, away from public roads. The impact summary is given in Table 9.

- ***Impact 2: Potential visual effect of haul roads, access roads, stockpiles and construction camps in the visually exposed landscape.***

This impact is rated as a negative, direct impact with a short-term duration and local spatial extent. The consequence and probability are respectively rated as moderate and very likely, rendering a low impact significance, without the implementation of mitigation measures. With mitigation, the significance of this

impact would remain low significance. The same mitigation measures identified for Impact 1 above apply to Impact 2.

Table 9: Construction Phase: Visual Impact Assessment

Impact	*Impact Criteria*		*Significance and Ranking (Pre-Mitigation)*	*Potential mitigation measures*	*Significance and Ranking (Post-Mitigation)*	*Confidence Level*
CONSTRUCTION PHASE						
Potential visual effect of construction activities, haul roads, construction camps (Impacts 1 and 2)	*Status*	**Negative**	**Low risk (Level 4)**	Locate construction camps, batching plants and stockpiles in visually unobtrusive areas, away from public roads. Implement EMPr with ECO during construction.	**Low risk (Level 4)**	**High**
	Spatial Extent	**Local**				
	Duration	**Short Term**				
	Consequence	**Moderate**				
	Probability	**Very Likely**				
	Reversibility	**High**				
	Irreplaceability	**Low**				

6.2. Potential Impacts during the Operational Phase

This section includes a description of the potential visual impacts during the Operational Phase.

- ***Impact 1 for the above facility: Potential visual intrusion of solar arrays and related infrastructure on receptors including glint and glare***

This impact is rated as a negative, direct impact that extends locally and is of a long term duration. The consequence is rated as moderate, and the probability identified as very likely, resulting in an impact significance of 'low risk', without the implementation of mitigation measures. With mitigation, the significance of this impact remains low risk significance. Mitigation measures include:

- Locate the substations and BESS in unobtrusive low-lying areas, away from public roads where possible. The current location is relatively unobtrusive, adjacent to a local farm road.
- Use muted natural colours and non-reflective finishes for structures generally.
- Keep internal access roads as narrow as possible, and use existing roads or tracks as far as possible.
- Fit outdoor/ security lighting with reflectors to obscure the light source, and minimise light spillage.
- Locate internal powerlines (i.e. 22 kV or 33 kV) underground where possible. (In some cases, such as stream crossings, internal powerlines may need to be above ground).
- Use discrete outdoor signage and avoid commercial / billboard signage.

- ***Impact 2 for the above solar facility: Potential visual impact of an industrial type activity on the pastoral / rural character and sense of place of the area***

This impact is rated as a negative, direct impact with a long-term duration and local spatial extent. The consequence and probability are respectively rated as moderate and very likely, rendering a low risk impact significance, without the implementation of mitigation measures. With mitigation, the significance of this impact remains low risk significance. The same mitigation measures identified for Impact 1 above apply to Impact 2. The impact summary is given in Table 10.

Table 10: Operational Phase: Visual Impact Assessment

Impact	*Impact Criteria*		*Significance and Ranking (Pre-Mitigation)*	*Potential mitigation measures*	*Significance and Ranking (Post-Mitigation)*	*Confidence Level*
OPERATIONAL PHASE						
Impact 1: Potential visual intrusion of solar arrays and related infrastructure on receptors, including glint and glare. Impact 2: Effect of an industrial type activity on the pastoral/rural character and sense of place.	*Status*	**Negative**	**Low risk (Level 4)**	Substation and BESS to be located in an unobtrusive low-lying area, away from public roads. Muted natural colours and non-reflective finishes to be used for structures generally. Internal access roads to be as narrow as possible, and existing roads or tracks used as far as possible. Outdoor/ security lighting to be fitted with reflectors to obscure the light source, and to minimise light spillage. Internal powerlines (i.e. 22 kV or 33 kV) to be located underground where possible. (In some cases, such as stream crossings, internal powerlines may need to be above ground). Outdoor signage to be discrete and commercial / billboard signage avoided.	**Low risk (Level 4)**	**High**
	Spatial Extent	**Local**				
	Duration	**Long Term**				
	Consequence	**Moderate**				
	Probability	**Very Likely**				
	Reversibility	**High**				
	Irreplaceability	**Low**				

6.3. Potential Impacts during the Decommissioning Phase

This section includes a description of the potential visual impacts during the Decommissioning Phase.

- ***Impact 1: Potential visual effect of any remaining structures, platforms and disused roads on the landscape.***

This impact is rated as a negative, direct impact that extends locally and is of a short-term duration. The consequence is rated as moderate, and the probability identified as very likely, resulting in an impact significance of low risk without the implementation of mitigation measures. With mitigation, the significance of this impact is rated as very low significance. Mitigation measures include ensuring that the solar arrays and infrastructure are removed and recycled; and access roads that are no longer required are ripped and regraded, and that exposed or disturbed areas are revegetated to blend with the surroundings. The impact summary is given in Table 11.

Table 11: Decommissioning Phase: Visual Impact Assessment

Impact	*Impact Criteria*		*Significance and Ranking (Pre-Mitigation)*	*Potential mitigation measures*	*Significance and Ranking (Post-Mitigation)*	*Confidence Level*
DECOMMISSIONING PHASE						
Potential visual effect of any remaining structures, platforms and disused roads on the landscape.	*Status*	**Negative**	**Low risk (Level 4)**	Solar arrays and infra-structure to be removed and recycled. Access roads no longer required to be ripped and regraded. Exposed or disturbed areas to be revegetated to blend with the surroundings.	**Very low risk (Level 5)**	**High**
	Spatial Extent	**Local**				
	Duration	**Short Term**				
	Consequence	**Moderate**				
	Probability	**Very Likely**				
	Reversibility	**High**				
	Irreplaceability	**Low**				

6.4. Cumulative Impacts

This section includes a description of the potential cumulative visual impacts during the Construction, Operational and Decommissioning Phases.

There are a number of other renewable energy and EGI projects within 30km of the site, (see **Map 11**), not all of which will be within the same viewshed as the proposed Kudu Solar PV 1 facility. The projects numbered on Map 11 are as follows:

- Project 1: Kalkbult Solar PV (Operational)
- Project 2: Longyuan Mulilo De Aar 2 North Wind Energy Facility (WEF) (Operational)
- Project 3: Longyuan Mulilo De Aar Maanhaarberg WEF (Operational)
- Project 4: EGI for the Longyuan Mulilo De Aar 2 North WEF
- Project 5: EGI for the De Aar 2 WEF
- Project 6: Proposed Castle WEF
- Project 7: Proposed Swartwater PV
- Project 8: Proposed Solar Power Plant in Phillipstown area
- Project 9: Proposed PV facility on farm Jakhalsfontein near De Aar
- Project 10: Proposed Solar Power Plant in Petrusville
- Project 11: Proposed Keren Energy Odyssey Solar PV Facilities (Eight PV Facilities)
- Project 12: Proposed Crossroads Green Energy Cluster of Renewable Energy Facilities and Grid Connection Infrastructure. The Cluster entails the development of up to 21 solar energy facilities, with the Scoping and EIA Processes consisting of three phases. Phases 1, 2 and 3 consist of 9, 6 and 6 solar facilities, respectively. The Phase 1 Scoping and EIA Processes were launched in January 2023.

Cumulative visual impacts would mainly be the combined visual effect of the 12 Kudu Solar PV facilities, as well as those solar projects within about 5 km of the Kudu PV 1 site, as well as the existing and proposed Eskom powerlines shown on **Map 11**.

The potential combined visual effect of the proposed 12 solar PV facilities and adjacent proposed solar facilities, seen together, is rated as a negative, cumulative impact for the construction, operational and decommissioning phases. The duration for the impact is rated as short term for the construction and decommissioning phases; and long term for the operational phases. The impacts have been rated with a local spatial extent. The consequence of the impact has been rated as substantial for the operational

phase; and moderate for the construction and decommissioning phases; and the probability has been rated as very likely for the three phases. Without the implementation of mitigation measures, the impact is rated as low significance for the construction and decommissioning phases, and moderate significance for the operational phase. With mitigation, the significance of this impact is rated as low, moderate and very low significance for the construction, operational, and decommissioning phases, respectively.

Table 12: Cumulative Visual Impact Assessment

Impact	*Impact Criteria*		*Significance and Ranking (Pre-Mitigation)*	*Potential mitigation measures*	*Significance and Ranking (Post-Mitigation)*	*Confidence Level*
CONSTRUCTION PHASE						
Potential combined visual effect of proposed 12 solar PV facilities seen together during construction phase.	*Status*	**Negative**	**Low risk (Level 4)**	Mitigation measures as for construction phase, Table 9.	**Low risk (Level 4)**	**High**
	Spatial Extent	**Local**				
	Duration	**Short Term**				
	Consequence	**Moderate**				
	Probability	**Very Likely**				
	Reversibility	**High**				
	Irreplaceability	**Low**				
OPERATIONAL PHASE						
Potential combined visual effect of proposed 12 solar PV facilities seen together during operational phase.	*Status*	**Negative**	**Moderate risk (Level 3)**	Mitigation measures as for operational phase, Table 10.	**Moderate risk (Level 3)**	**High**
	Spatial Extent	**Local**				
	Duration	**Long Term**				
	Consequence	**Substantial**				
	Probability	**Very Likely**				
	Reversibility	**High**				
	Irreplaceability	**Low**				
DECOMMISSIONING PHASE						
Potential combined visual effect of proposed 12 solar PV facilities seen together during decommissioning phase.	*Status*	**Negative**	**Low risk (Level 4)**	Mitigation measures as for decommissioning phase, Table 11.	**Very low risk (Level 5)**	**High**
	Spatial Extent	**Local**				
	Duration	**Short Term**				
	Consequence	**Moderate**				
	Probability	**Very Likely**				
	Reversibility	**High**				
	Irreplaceability	**Low**				

6.5. Substation and BESS

Lithium-Ion BESS and Redox Flow BESS were both considered for the proposed project. For Redox Flow BESS, various chemical compositions are likely, such as Vanadium. Refer to Chapter 15 of this EIA Report for a High-Level Safety, Health and Environment Risk Assessment, which provides high level information on the safety, health and environmental risks of the BESS technologies.

The substation and BESS have been considered as an integral part of the solar facility and mitigations for these have been included in the assessment tables above. Both BESS technologies are considered viable from a visual perspective.

7. Impact Assessment Summary

The overall visual impact significance findings, post-mitigation, are indicated in the Table 13 below:

Table 13: Overall Visual Impact Significance (Post Mitigation)

Phase	**Overall Impact Significance**
Construction	**Low risk (level 4)**
Operational:	**Low risk (level 4)**
Decommissioning	**Very low risk (level 5)**
Nature of Impact	**Overall Impact Significance**
Cumulative - Construction	**Low risk (level 4)**
Cumulative - Operational	**Moderate risk (level 3)**
Cumulative - Decommissioning	**Very low risk (level 5)**

8. Legislative and Permit Requirements

No permits, licenses or other authorizations are specifically required in terms of landscape or visual issues. Visual assessments are sometimes required in terms of the National Heritage Act, being part of the 'national estate', and would be included with the heritage assessment in those cases.

Although the proposed Kudu Solar PV project is located in the Northern Cape, the Western Cape guideline for involving visual and aesthetic specialists in EIA processes has been used.

National Heritage Resources Act (Act 25 of 1999 NHRA)	The Act includes protection of national and provincial heritage sites, as well as areas of environmental or cultural value, and proclaimed scenic routes. Natural heritage, including scenic resources, form part of the 'national estate'.
Provincial Government of the Western Cape 2005: Guideline for Involving Visual and Aesthetic Specialists in EIA Processes. B. Oberholzer.	A guideline document for specialist visual input with respect to determining potential visual impacts, along with criteria for rating the significance of impacts.

9. Environmental Management Programme Inputs

Mitigation measures have been recommended for the solar facility and related infrastructure in the tables above, in order to minimise visual impacts on scenic resources and sensitive receptors.

Visual input into the Environmental Management Programme (EMPr) is discussed below. This should be included in the Environmental Authorisation for the project.

Design Phase Monitoring:

Review signed off designs to ensure that the substation and BESS are located in an unobtrusive low-lying area, away from public roads; muted natural colours and non-reflective finishes are used for structures; internal access roads are designed to be as narrow as possible, and existing roads or tracks used as far as possible; outdoor/security lighting to be fitted with reflectors; internal powerlines (i.e. 22 kV or 33 kV) to be located underground where possible; (in certain cases, such as stream crossings, internal powerlines may need to be aboveground); and outdoor signage to be discrete and commercial / billboard signage avoided.

Responsibility: Project Developer and ECO.

Timeframe: During the planning and design phase.

Construction Phase Monitoring:

Ensure that visual management measures are included as part of the EMPr, monitored by an Environmental Control Officer (ECO), including siting of any construction camps, stockpiles, temporary laydown areas and batching plants outside of identified no-go areas unless otherwise approved by the visual specialists, as well as the implementation of dust suppression and litter control measures. Rehabilitation efforts to commence immediately after construction activities are completed.

Responsibility: ECO / Contractor.

Timeframe: Preparation of EMPr during the planning phase. Monitoring during the construction phase.

Operation Phase Monitoring:

Ensure that visual mitigation measures are monitored by management on an on-going basis, including the maintenance of rehabilitated areas, as well as control of any signage, lighting and waste at the proposed solar project, with interim inspections by the responsible environmental officer.

Responsibility: Solar Farm Operator.

Timeframe: During the operational life of the project.

Decommissioning Phase Monitoring:

Ensure that procedures for the removal of structures and stockpiles during decommissioning are implemented, including recycling of materials and rehabilitation of the site to a visually acceptable standard, and signed off by the delegated authority.

It is assumed that some access roads and concrete pads would remain. Those that are not required should be ripped and regraded, and vegetation or cropland reinstated to match the surroundings.

Exposed or disturbed areas to be revegetated to blend with the surroundings. The revegetation measures are not described here as they would fall under the auspices of the vegetation/ biodiversity specialist.

Responsibility: ECO / Contractor / qualified rehabilitation ecologist or horticulturist.

Timeframe: During the decommissioning contract phase, as well as a prescribed maintenance period thereafter (usually one year).

10. Visual Specialist Statement and Authorisation Recommendation

The VIA is based on the currently provided layout for the proposed Kudu PV 1 facility. Mitigation measures have been recommended in Tables 9 to 12 above. These have been included where possible in the project layout. A photomontage has been attached to depict the current layout.

The visual assessment findings are the following:

- The viewshed is fairly localised given the modest height of the solar facilities.
- There are a number of visual receptors in the surroundings these being mainly small farmsteads. However, these are fairly distant, the Vrede farmstead being the closest at 2,97 km.
- The overall visual impact significance for the Kudu PV 1 facility has been rated as low during the operational and construction phases, both before and after mitigation. The main visual impact is that there would be some change in character to the rural area.

- The cumulative visual impact significance of the proposed 12 Kudu solar energy facilities, seen in combination with other renewable energy projects in the adjacent area, as well as existing and proposed Eskom powerlines, could be substantial and has been rated as moderate using the rating methodology provided by the CSIR.

The fact that there will be similar proposed solar facilities adjacent to the site tends to reduce the visual sensitivity of the Kudu PV 1 site as the area would be seen as a node for solar energy.

Conclusion, Reasoned Opinion, and Impact Statement

The layout of the Kudu PV 1 facility has been subject to revisions, based on the various specialist findings, including the mapping of scenic resources and sensitive receptors. The currently proposed layout succeeds in avoiding visually sensitive areas as indicated on the visual sensitivity map (**Map 10**).

The cumulative visual impact of the solar facilities and related infrastructure, such as the substations, battery facilities and grid connection powerlines, together with other existing and proposed renewable energy facilities in the area, could affect the rural quality of the area (**Map 11**).

Specialist Recommendations for Inclusion in the EA

It is the opinion of the Visual Specialists that provided the recommended mitigation measures and EMPr are implemented, the Kudu PV 1 project would not present a potential fatal flaw in visual terms and could be authorised.

11. References

CSIR, April 2022. Terms of Reference for Specialist Studies for the Environmental Impact Assessments and Basic Assessments for the proposed development of 12 Solar PV Facilities and Associated Infrastructure, near De Aar, Northern Cape.

DFFE, 2022. Screening Report for an Environmental Authorisation as Required by the 2014 EIA Regulations – Proposed Site Environmental Sensitivity: Kudu PV Project.

Lawson, Q. and Oberholzer, B. 2014. National Wind and Solar PV SEA Specialist Report: Landscape Assessment, with CSIR for Department of Environmental Affairs.

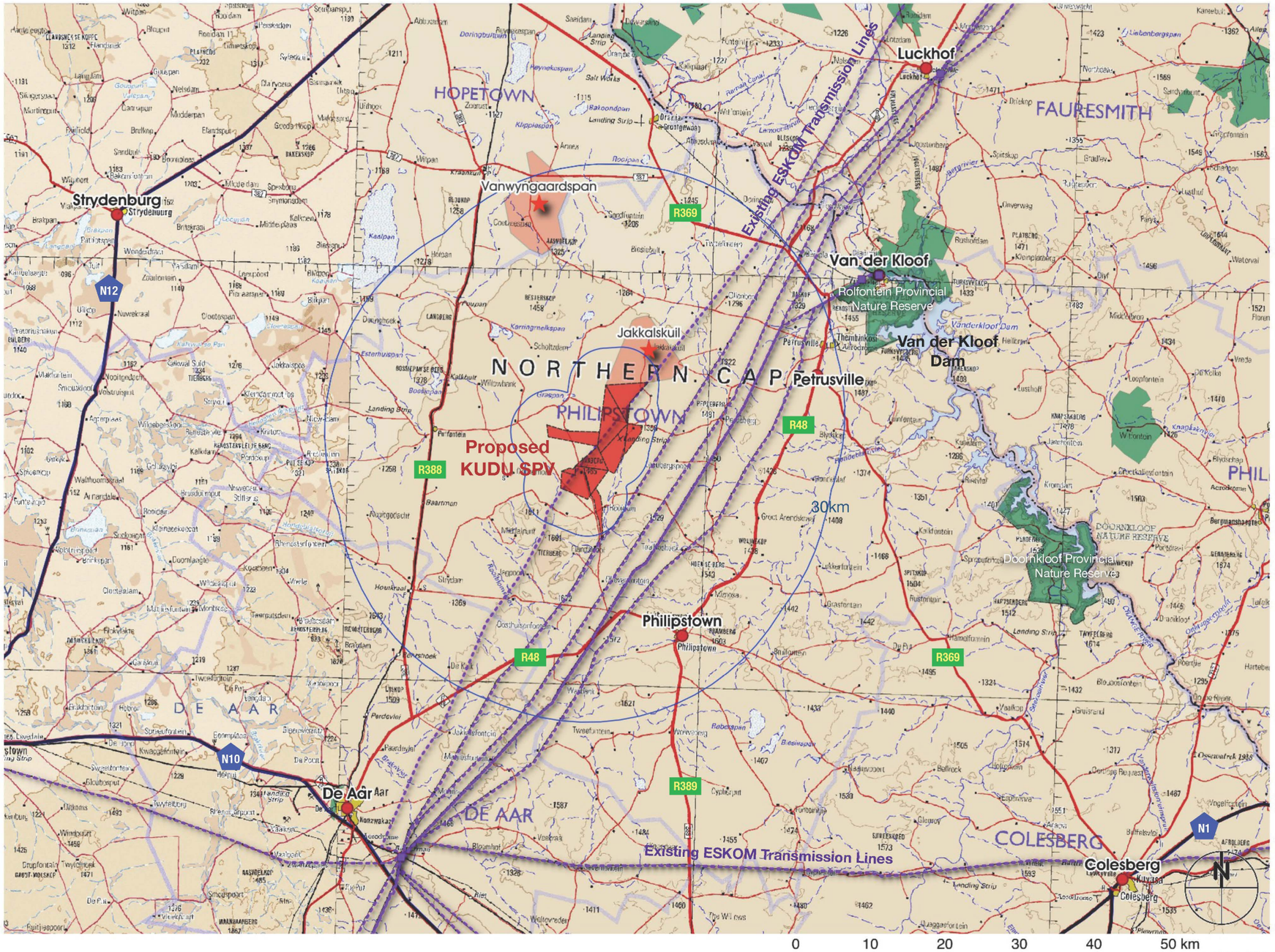
Mucina, L. and Rutherford, M.C. (eds) 2006.The Vegetation of South Africa, Lesotho and Swaziland. *Strelizia* 19. SANBI, Pretoria.

Oberholzer, B. 2005. Guideline for Involving Visual and Aesthetic Specialists in EIA Processes: Edition 1 CSIR Report No. ENV-S-C 2005 053 F. Provincial Government of the Western Cape, Department of Environmental Affairs and Development Planning.

MAPS

LEGEND :

- KUDU SPV Farm Properties
- SAPAD Protected Areas
- Existing ESKOM Transmission Lines



base map : NGI 500K Topographic Series : 2920-3124 Prieska, 2924-3128 Bloemfontein

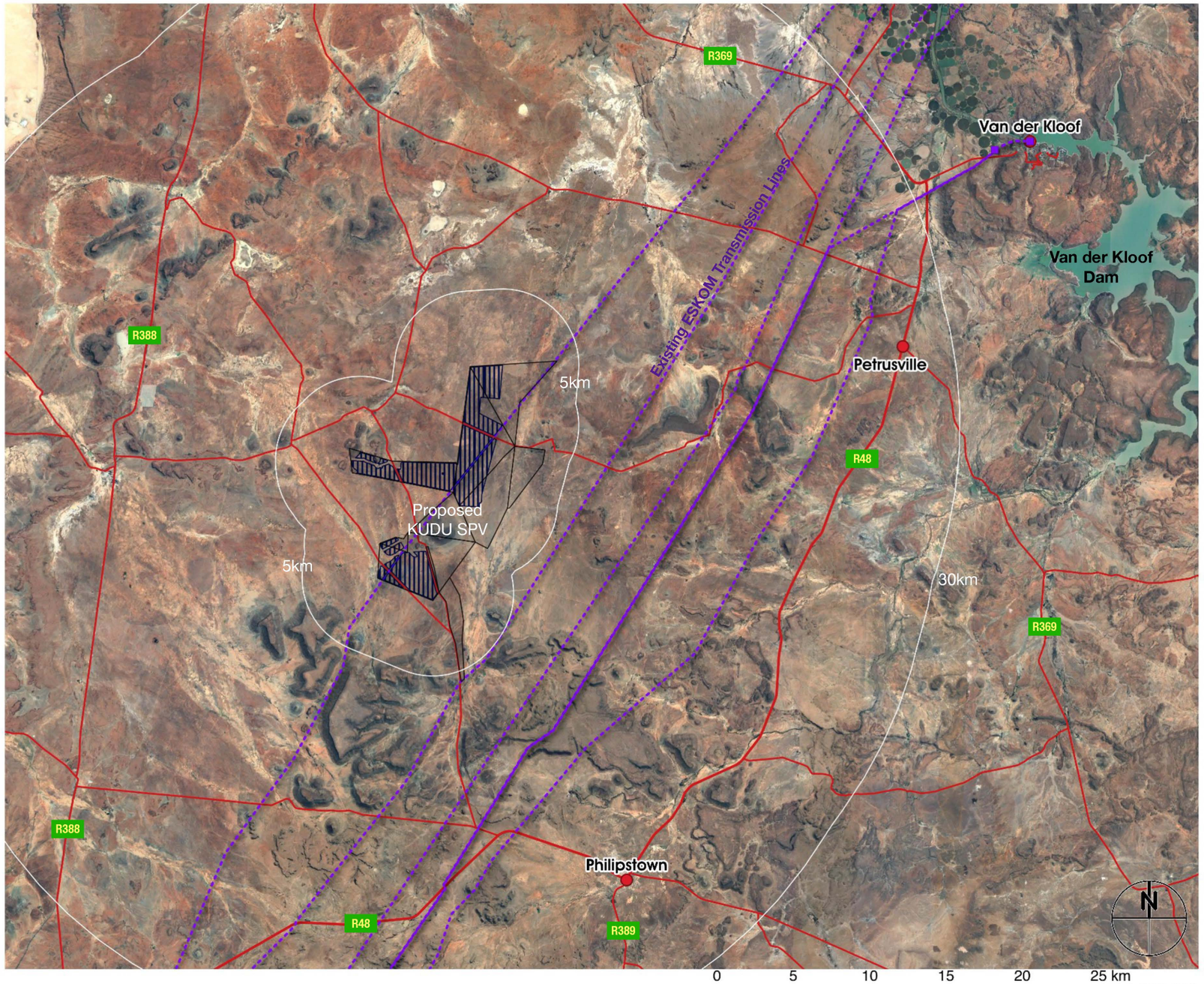
map 1 : KUDU SPV 1 Regional Locality

LEGEND :

KUDU SPV Farm Properties

KUDU SPV Areas

Existing ESKOM Transmission Lines

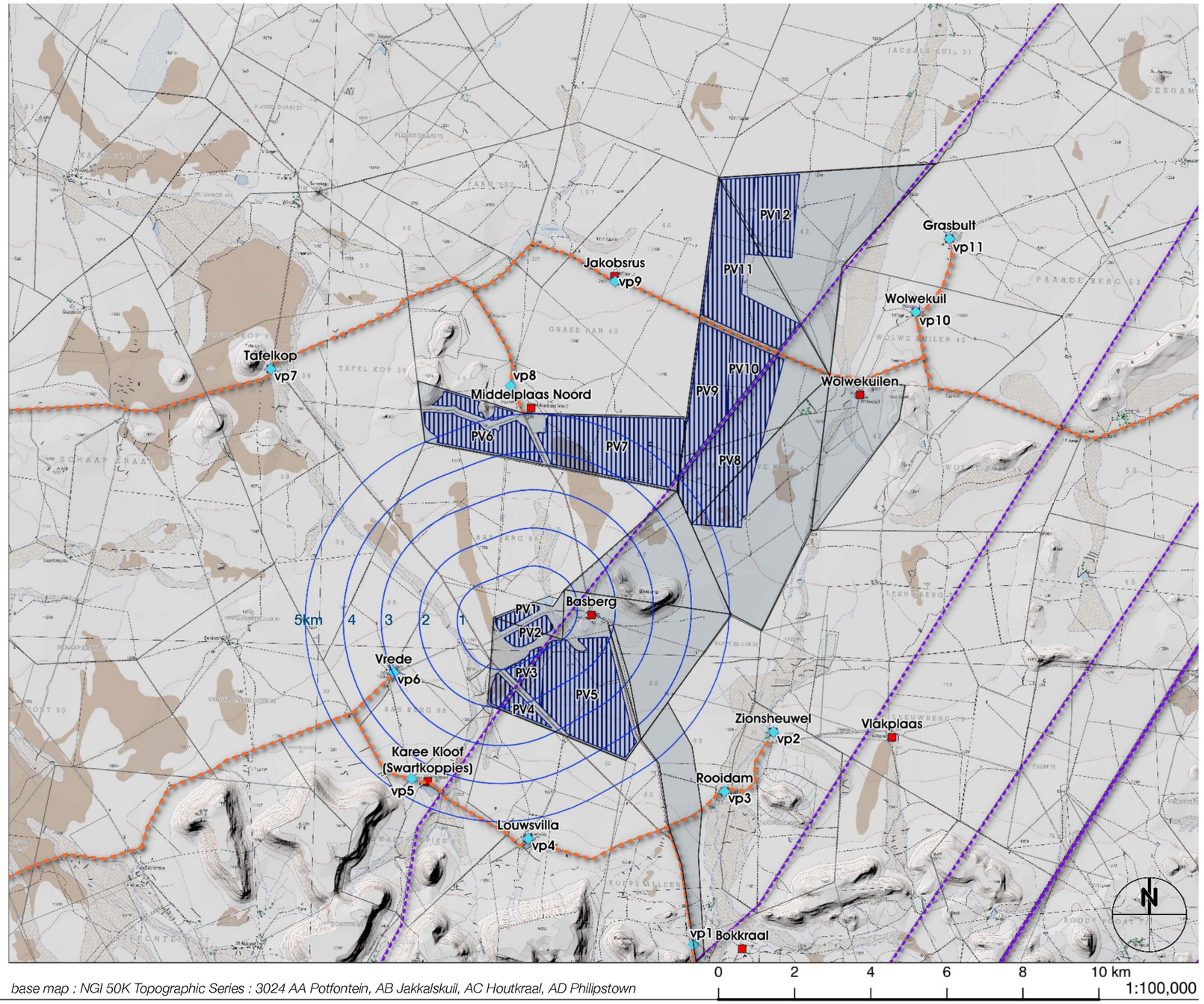


base map : Google Earth 2023

map 2 : KUDU SPV 1 Local Context

LEGEND :

- KUDU SPV Farm Properties
- KUDU SPV Areas
- Fieldwork Viewpoints
- Field Track Route

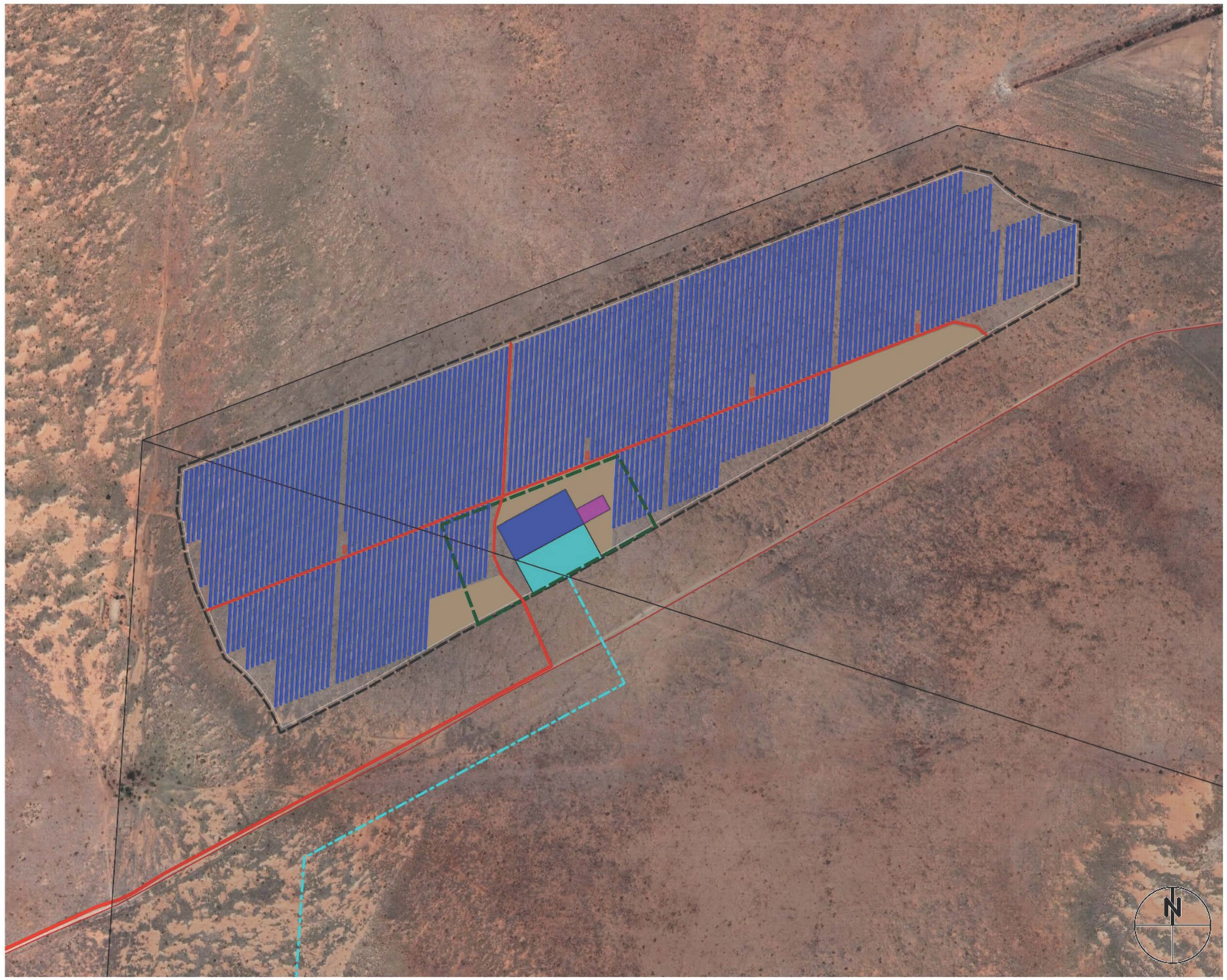


base map : NGI 50K Topographic Series : 3024 AA Potfontein, AB Jakkalskuil, AC Houtkraal, AD Philipstown

map 3 : KUDU SPV 1 • Fieldwork and Viewpoints

FACILITIES LEGEND :

- Fence Line
- Substation Complex
- Laydown Areas
- O&M Buildings
- Substation
- BESS
- SPV Module Arrays
- Inverters
- Access and Internal Roads
- Overhead Powerline

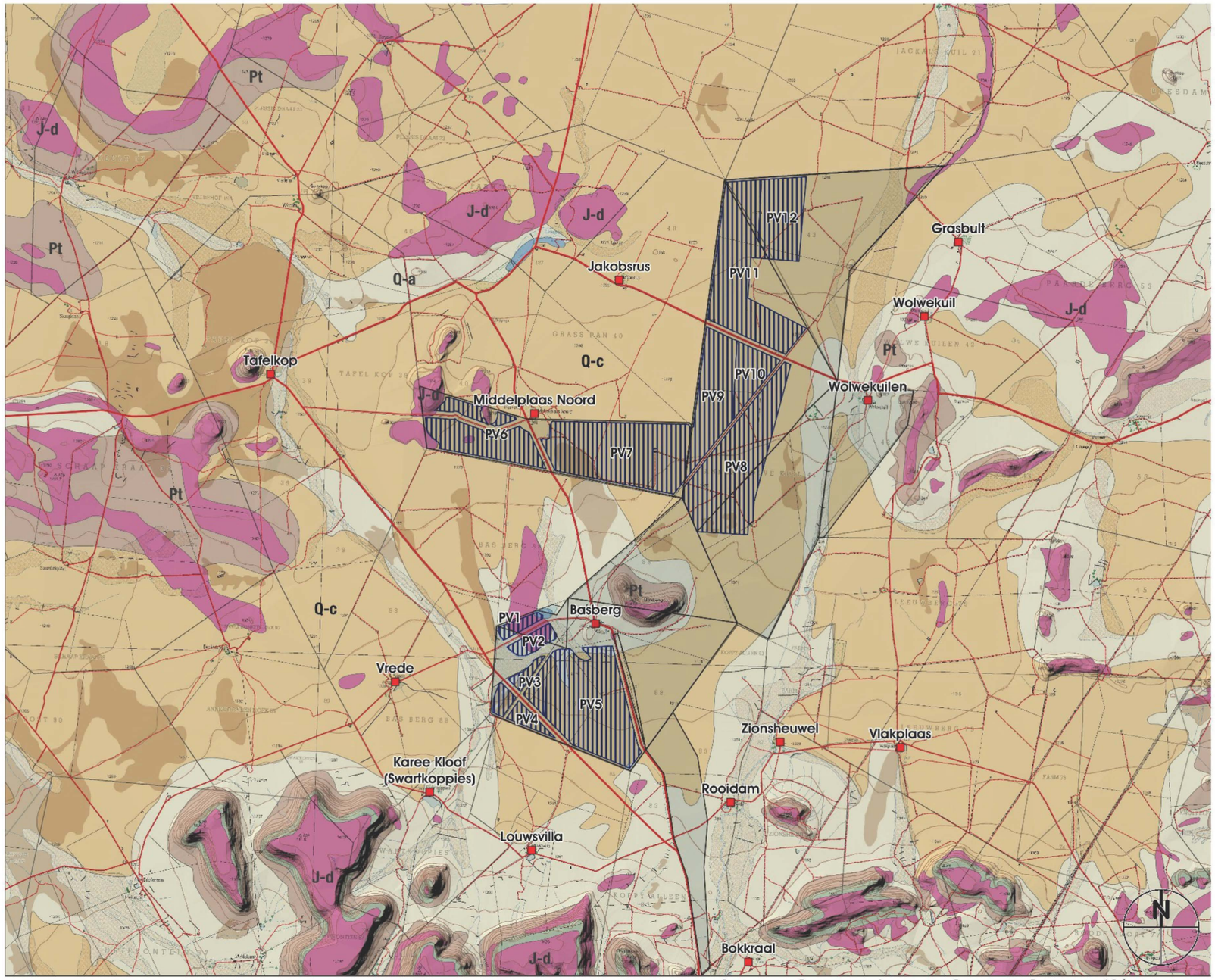


base map : Google Earth 2023

map 4 : KUDU SPV 1 • Facilities Layout

GEOLOGY LEGEND :

Q-a	Alluvium
Q-c	Calcrete
J-d	Dolerite
Pa	Beaufort Group Mudstones and Sandstones
Pt	Ecca Group Shale, Siltstone and Sandstones

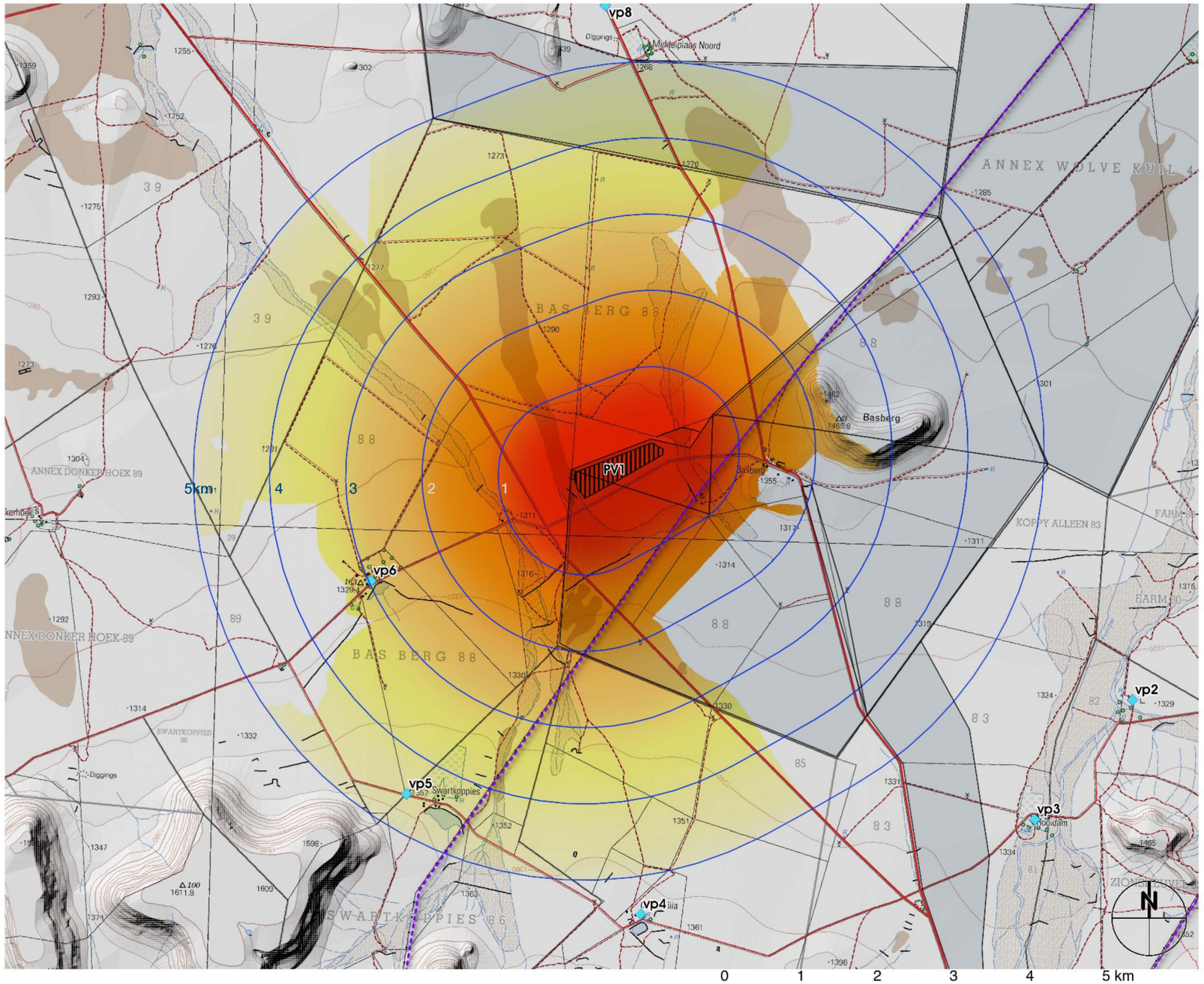


base map : CGS 1:250K Geological Series 3024 Colesberg

map 5 : KUDU SPV 1 Geology

Viewshed Legend :

- High Visibility
- Medium Visibility
- Low Visibility
- No Visibility (View Shadow)

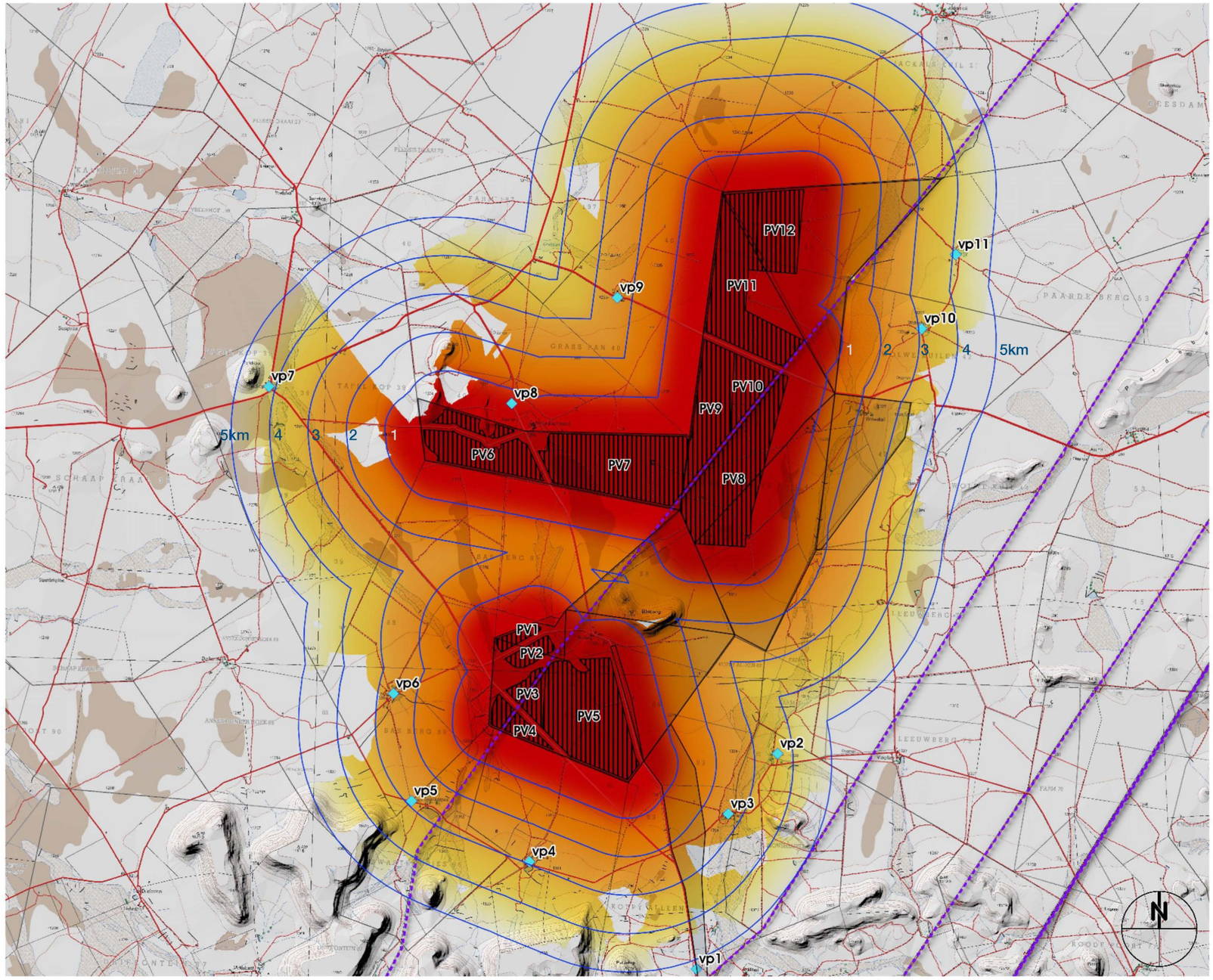


base map : NGI 50K Topographic Series : 3024 AA Potfontein, AB Jakkalskuil, AC Houtkraal, AD Philipstown

map 6 : KUDU SPV 1 • Nominal Viewshed : PV Arrays 3.5m High

Viewshed Legend :

- High Visibility
- Medium Visibility
- Low Visibility
- No Visibility (View Shadow)

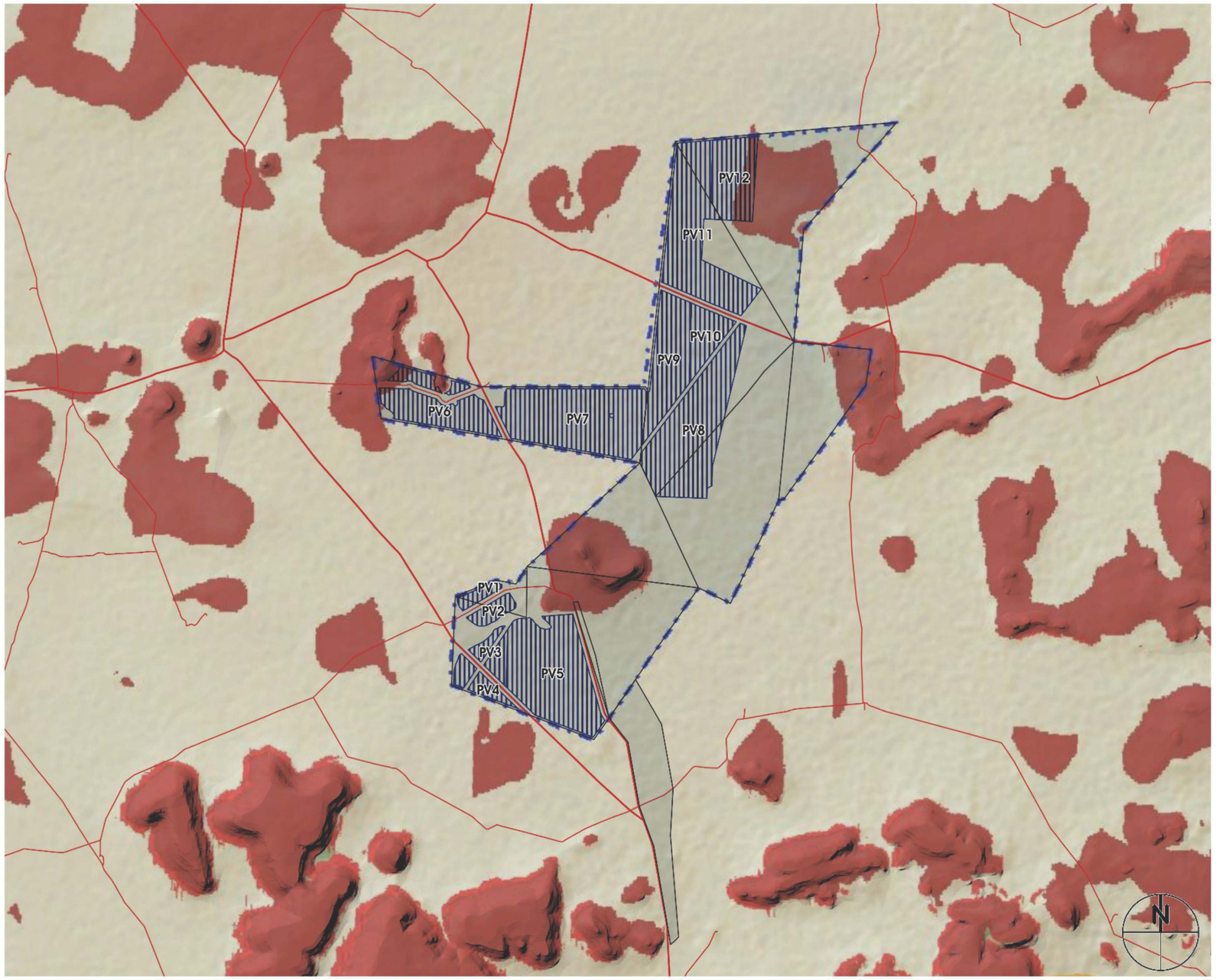


base map : NGI 50K Topographic Series : 3024 AA Potfontein, AB Jakkalskuil, AC Houtkraal, AD Philipstown

map 7 : KUDU SPV • Combined Viewshed : PV Arrays 3.5m High

Sensitivity Features:

Sensitivity	Feature(s)
High	Slope between 1:4 and 1:10
Low	Slope less than 1:10
Very High	Mountain tops and high ridges
Very High	Slope more than 1:4



Legend:
- Very High
- High
- Medium
- Low

map 8 : KUDU SPV 1 : DFFE Screening Tool : Landscape (Solar) Theme

LEGEND :

Topographic Features

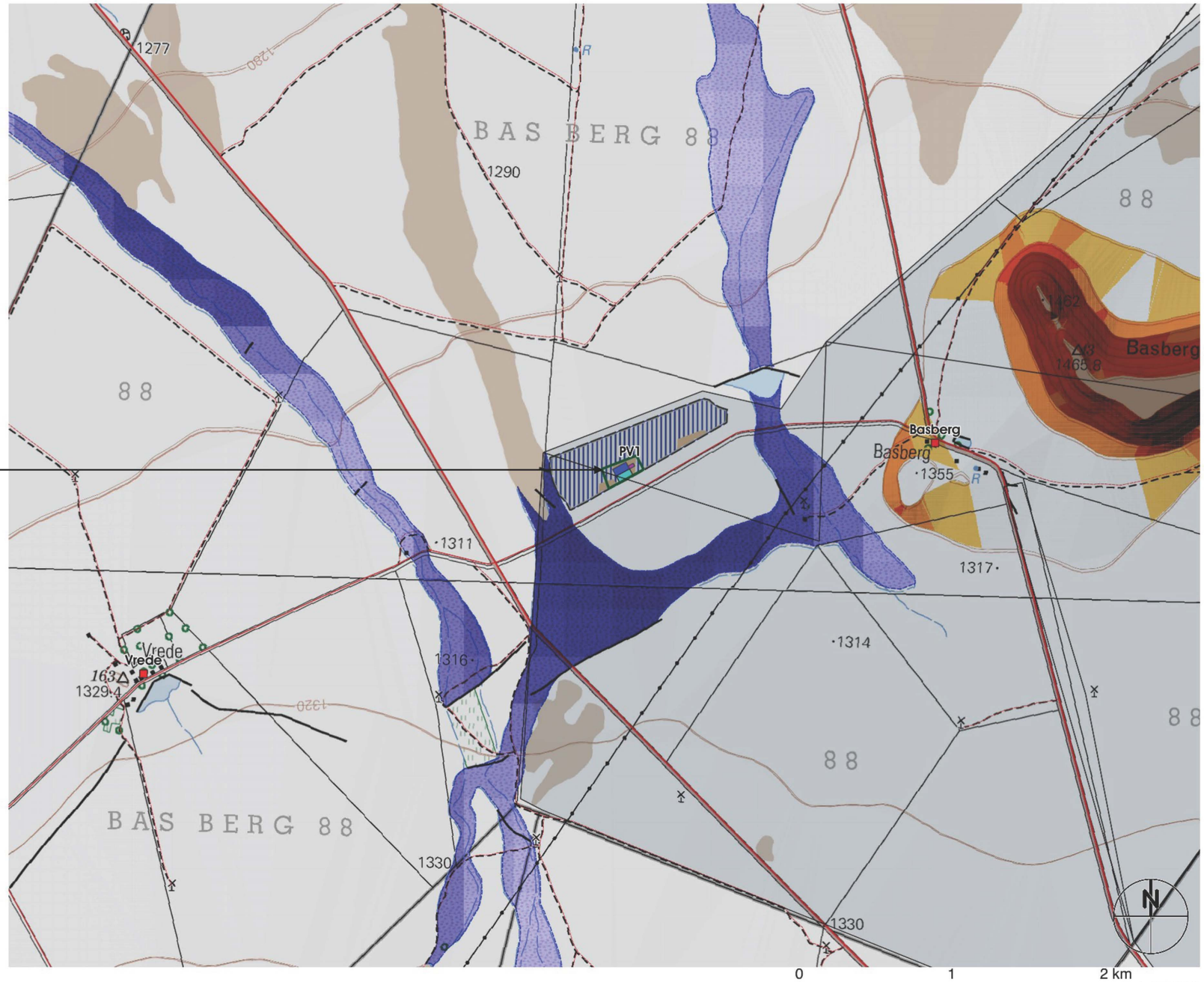
YELLOW <1:10 slopes
ORANGE 1:10 - 1:4 slopes,
RED >1:4 + slopes

Drainage Courses

Farmsteads

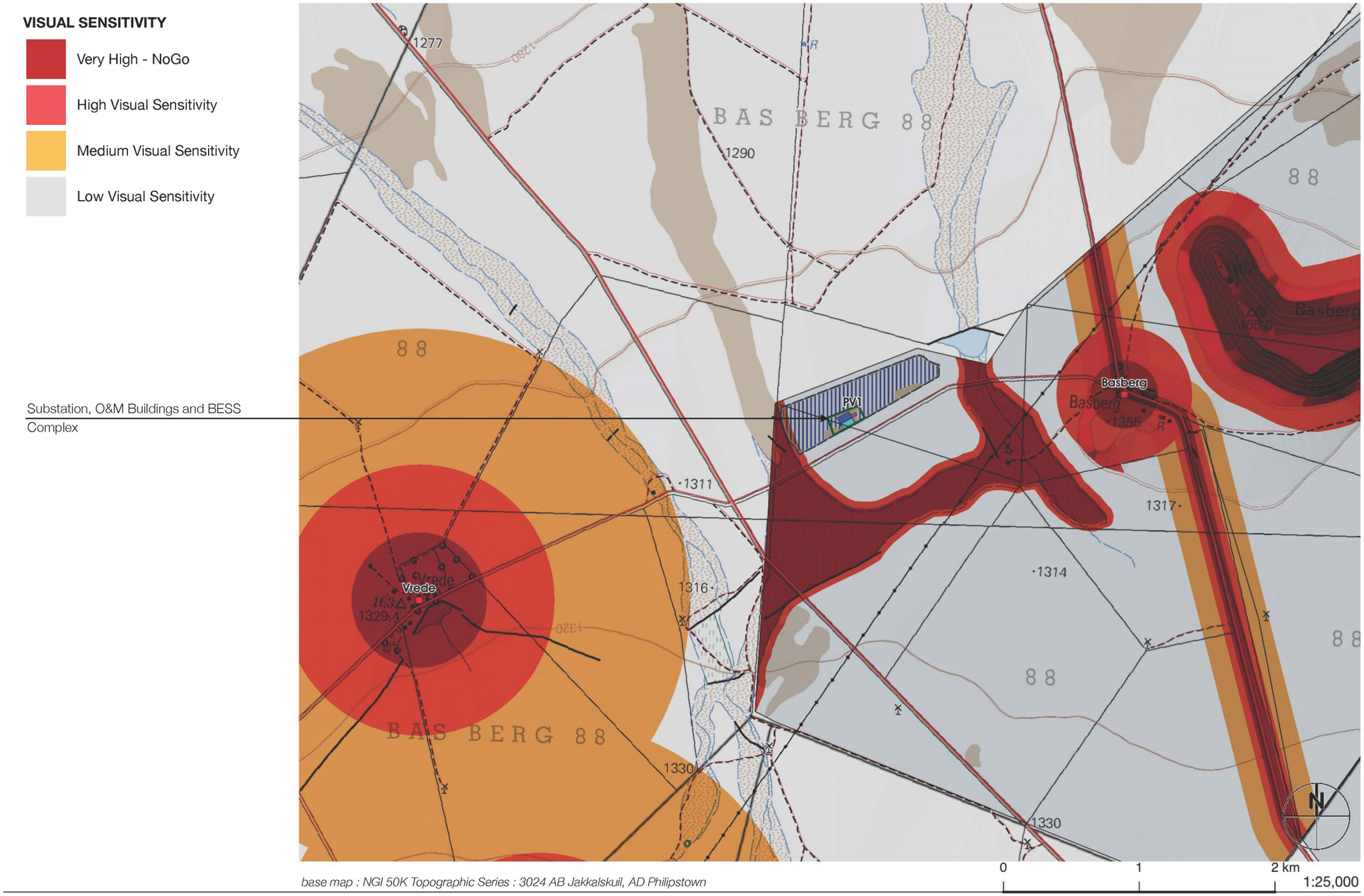
District Roads

Substation, O&M Buildings and BESS Complex



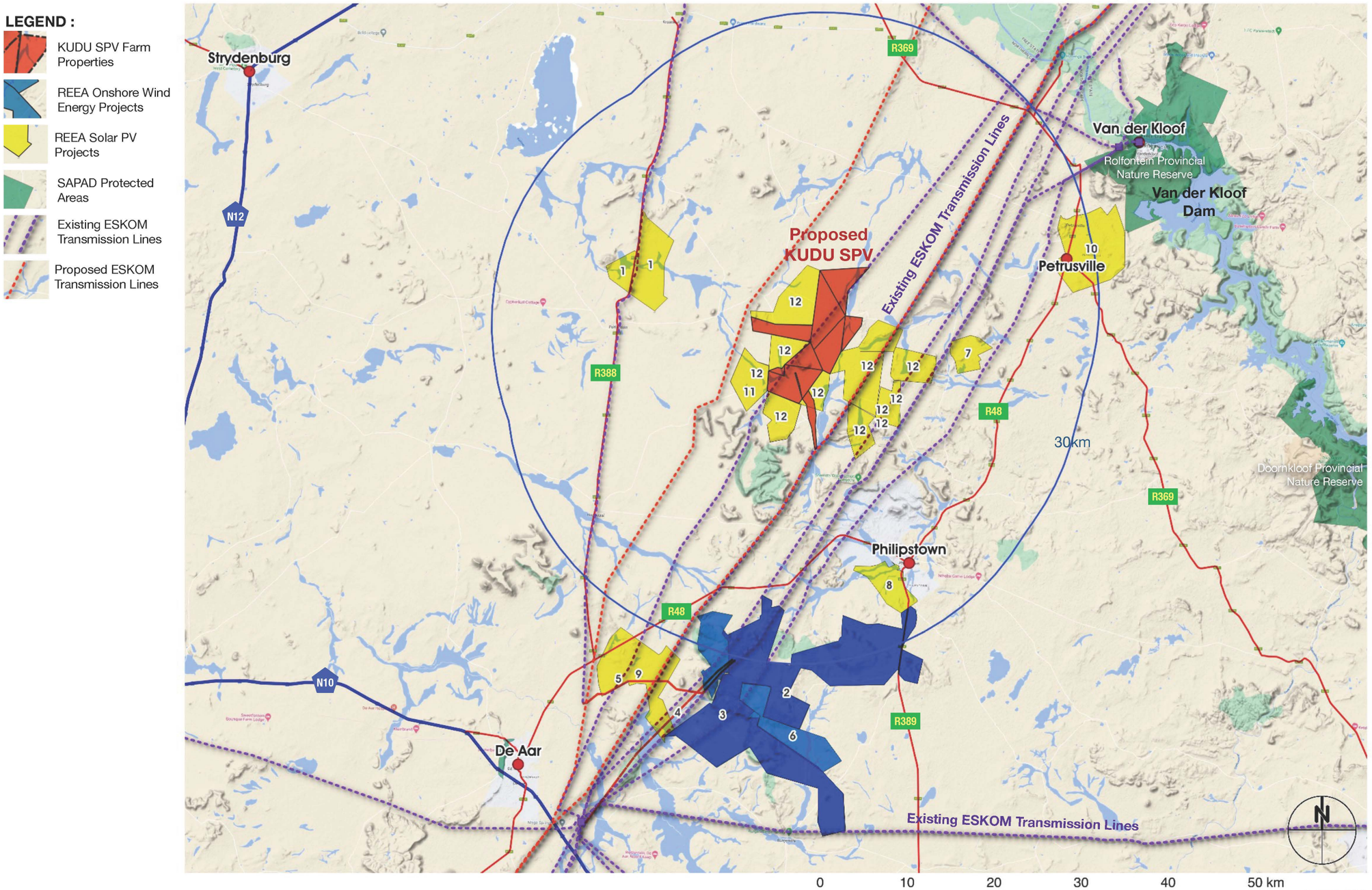
base map : NGI 50K Topographic Series : 3024 AB Jakkalskuil, AD Philipstown

map 9 : KUDU SPV 1 • Visual Features



base map : NGI 50K Topographic Series : 3024 AB Jakkalskuil, AD Philipstown

map 10 : KUDU SPV 1 • Visual Sensitivity



base map : Google Maps Terrain 2023

map 11 : KUDU SPV Cumulative Renewable Energy Projects • REEA - SAHRIS Projects 25/04/2023

vp5 : Looking North East from Karee Kloof farm road

30.281137S 24.276414E Distance 4.52km

Photomontage : KUDU SPV 1 • Viewpoint 5 : Karee Kloof (Swartkoppies)

Appendix A: Visual Specialist Expertise

Bernard Oberholzer, Landscape Architect
PO Box 471, Stanford, Western Cape, 7210
Email: bernard.bola@gmail.com

Quinton Lawson, Architect
8 Blackwood Drive, Hout Bay 7806
Email: quinton@openmail.co.za

Expertise

Bernard Oberholzer has a Bachelor of Architecture (UCT) and Master of Landscape Architecture (U. of Pennsylvania), and has more than 25 years' experience in undertaking visual impact assessments. He has presented papers on *Visual and Aesthetic Assessment Techniques*, and is the author of *Guideline for Involving Visual and Aesthetic Specialists in EIA Processes,* prepared in association with the CSIR for the Dept. of Environmental Affairs and Development Planning, Provincial Government of the Western Cape, 2005.

Quinton Lawson has a Bachelor of Architecture Degree (Natal) and has more than 15 years' experience in visual assessments, specializing in 3D modelling and visual simulations. He has previously lectured on visual simulation techniques in the Master of Landscape Architecture Programme at UCT.

The authors have been involved in visual assessments for a wide range of residential, industrial and renewable energy projects. They prepared the 'Landscape/Visual Assessment' chapter in the report for the *National Wind and Solar PV Strategic Environmental Assessment (SEA)*, as well as the *National Electricity Grid Infrastructure SEA* in association with the CSIR, for the Department of Environmental Affairs in 2014-2015.

Appendix B: Specialist Statement of Independence

environmental affairs
Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

DETAILS OF THE SPECIALIST, DECLARATION OF INTEREST AND UNDERTAKING UNDER OATH

	(For official use only)
File Reference Number:	
NEAS Reference Number:	DEA/EIA/
Date Received:	

Application for authorisation in terms of the National Environmental Management Act, Act No. 107 of 1998, as amended and the Environmental Impact Assessment (EIA) Regulations, 2014, as amended (the Regulations)

PROJECT TITLE

Scoping and Environmental Impact Assessment Processes for the Proposed Development of 12 Solar Photovoltaic (PV) Facilities and associated infrastructure (i.e. Kudu Solar Facility 1 - 12), near De Aar, Northern Cape

Kindly note the following:

1. This form must always be used for applications that must be subjected to Basic Assessment or Scoping & Environmental Impact Reporting where this Department is the Competent Authority.
2. This form is current as of 01 September 2018. It is the responsibility of the Applicant / Environmental Assessment Practitioner (EAP) to ascertain whether subsequent versions of the form have been published or produced by the Competent Authority. The latest available Departmental templates are available at https://www.environment.gov.za/documents/forms.
3. A copy of this form containing original signatures must be appended to all Draft and Final Reports submitted to the department for consideration.
4. All documentation delivered to the physical address contained in this form must be delivered during the official Departmental Officer Hours which is visible on the Departmental gate.
5. All EIA related documents (includes application forms, reports or any EIA related submissions) that are faxed; emailed; delivered to Security or placed in the Departmental Tender Box will not be accepted, only hardcopy submissions are accepted.

Departmental Details

Postal address:
Department of Environmental Affairs
Attention: Chief Director: Integrated Environmental Authorisations
Private Bag X447
Pretoria
0001

Physical address:
Department of Environmental Affairs
Attention: Chief Director: Integrated Environmental Authorisations
Environment House
473 Steve Biko Road
Arcadia

Queries must be directed to the Directorate: Coordination, Strategic Planning and Support at:
Email: EIAAdmin@environment.gov.za

Details of Specialist, Declaration and Undertaking Under Oath

Page 1 of 3

1. SPECIALIST INFORMATION

Specialist Company Name:	BOLA			
B-BBEE	Contribution level (indicate 1 to 8 or non-compliant)	Level 5	Percentage Procurement recognition	
Specialist name:	Bernard Oberholzer			
Specialist Qualifications:	B.Arch, MLA			
Professional affiliation/registration:	SACLAP			
Physical address:	16 Caledon Street			
Postal address:	PO Box 471, Stanford			
Postal code:	7210	Cell:		
Telephone:	083 513 5696	Fax:		
E-mail:	bernard.bola@gmail.com			

2. DECLARATION BY THE SPECIALIST

I, B. Oberholzer, declare that –

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- all the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.

BO

Signature of the Specialist

BOLA

Name of Company:

20 May 2023

Date

Details of Specialist, Declaration and Undertaking Under Oath

Page 2 of 3

3. UNDERTAKING UNDER OATH/ AFFIRMATION

I, B. Oberholzer, swear under oath / affirm that all the information submitted or to be submitted for the purposes of this application is true and correct.

BJO

Signature of the Specialist

BOLA

Name of Company

20 May 2023

Date

Karin Sfreddo

Signature of the Commissioner of Oaths

20 May 2023

Date

COMMISSIONER OF OATHS
KARIN T. SFREDDO
9/1/8/2 PRETORIA (A...)
805 STANZA BOPAPE STR. ARCA...

Details of Specialist, Declaration and Undertaking Under Oath

Page 3 of 3

environmental affairs
Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

DETAILS OF THE SPECIALIST, DECLARATION OF INTEREST AND UNDERTAKING UNDER OATH

	(For official use only)
File Reference Number:	
NEAS Reference Number:	DEA/EIA/
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Kindly note the following:

1. This form must always be used for applications that must be subjected to Basic Assessment or Scoping & Environmental Impact Reporting where this Department is the Competent Authority.
2. This form is current as of 01 September 2018. It is the responsibility of the Applicant / Environmental Assessment Practitioner (EAP) to ascertain whether subsequent versions of the form have been published or produced by the Competent Authority. The latest available Departmental templates are available at https://www.environment.gov.za/documents/forms.
3. A copy of this form containing original signatures must be appended to all Draft and Final Reports submitted to the department for consideration.
4. All documentation delivered to the physical address contained in this form must be delivered during the official Departmental Officer Hours which is visible on the Departmental gate.
5. All EIA related documents (includes application forms, reports or any EIA related submissions) that are faxed; emailed; delivered to Security or placed in the Departmental Tender Box will not be accepted, only hardcopy submissions are accepted.

Departmental Details

Postal address:
Department of Environmental Affairs
Attention: Chief Director: Integrated Environmental Authorisations
Private Bag X447
Pretoria
0001

Physical address:
Department of Environmental Affairs
Attention: Chief Director: Integrated Environmental Authorisations
Environment House
473 Steve Biko Road
Arcadia

Queries must be directed to the Directorate: Coordination, Strategic Planning and Support at:
Email: EIAAdmin@environment.gov.za

1. SPECIALIST INFORMATION

Specialist Company Name:	qarc			
B-BBEE	Contribution level (indicate 1 to 8 or non-compliant)	4	Percentage Procurement recognition	100%
Specialist name:	Quinton Lawson			
Specialist Qualifications:	BArch (Natal)			
Professional affiliation/ registration:	SACAP 3686			
Scientific Organisation Registration / Member Number	-			
Status of Registration / Membership	Current			
Physical address:	8 Blackwood Drive, Hout Bay, Cape Town			
Postal address:	As above			
Postal code:	7806	Cell:	083 309 3338	
Telephone:	021 790 5119	Fax:	-	
E-mail:	quinton@openmail.co.za			

2. DECLARATION BY THE SPECIALIST

I, **Quinton Lawson**, declare that –

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- all the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.

Signature of the Specialist

qarc

Name of Company:

14 /06/ 2023

Date

3. UNDERTAKING UNDER OATH/ AFFIRMATION

I, **Quinton Lawson**, swear under oath / affirm that all the information submitted or to be submitted for the purposes of this application is true and correct.

Signature of the Specialist

qarc

Name of Company

14 /06/ 2023

Date

Signature of the Commissioner of Oaths

14 /06/ 2023

Date

I certify that the DEPONENT has acknowledged that he / she knows and understands the contents of this affidavit, that he / she does not have any objection to taking the oath, and that he / she considers it to be binding on his / her conscience, and which was sworn to and signed before me and that the administering oath complied with regulations contained in Government Gazette No. R 1258 of 21 July 1972, as amended.

BRANCH MANAGER
Post Office
14 JUN 2023
HOUTBAAI 7872

SIGNATURE
Commissioner of Oaths
Designation: BRANCH MANAGER ex officio Republic of South Africa
Date: 14 June 2023
Place: HOUTBAY
Business Address: Mainstream Centre Houtbay

Appendix C: Site Sensitivity Verification

Part A of the Assessment Protocols published in Government Notice (GN) 320 on 20 March 2020 (i.e. Site sensitivity verification requirements where a specialist assessment is required but no specific assessment protocol has been prescribed) is applicable where the Department of Forestry, Fisheries and the Environment (DFFE) Screening Tool has the relevant themes to verify. This is applicable to the Visual Impact Assessment, as the Landscape Theme relevant to Solar PV developments is relevant.

Prior to commencing with the specialist assessment in accordance with Appendix 6 of the National Environmental Management Act (Act 107 of 1998, as amended) (NEMA) Environmental Impact Assessment (EIA) Regulations of 2014, a site sensitivity verification was undertaken in order to confirm the current land use and environmental sensitivity of the proposed project area as identified by the DFFE National Web-Based Environmental Screening Tool (Screening Tool).

The details of the site sensitivity verification are noted below:

Date of Site Visit	15 and 16 March 2022
Specialist Name	Bernard Oberholzer and Quinton Lawson
Professional Registration Number	South African Council for the Landscape Architectural Profession (SACLAP) 87018 South African Council for the Architectural Profession (SACAP) 3686
Specialist Affiliation / Company	BOLA and QARC

The site sensitivity verification was undertaken using the following means:

(a) desk top analysis, using 1:50 000 topographic series maps and Google Earth satellite imagery;
(b) preliminary on-site inspection; and
(c) various databases, including the South African Protected Areas Database (SAPAD).

A screening report was compiled using the DFFE Screening Tool. The Report includes a 'Map of Relative Landscape (Solar) Theme Sensitivity', based on mapping prepared for the Phase 1 Wind and Solar SEA by the CSIR for DFFE in 2015 (DEA, 2015).

The current visual sensitivity mapping included in this Visual Impact Assessment is in greater detail (at the site scale) for the proposed solar photovoltaic (PV) study area, taking into account detailed viewshed mapping and local site conditions.

Outcome of the site sensitivity verification:

(a) The DFFE screening tool findings for the Landscape Theme (Figure 1 below) was refined, based on more detailed project-scale mapping of landscape features.

(b) Evidence is provided by means of detailed feature mapping and the application of visual sensitivity buffers as contained in the Visual Impact Assessment Report. (Figure 2 below).

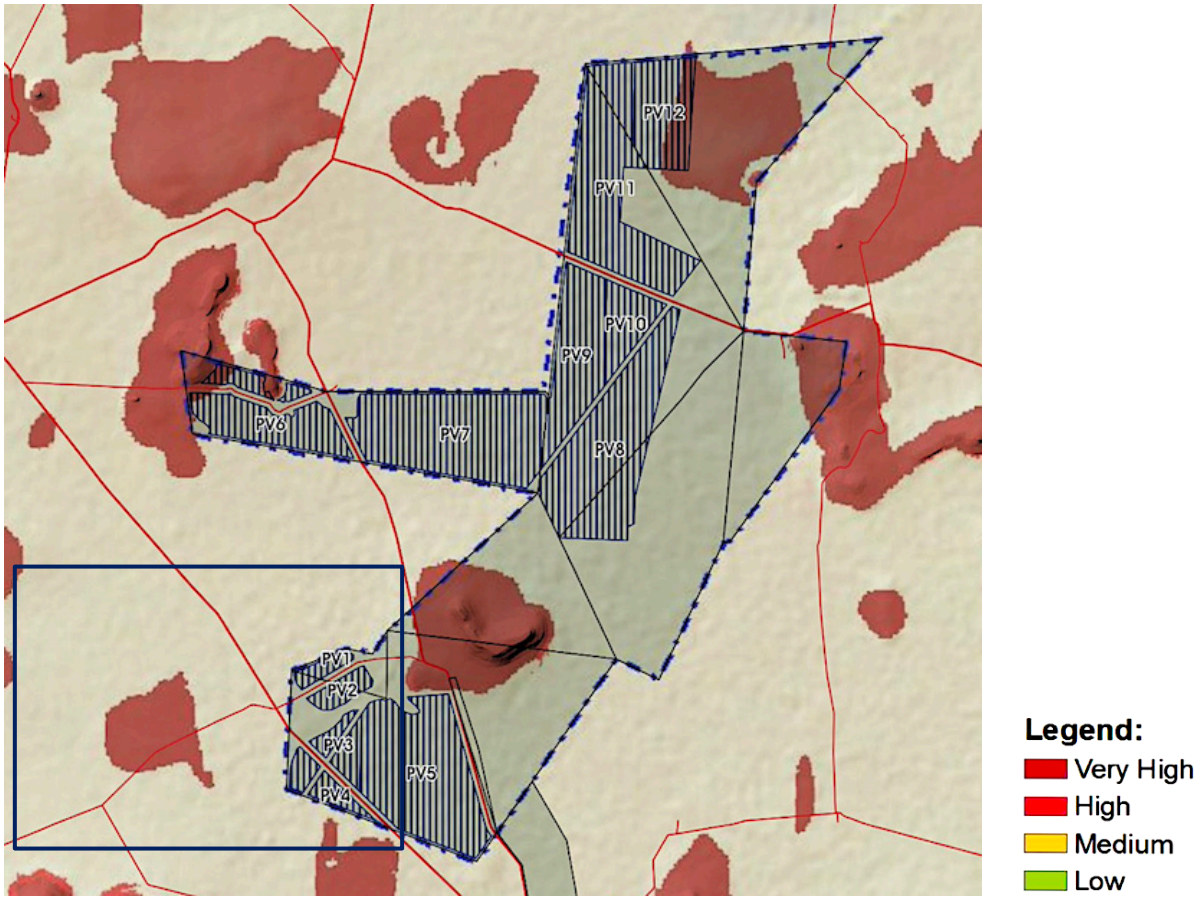


Figure 1

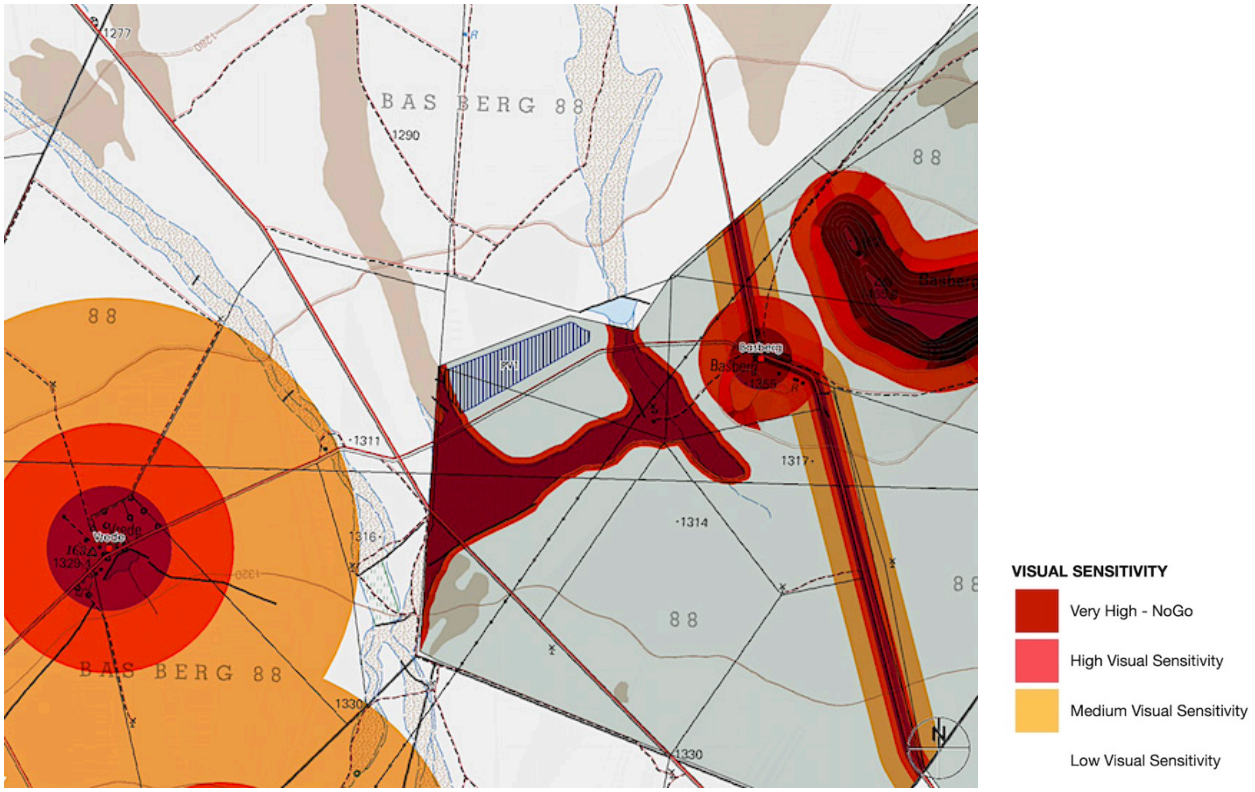


Figure 2

Appendix D: Impact Assessment Methodology

The impact assessment includes:

- *the nature, status, significance and consequences of the impact and risk;*
- *the extent and duration of the impact and risk;*
- *the probability of the impact and risk occurring;*
- *the degree to which impacts and risks can be mitigated;*
- *the degree to which the impacts and risks can be reversed; and*
- *the degree to which the impacts and risks can cause loss of irreplaceable resources.*

Terminology used in impact assessment can overlap. To avoid ambiguity, please note the following clarifications (that are based on NEMA and the EIA Regulations):

- *The term environment is understood to have a broad interpretation that includes both the natural (biophysical) environment and the socio-economic environment. The term socio-ecological system is also used to describe the natural and socio-economic environment and the interactions amongst these components.*
- *Significance = Consequence x Probability, which means that significance is equivalent to risk.*
- *The impact can have a positive or negative status. The significance of a negative impact may be called a risk, and the significance of a positive impact may be called an opportunity.*

The following principles are to underpin the application of this methodology:

- *Transparent and repeatable process - specialists are to describe the thresholds and limits they apply in their assessment, wherever possible.*
- *Adapt parameters to context (where justified) – the methodology proposes some thresholds (e.g. for spatial extent, in Step 3 below), however, if the nature of the impact requires a different definition of the categories of spatial extent, then this can be provided and described.*
- *Combination of a quantitative and qualitative assessment – where possible, specialists are to provide quantitative assessments (e.g. areas of habitat affected, decibels of noise, number of jobs), however, it is recognised that not all impacts can be quantified, and then qualitative assessments are to be provided.*

As per the DFFE Guideline 5: Assessment of Alternatives and Impacts, the following methodology is applied to the prediction and assessment of impacts and risks. Potential impacts and risks have been rated in terms of the direct, indirect and cumulative:

- *Direct impacts are impacts that are caused directly by the activity and generally occur at the same time and at the place of the activity. These impacts are usually associated with the construction, operation or maintenance of an activity and are generally obvious and quantifiable.*
- *Indirect impacts of an activity are indirect or induced changes that may occur as a result of the activity. These types of impacts include all the potential impacts that do not manifest immediately when the activity is undertaken or which occur at a different place as a result of the activity.*
- *Cumulative impacts are impacts that result from the incremental impact of the proposed activity on a common resource when added to the impacts of other past, present or reasonably foreseeable future activities. Cumulative impacts can occur from the collective impacts of individual minor actions over a period of time and can include both direct and indirect impacts.*

The impact assessment methodology includes the aspects described below.

- ***Step 1**: **Nature** of impact/risk - The type of effect that a proposed activity will have on the environment.*

- ***Step 2**: **Status** - Whether the impact/risk on the overall environment will be:*
  - *Positive - environment overall will benefit from the impact/risk;*
  - *Negative - environment overall will be adversely affected by the impact/risk; or*
  - *Neutral - environment overall not be affected.*

- ***Step 3**: **Qualitatively** determine the **consequence** of the impact/risk by identifying the **a) SPATIAL EXTENT; b) DURATION; c) REVERSIBILITY; AND d) IRREPLACEABILITY**.*

  - ***A) Spatial extent** – The size of the area that will be affected by the impact/risk:*
    - *Site specific;*
    - *Local (<10 km from site);*
    - *Regional (<100 km of site);*
    - *National; or*
    - *International (e.g. Greenhouse Gas emissions or migrant birds).*

  - ***B) Duration** – The timeframe during which the impact/risk will be experienced:*
    - *Very short term (instantaneous);*
    - *Short term (less than 1 year);*
    - *Medium term (1 to 10 years);*
    - *Long term (the impact will cease after the operational life of the activity (i.e. the impact or risk will occur for the project duration)); or*
    - *Permanent (mitigation will not occur in such a way or in such a time span that the impact can be considered transient (i.e. the impact will occur beyond the project decommissioning)).*

  - ***C) Reversibility** of the Impacts - the extent to which the impacts/risks are reversible assuming that the project has reached the end of its life cycle (decommissioning phase):*
    - *High reversibility of impacts (impact is highly reversible at end of project life i.e. this is the most favourable assessment for the environment);*
    - *Moderate reversibility of impacts;*
    - *Low reversibility of impacts; or*
    - *Impacts are non-reversible (impact is permanent, i.e. this is the least favourable assessment for the environment).*

  - ***D) Irreplaceability** of Receiving Environment/Resource Loss caused by impacts/risks – the degree to which the impact causes irreplaceable loss of resources assuming that the project has reached the end of its life cycle (decommissioning phase):*
    - *High irreplaceability of resources (project will destroy unique resources that cannot be replaced, i.e. this is the least favourable assessment for the environment);*
    - *Moderate irreplaceability of resources;*
    - *Low irreplaceability of resources; or*
    - *Resources are replaceable (the affected resource is easy to replace/rehabilitate, i.e. this is the most favourable assessment for the environment).*

*Some of the criteria are quantitative (e.g. spatial extent and duration) and some may be described in a quantitative or qualitative manner (e.g. reversibility and irreplaceability). The specialist then combines these criteria in a qualitative manner to determine the **consequence**.*

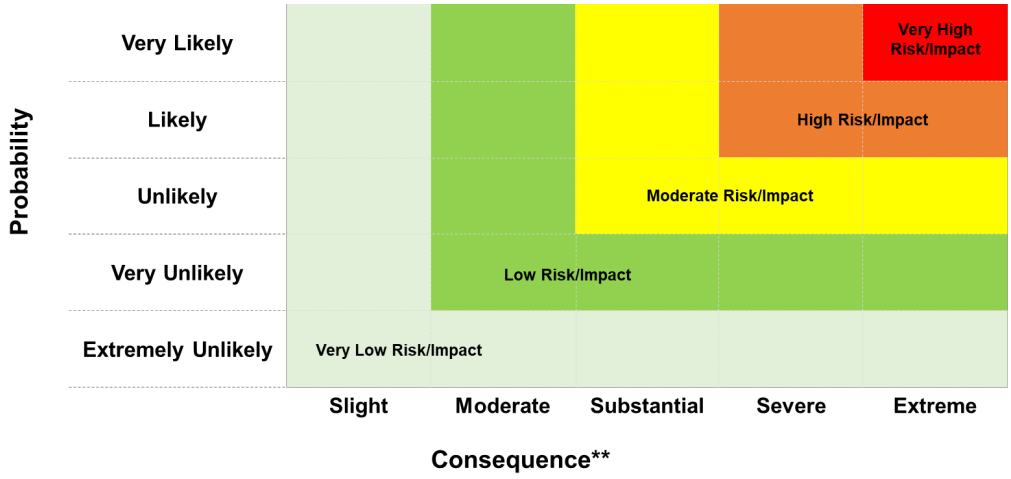
The consequence terms ranging from slight to extreme must be calibrated per Specialist Study so that there is transparency and consistency in the way a risk/impact is measured. For example, from a biodiversity and ecology perspective, the consequence ratings could be defined according to a reduction in population or occupied area in relation to Species of Conservation Concern (SCC) status, ranging from slight consequence for defined areas of Least Concern, to extreme consequence for defined areas that are Critically Endangered. For example, from a social perspective, a slight consequence could refer to small and manageable impacts, or impacts on small sections of the community; a moderate consequence could refer to impacts which affect the bulk of the local population negatively or may produce a net negative impact on the community; and an extreme consequence could refer to impacts which could result in social or political violence or institutional collapse.

- ***Consequence*** *– The anticipated consequence of the risk/impact is generally defined as follows:*
    - *Extreme (extreme alteration of natural or socio-economic systems, patterns or processes, i.e. where environmental or socio-economic functions and processes are altered such that they permanently cease);*
    - *Severe (severe alteration of natural or socio-economic systems, patterns or processes, i.e. where environmental or socio-economic functions and processes are altered such that they temporarily or permanently cease);*
    - *Substantial (substantial alteration of natural or socio-economic systems, patterns or processes, i.e. where environmental or socio-economic functions and processes are altered such that they temporarily or permanently cease;*
    - *Moderate (notable alteration of natural or socio-economic systems, patterns or processes, i.e. where the natural or socio-economic environment continues to function but in a modified manner; or*
    - *Slight (negligible and transient alteration of natural or socio-economic systems, patterns or processes, i.e. where natural systems/environmental or socio-economic functions, patterns, or processes are not affected in a measurable manner, or if affected, that effect is transient and the system recovers).*

- ***Step 4****: Rate the* ***probability*** *of the impact/risk using the criteria below:*

    - ***Probability*** *– The probability of the impact/risk occurring:*
        - *Extremely unlikely (little to no chance of occurring);*
        - *Very unlikely (<30% chance of occurring);*
        - *Unlikely (30-50% chance of occurring)*
        - *Likely (51 – 90% chance of occurring); or*
        - *Very Likely (>90% chance of occurring regardless of prevention measures).*

- ***Step 5****: Use both the* ***consequence*** *and* ***probability*** *to determine the* ***significance*** *of the identified impact/risk (qualitatively as shown in Figure 1). Significance definitions and rankings are provided below:*



[Qualitatively determined based on Spatial Extent, Duration, Reversibility and Irreplaceability]

Figure 1. Guide to assessing risk/impact significance as a result of consequence and probability.

- ***Significance*** *– Will the impact cause a notable alteration of the environment?*
    - *Very low (the risk/impact may result in very minor alterations of the environment and can be easily avoided by implementing appropriate mitigation measures, and will not have an influence on decision-making);*
    - *Low (the risk/impact may result in minor alterations of the environment and can be easily avoided by implementing appropriate mitigation measures, and will not have an influence on decision-making);*
    - *Moderate (the risk/impact will result in moderate alteration of the environment and can be reduced or avoided by implementing the appropriate mitigation measures, and will only have an influence on the decision-making if not mitigated);*
    - *High (the risk/impact will result in major alteration to the environment even with the implementation on the appropriate mitigation measures and will have an influence on decision-making); and*
    - *Very high (the risk/impact will result in very major alteration to the environment even with the implementation on the appropriate mitigation measures and will have an influence on decision-making (i.e. the project cannot be authorised unless major changes to the engineering design are carried out to reduce the significance rating)).*

With the implementation of mitigation measures, the residual impacts/risks are ranked as follows in terms of significance:

- *Very low = 5;*
- *Low = 4;*
- *Moderate = 3;*
- *High = 2; and*
- *Very high = 1.*

The specialists must provide a written supporting motivation of the assessment ratings provided.

- ***Step 6****: Determine the* ***Confidence Level*** *– The degree of confidence in predictions based on available information and specialist knowledge:*
    - *Low;*
    - *Medium; or*
    - *High.*

Appendix E: Appendix 6 of the 2014 NEMA EIA Regulations (as amended)

NEMA requirements for Specialist Reports		
	Specialist Report content as required by the NEMA 2014 EIA Regulations, as amended	**Section**
1 (1)(a)	(i) the specialist who prepared the report; and	Section 1 Appendix A
	(ii) the expertise of that specialist to compile a specialist report including a curriculum vitae;	
(b)	a declaration that the specialist is independent in a form as may be specified by the competent authority;	Appendix B
(c)	an indication of the scope of, and the purpose for which, the report was prepared;	Section 1
(cA)	an indication of the quality and age of the base data used for the specialist report;	Section 2
(cB)	a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	Section 6
(d)	the duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment;	Section 2
(e)	a description of the methodology adopted in preparing the report or carrying out the specialised process, inclusive of equipment and modelling used;	Section 2
(f)	details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives;	Section 6
(g)	an identification of any areas to be avoided, including buffers;	Section 4
(h)	a map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	Map 10
(i)	a description of any assumptions made and any uncertainties or gaps in knowledge;	Section 2
(j)	a description of the findings and potential implications of such findings on the impact of the proposed activity, or activities;	Section 7
(k)	any mitigation measures for inclusion in the EMPr;	Section 6 tables
(l)	any conditions for inclusion in the environmental authorisation;	Section 6
(m)	any monitoring requirements for inclusion in the EMPr or environmental authorisation;	Section 6
(n)	a reasoned opinion-	Section 10
	(i) whether the proposed activity or portions thereof should be authorised; and	
	(iA) regarding the acceptability of the proposed activity or activities; and	
	(ii) if the opinion is that the proposed activity or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan;	
(o)	a description of any consultation process that was undertaken during the course of preparing the specialist report;	n/a
(p)	a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	Section 5
(q)	any other information requested by the competent authority.	n/a
2	Where a government notice gazetted by the Minister provides for any protocol or minimum information requirement to be applied to a specialist report, the requirements as indicated in such notice will apply.	Appendix C

CHAPTER II:

Heritage Impact Assessment (Archaeology and Cultural Heritage)

CSIR
Touching lives through innovation

HERITAGE SPECIALIST STUDY:

Scoping and Environmental Impact Assessment (EIA) Processes for the Proposed Development of a Solar Photovoltaic Facility (Kudu Solar Facility 1) and associated infrastructure, near De Aar, Northern Cape Province

Required under Section 38 (8) of the National Heritage Resources Act (No. 25 of 1999)

SAHRA Case ID: 20336

Report for:

CSIR – Environmental Management Services
P.O. Box 320, Stellenbosch, 7599
Email: RAbed@csir.co.za

On behalf of:

Kudu Solar Facility 1 (Pty) Ltd

Dr Jayson Orton
ASHA Consulting (Pty) Ltd
40 Brassie Street, Lakeside, 7945
Tel: (021) 788 1025 | 083 272 3225
Email: jayson@asha-consulting.co.za

1st draft: 23 March 2023
Final report: 23 May 2023

Specialist declaration

environmental affairs
Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

DETAILS OF THE SPECIALIST, DECLARATION OF INTEREST AND UNDERTAKING UNDER OATH

	(For official use only)
File Reference Number:	
NEAS Reference Number:	DEA/EIA/
Date Received:	

Application for authorisation in terms of the National Environmental Management Act, Act No. 107 of 1998, as amended and the Environmental Impact Assessment (EIA) Regulations, 2014, as amended (the Regulations)

PROJECT TITLE

Scoping and Environmental Impact Assessment (EIA) Processes for the Proposed Development of 12 Solar Photovoltaic Facilities (Kudu Solar Facilities 1 to 12) and associated infrastructure, near De Aar, Northern Cape Province

Kindly note the following:

1. This form must always be used for applications that must be subjected to Basic Assessment or Scoping & Environmental Impact Reporting where this Department is the Competent Authority.
2. This form is current as of 01 September 2018. It is the responsibility of the Applicant / Environmental Assessment Practitioner (EAP) to ascertain whether subsequent versions of the form have been published or produced by the Competent Authority. The latest available Departmental templates are available at https://www.environment.gov.za/documents/forms.
3. A copy of this form containing original signatures must be appended to all Draft and Final Reports submitted to the department for consideration.
4. All documentation delivered to the physical address contained in this form must be delivered during the official Departmental Officer Hours which is visible on the Departmental gate.
5. All EIA related documents (includes application forms, reports or any EIA related submissions) that are faxed; emailed; delivered to Security or placed in the Departmental Tender Box will not be accepted, only hardcopy submissions are accepted.

Departmental Details

Postal address:
Department of Environmental Affairs
Attention: Chief Director: Integrated Environmental Authorisations
Private Bag X447
Pretoria
0001

Physical address:
Department of Environmental Affairs
Attention: Chief Director: Integrated Environmental Authorisations
Environment House
473 Steve Biko Road
Arcadia

Queries must be directed to the Directorate: Coordination, Strategic Planning and Support at:
Email: EIAAdmin@environment.gov.za

Details of Specialist, Declaration and Undertaking Under Oath

Page 1 of 3

1. SPECIALIST INFORMATION

Specialist Company Name:	ASHA Consulting (Pty) Ltd			
B-BBEE	Contribution level (indicate 1 to 8 or non-compliant)	4	Percentage Procurement recognition	0
Specialist name:	Dr Jayson Orton			
Specialist Qualifications:	D.Phil (Archaeology, Oxford, UK) MA (Archaeology, UCT)			
Professional affiliation/registration:	ASAPA CRM member No. 233 APHP member No. 043			
Physical address:	40 Brassie Street, Lakeside, 7945			
Postal address:	40 Brassie Street, Lakeside			
Postal code:	7945	Cell:	083 272 3225	
Telephone:	021 788 1025	Fax:	n/a	
E-mail:	jayson@asha-consulting.co.za			

2. DECLARATION BY THE SPECIALIST

I, JAYSON ORTON, declare that –

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- all the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.

Signature of the Specialist

ASHA CONSULTING (PTY) LTD

Name of Company:

19-05-2023

Date

Details of Specialist, Declaration and Undertaking Under Oath

3. UNDERTAKING UNDER OATH/ AFFIRMATION

I, JAYSON ORTON, swear under oath / affirm that all the information submitted or to be submitted for the purposes of this application is true and correct.

Signature of the Specialist

ASHA CONSULTING (PTY) LTD

Name of Company

19-05-2023

Date

SGT

Signature of the Commissioner of Oaths

2023-05-19

Date

SOUTH AFRICAN POLICE SERVICE
KIRSTENHOF SAPS
19 MAY 2023
CSC
SUID-AFRIKAANSE POLISIEDIENS

Details of Specialist, Declaration and Undertaking Under Oath

EXECUTIVE SUMMARY

ASHA Consulting (Pty) Ltd was appointed by the Council for Scientific and Industrial Research (CSIR) to assess the potential impacts to heritage resources that might occur through the proposed development of a suite of twelve photovoltaic (PV) solar energy facilities (SEFs) to be located between 50 km and 66 km northeast of De Aar, Northern Cape. They will be named Kudu PV1 SEF, Kudu PV2 SEF, etc. The present report pertains to the Kudu PV1 SEF which has a centre point at S30° 14' 31.4" E24° 18' 12.2".

The wider site was assessed in the field over 4 days and found to be covered in very dense grass which made visibility extremely poor. However, several dolerite hills and outcrops were encountered and visibility was better on those. Fieldwork was thus focused on the visible dolerite with the open grasslands receiving very little attention. Desktop work and previous experience suggested that significant heritage resources were likely to be very rare in the open grasslands with most heritage focused on the rocky areas. Ephemeral scatters of Pleistocene-aged MSA artefacts were seen in the grasslands in a few denuded areas and the Basberg farm graveyard and some animal watering points of varying age were also located in the grassland. All other resources were associated with rocky outcrops and included LSA engravings, a rock gong, historical engravings, historical stone walling (related to agricultural uses and also to the Anglo-Boer War) and farmsteads. The farmsteads were not on the outcrops but close to them.

No heritage resources were found within the Kudu PV1 site but the site does form part of the wider cultural landscape which would be altered if the facility was constructed.

All impacts were found to be of low to very low significance after mitigation and no fatal flaws were found. Given the lack of significant heritage on the PV1 site, it is the opinion of the heritage specialist that the proposed project should be authorised in full.

It is recommended that the proposed Kudu PV1 SEF be authorised, but subject to the following recommendations which should be included as conditions of authorisation:

- Visually permeable fences, preferably in a dark colour, should be used;
- Buildings to be painted in earthy colours to reduce contrast;
- Night-time light spillage should be minimised, possibly through the use of motion detectors so that the area can stay dark until light is needed; and
- If any archaeological material or human burials are uncovered during the course of development then work in the immediate area should be halted. The find would need to be reported to the heritage authorities and may require inspection by an archaeologist. Such heritage is the property of the state and may require excavation and curation in an approved institution.

Glossary

Background scatter: Artefacts whose spatial position is conditioned more by natural forces than by human agency

Early Stone Age: Period of the Stone Age extending approximately between 2 million and 200 000 years ago.

Holocene: The geological period spanning the last approximately 10-12 000 years.

Hominid: a group consisting of all modern and extinct great apes (i.e. gorillas, chimpanzees, orangutans and humans) and their ancestors.

Later Stone Age: Period of the Stone Age extending over the last approximately 20 000 years.

Middle Stone Age: Period of the Stone Age extending approximately between 200 000 and 20 000 years ago.

Patina: The weathered surface of an artefact which has changed colour and/or texture (patinated, patination).

Pleistocene: The geological period beginning approximately 2.5 million years ago and preceding the Holocene.

Abbreviations

APHP: Association of Professional Heritage Practitioners

ASAPA: Association of Southern African Professional Archaeologists

BA: Basic Assessment

CSIR: Council for Scientific and Industrial Research

CRM: Cultural Resources Management

DFFE: Department of Forestry, Fisheries and the Environment

EA: Environmental Authorisation

ECO: Environmental Control Officer

EGI: Electricity Grid Infrastructure

EIA: Environmental Impact Assessment

EMPr: Environmental Management Program

ESA: Early Stone Age

GPS: global positioning system

GP: General Protection

HIA: Heritage Impact Assessment

LSA: Later Stone Age

MSA: Middle Stone Age

NBKB: Ngwao-Boswa Ya Kapa Bokoni

NEMA: National Environmental Management Act (No. 107 of 1998)

NHRA: National Heritage Resources Act (No. 25) of 1999

PPP: Public Participation Process

REDZ: Renewable Energy Development Zone

SAHRA: South African Heritage Resources Agency

SAHRIS: South African Heritage Resources Information System

Compliance with Appendix 6 of the 2014 EIA Regulations

Requirements of Appendix 6 – GN R326 (7 April 2017)	Addressed in the Specialist Report
1. (1) A specialist report prepared in terms of these Regulations must contain- a) details of- i. the specialist who prepared the report; and ii. the expertise of that specialist to compile a specialist report including a curriculum vitae;	Section 1.4 Appendix 1
b) a declaration that the specialist is independent in a form as may be specified by the competent authority;	Page ii (Preliminary Section of this report)
c) an indication of the scope of, and the purpose for which, the report was prepared;	Section 1.3
(cA) an indication of the quality and age of base data used for the specialist report;	Section 3
(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	Sections 7.6, 7.4 & 7.8
d) the duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment;	Section 3.2
e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;	Section 3
f) details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying alternatives;	Sections 1.1.3 & 5 Appendix 3
g) an identification of any areas to be avoided, including buffers;	Section 11
h) a map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	Appendix 3
i) a description of any assumptions made and any uncertainties or gaps in knowledge;	Section 3.6
j) a description of the findings and potential implications of such findings on the impact of the proposed activity or activities;	Section 5 Section 11
k) any mitigation measures for inclusion in the EMPr;	Section 10
l) any conditions for inclusion in the environmental authorisation;	Section 12
m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;	Section 10
n) a reasoned opinion- i. whether the proposed activity, activities or portions thereof should be authorised; (iA) regarding the acceptability of the proposed activity and activities; and ii. if the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan;	Sections 11.1 & 12
o) a description of any consultation process that was undertaken during the course of preparing the specialist report;	Section 3.7
p) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	Section 6.1
q) any other information requested by the competent authority.	Not Applicable
2. Where a government notice gazetted by the Minister provides for any protocol of minimum information requirement to be applied to a specialist report, the requirements as indicated in such notice will apply	Part A of the Assessment Protocols published in Government Notice No. 320 on 20 March 2020 is applicable (i.e. Site sensitivity verification requirements where a specialist assessment is required but no specific assessment protocol has been prescribed). See Appendix 3.

Contents

1. INTRODUCTION

ASHA Consulting (Pty) Ltd was appointed by the Council for Scientific and Industrial Research (CSIR) to conduct an assessment of the potential impacts to heritage resources that might occur through the proposed development of a suite of twelve photovoltaic (PV) solar energy facilities (SEFs) to be located between 50 km and 66 km northeast of De Aar, Northern Cape (Figure 1). They will be named Kudu PV1 SEF, Kudu PV2 SEF, etc. The present report pertains to the Kudu PV1 SEF which has a centre point at S30° 14' 31.4" E24° 18' 12.2" (Figure 2). The properties affected are shown in Table 1.

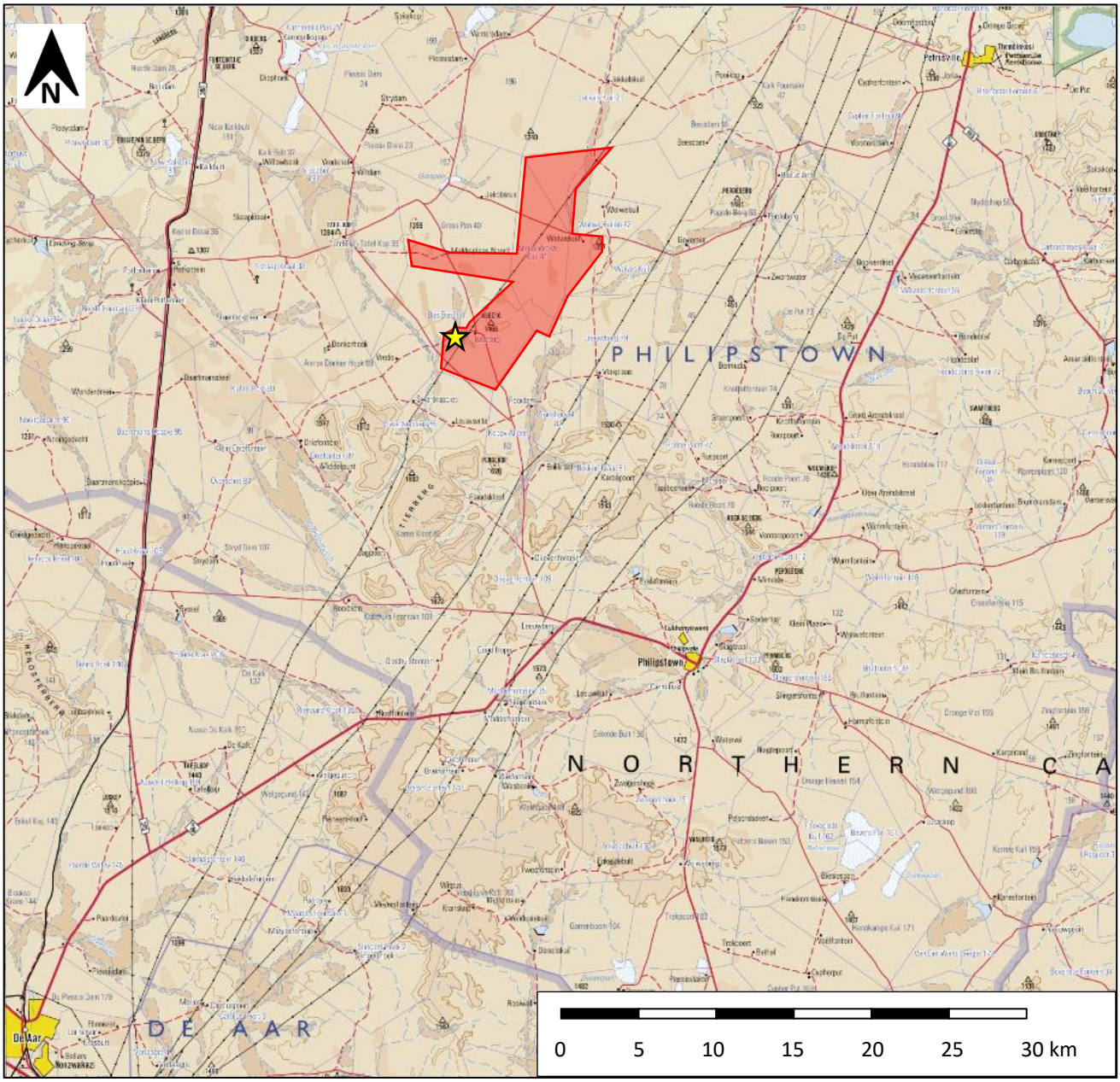


Figure 1: *Extract from 1:250 000 topographic map 3024 showing the location of the broader study area (red shaded polygon) in relation to De Aar and Philipstown. The approximate location of PV1 is starred. Source: Chief Directorate: National Geo-Spatial Information. Website: www.ngi.gov.za.*

Table 1: *List of farm portions included in the overall study area with an indication of which farm portions are affected by each proposed Kudu PV project.*

Farm Portions Affected	**Kudu PV facility**											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Remaining Extent of the Farm Bas Berg No. 88	X	X										
Remaining Extent of Portion 3 of the Farm Bas Berg No. 88	X	X	X	X	X							
Portion 4 (Portion of Portion 3) of the Farm Bas Berg No. 88												
Remaining Extent of Portion 2 (Middel Plaats) (a Portion of Portion 1) of the Farm Grass Pan No. 40[1]						X	X					
Remaining Extent of the Farm Annex Wolve Kuil No. 41								X				
Portion 1 (Wolve Kuil West) of the Farm Annex Wolve Kuil No. 41								X	X	X	X	
Remaining Extent of the Farm Wolve Kuilen No. 42												
Portion 2 of the Farm Wolve Kuil No. 43												X

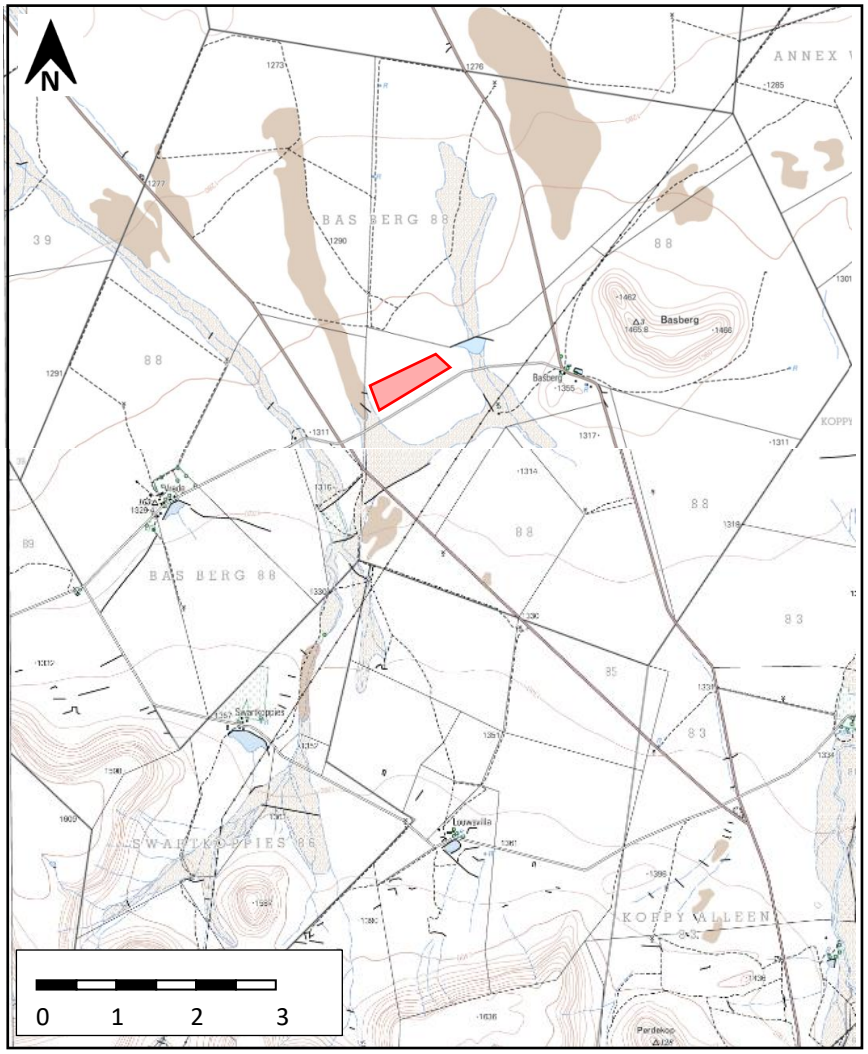


Figure 2: *Extract from 1:50 000 topographic map 3024AB & AD showing the location of the PV1 site (red polygon). Source: Chief Directorate: National Geo-Spatial Information. Website: www.ngi.gov.za.*

[1] Note that although the topographic map and SG Diagram uses the spelling "Grass Pan, the current Title Deed shows the property name as "Grasspan".

1.1. The proposed project

1.1.1. Project description

ABO Wind is proposing to develop twelve PV SEFs and associated Electrical Grid Infrastructure (EGI), north-east of the town of De Aar, in the Renosterberg Local Municipality and Pixley Ka Seme District Municipality, in the Northern Cape Province. The Kudu PV1 SEF will consist of the infrastructure described in Table 2 with the layout being as shown in Figure 3. Note that the Kudu EGI projects, Projects 13 to 26 are the subject of separate assessments that will be carried out at a later stage.

Table 2: *Details of the proposed Kudu PV1 SEF.*

Component	Description
Solar Field	
Type of Technology	Solar Photovoltaic (PV) Technology
Generation Capacity (Maximum Installed)	▪ 50 MWac
Total developable area that includes all associated infrastructure within the fenced off area of the PV facility	▪ 34 ha
PV Panel Structure (with the following possible tracking and mounting systems): ▪ Single Axis Tracking structures (aligned north-south); ▪ Dual Axis Tracking (aligned east-west and north-south); ▪ Fixed Tilt Mounting Structure; ▪ Mono-facial Solar Modules; or ▪ Bifacial Solar Modules.	▪ Height: Approximately 3.5 m (maximum)
Building Infrastructure	
Auxiliary Buildings	▪ Type: These include, but are not limited to, Operation and Maintenance (O&M) building / centre, site office, workshop, staff lockers, bathrooms/ablutions, warehouses, guard houses, etc. ▪ Cumulative Footprint: Approximately up to 5000 m^2 ▪ Height: Up to 10 m
Inverter/Transformer Stations	▪ Preliminary average number of stations: 27 ▪ Height: Approximately 3 m ▪ Footprint: Approximately 220 m^2 each
On-site Substation Complex	▪ Components of the on-site substation complex: ○ On-site Independent Power Producer (IPP) or Facility Substation (~1 ha). ○ Lithium Ion or Redox Flow Battery Energy Storage System. Refer to the details below. ○ Switching Station and Collector Station (~2 ha). This forms part of Projects 13 – 24 and will be assessed as part of separate processes. ▪ Footprint of the on-site substation complex: Up to approximately 8 ha ▪ Height of the on-site substation complex: Up to 10 m

	▪ Capacity of the on-site substation complex: This varies according to the detailed design and requirements from potential clients, however a capacity stepping up from 22 kV or 33 kV to 132 kV is estimated.
Associated Infrastructure	
Battery Energy Storage System (BESS)	▪ Technology: Lithium-Ion BESS or Redox Flow BESS (both options considered in the Scoping and EIA Process) ▪ Footprint: Approximately 1 ha ▪ Height: Up to 10 m ▪ Capacity: Up to 500 MW / 500 MWh
On-site medium voltage internal cables	▪ Placement: Underground or above ground in certain sections ▪ Capacity: 22 or 33 kV ▪ Depth: Maximum depth of 1.5 m
Underground low voltage cables or cable trays	▪ Depth: Maximum depth of 1.5 m
Access roads (including upgrading and widening of existing roads, where relevant)	▪ Details: Existing roads will be used as far as practically achievable, with some intersections potentially needing widening and some roads potentially needing upgrading.
Internal roads	▪ Details: New internal service roads will need to be established. These would either comprise farm roads (compacted dirt/gravel) or paved roads. ▪ Width: Approximately 4 – 5 m
Fencing around the PV Facility Perimeter	▪ Type: Could be palisade or mesh or fully electrified ▪ Height: Up to 3 m
Storm water channels	▪ Details to be confirmed once the Engineering, Procurement and Construction (EPC) contractor has been selected and the design is finalised. Where necessary, a detailed storm water management plan would need to be developed.
Panel cleaning and maintenance area	▪ Refer to the EIA Report for information
Work area during the construction phase (i.e. laydown area)	▪ Temporary Laydown: Up to 7 ha.
Water Requirements	▪ Approximately 9 000 m^3 of water is estimated to be required per year for the construction phase. ▪ Approximately 1 000 m^3 of water is estimated to be required per year for the operational phase. ▪ Water requirements during the decommissioning phase are unknown at this stage. ▪ Potential sources: Local municipality, third-party water supplier, existing boreholes or drilled boreholes on site.
Construction Period	▪ 12 – 18 months
Operational Period	▪ Once the commercial operation date is achieved, the proposed facility will generate electricity for a minimum period of 20 years.

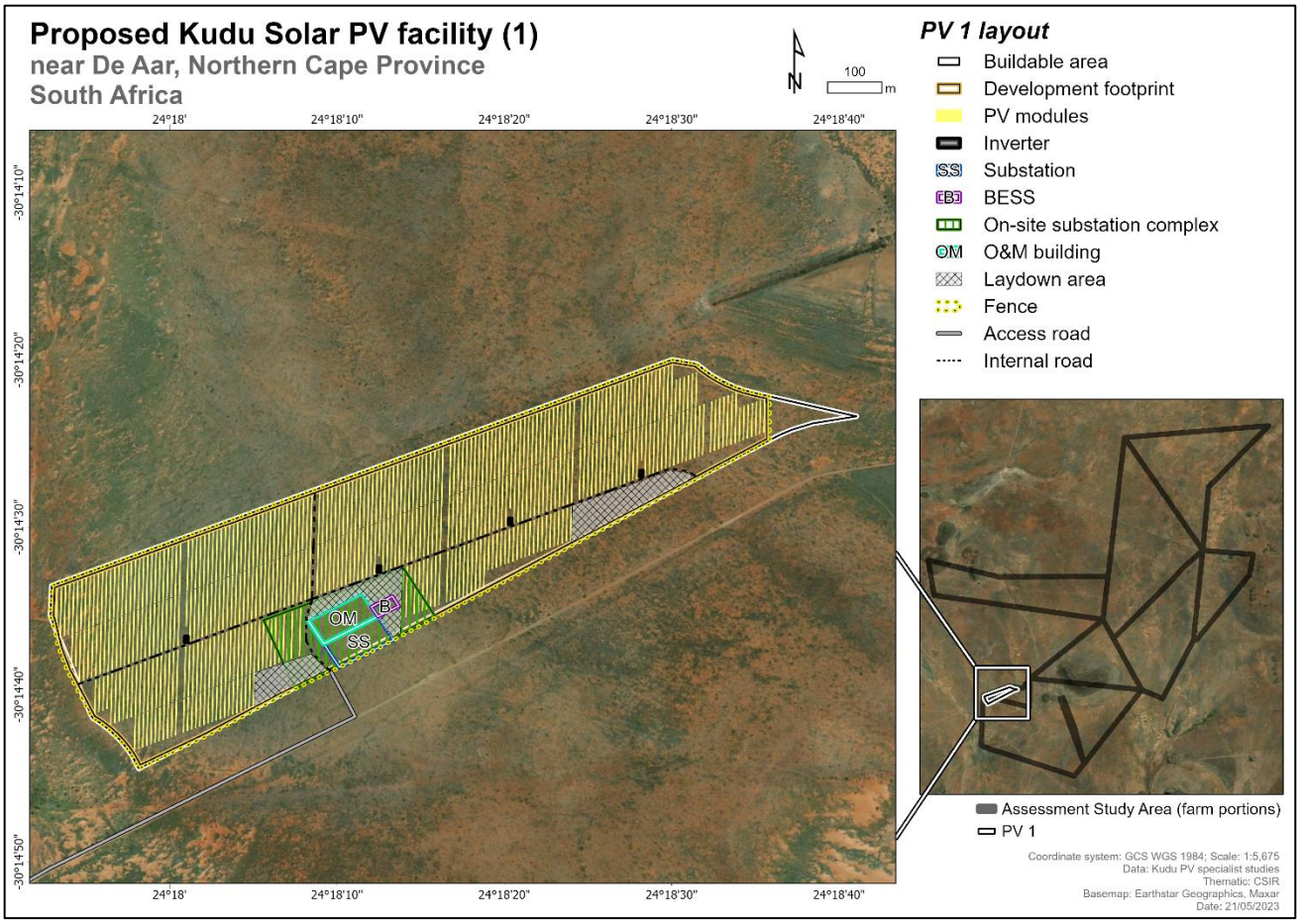


Figure 3: *Map showing the layout of the proposed project.*

1.1.2. Identification of alternatives

No alternative sites have been examined because the assessment process started with a larger site (i.e. study area consisting of eight farm portions totalling 8 150 ha) and the final footprint has been selected based on the lack of sensitive environmental features. Two different battery technologies are being considered, but this makes no difference to the heritage assessment and, being equally acceptable, they are not assessed separately in this report.

1.1.3. Description of project aspects relevant to the heritage study

All aspects of the proposed development are relevant, since excavations for foundations may impact on archaeological and/or palaeontological remains, while the above-ground aspects create potential visual (contextual) impacts to the cultural landscape and any significant heritage sites that might be visually sensitive.

1.2. Terms of reference

ASHA Consulting was asked to:

- Conduct a field survey to search for sensitive areas and sites of heritage significance;
- Provide mapping data indicating where sensitive features lay;
- Compile separate impact assessment reports per project including the following:
    - Describe regional and local features of the receiving environment;
    - Map sensitive features;
    - Assess (identify and rate) the potential impacts on the environment;
    - Identify relevant legislation and legal requirements; and
    - Provide recommendations on possible mitigation measures, rehabilitation procedures, and management guidelines.

1.3. Scope, purpose and objectives of the report

A heritage impact assessment (HIA) is a means of identifying any significant heritage resources before development begins so that these can be managed in such a way as to allow the development to proceed (if appropriate) without undue impacts to the fragile heritage of South Africa. This HIA report aims to fulfil the requirements of the heritage authorities such that a comment can be issued by them for consideration by the National Department of Forestry and Fisheries and Environment (DFFE) who will review the Environmental Impact Assessment (EIA) and grant or refuse authorisation. The HIA report will outline any management and/or mitigation requirements that will need to be complied with from a heritage point of view and that should be included in the conditions of authorisation should this be granted.

1.4. Details of specialist

This specialist assessment has been undertaken by Dr Jayson Orton of ASHA Consulting (Pty) Ltd. He has an MA (UCT, 2004) and a D.Phil (Oxford, UK, 2013), both in archaeology, and has been conducting Heritage Impact Assessments and archaeological specialist studies in South Africa (primarily in the Western Cape and Northern Cape provinces) since 2004 (please see curriculum vitae included as Appendix 1). He has also conducted research on aspects of the Later Stone Age in these provinces and published widely on the topic. He is an accredited heritage practitioner with the Association of Professional Heritage Practitioners (APHP; Member #43) and also holds archaeological accreditation with the Association of Southern African Professional Archaeologists (ASAPA) CRM section (Member #233) as follows:

- Principal Investigator: Stone Age, Shell Middens & Grave Relocation; and
- Field Director: Colonial Period & Rock Art.

A signed specialist statement of independence is included at the front of this specialist assessment.

2. LEGISLATIVE CONTEXT

2.1. National Heritage Resources Act (NHRA) No. 25 of 1999

The NHRA protects a variety of heritage resources as follows:

- Section 34: structures older than 60 years;
- Section 35: palaeontological, prehistoric and historical material (including ruins) more than 100 years old as well as military remains more than 75 years old;
- Section 36: graves and human remains older than 60 years and located outside of a formal cemetery administered by a local authority; and
- Section 37: public monuments and memorials.

Following Section 2, the definitions applicable to the above protections are as follows:

- Structures: “any building, works, device or other facility made by people and which is fixed to land, and includes any fixtures, fittings and equipment associated therewith”;
- Palaeontological material: “any fossilised remains or fossil trace of animals or plants which lived in the geological past, other than fossil fuels or fossiliferous rock intended for industrial use, and any site which contains such fossilised remains or trace”;
- Archaeological material: a) “material remains resulting from human activity which are in a state of disuse and are in or on land and which are older than 100 years, including artefacts, human and hominid remains and artificial features and structures”; b) “rock art, being any form of painting, engraving or other graphic representation on a fixed rock surface or loose rock or stone, which was executed by human agency and which is older than 100 years, including any area within 10m of such representation”; c) “wrecks, being any vessel or aircraft, or any part thereof, which was wrecked in South Africa, whether on land, in the internal waters, the territorial waters or in the maritime culture zone of the Republic, as defined respectively in sections 3, 4 and 6 of the Maritime Zones Act, 1994 (Act No. 15 of 1994), and any cargo, debris or artefacts found or associated therewith, which is older than 60 years or which SAHRA considers to be worthy of conservation”; and d) “features, structures and artefacts associated with military history which are older than 75 years and the sites on which they are found”;
- Grave: “means a place of interment and includes the contents, headstone or other marker of such a place and any other structure on or associated with such place”; and
- Public monuments and memorials: “all monuments and memorials a) “erected on land belonging to any branch of central, provincial or local government, or on land belonging to any organisation funded by or established in terms of the legislation of such a branch of government”; or b) “which were paid for by public subscription, government funds, or a public-spirited or military organisation, and are on land belonging to any private individual.”

Section 3(3) describes the types of cultural significance that a place or object might have in order to be considered part of the national estate. These are as follows:

a) its importance in the community, or pattern of South Africa’s history;
b) its possession of uncommon, rare or endangered aspects of South Africa’s natural or cultural heritage;
c) its potential to yield information that will contribute to an understanding of South Africa’s natural or cultural heritage;

d) its importance in demonstrating the principal characteristics of a particular class of South Africa's natural or cultural places or objects;
e) its importance in exhibiting particular aesthetic characteristics valued by a community or cultural group;
f) its importance in demonstrating a high degree of creative or technical achievement at a particular period;
g) its strong or special association with a particular community or cultural group for social, cultural or spiritual reasons;
h) its strong or special association with the life or work of a person, group or organisation of importance in the history of South Africa; and
i) sites of significance relating to the history of slavery in South Africa.

While landscapes with cultural significance do not have a dedicated Section in the NHRA, they are protected under the definition of the National Estate (Section 3). Section 3(2)(c) and (d) list "historical settlements and townscapes" and "landscapes and natural features of cultural significance" as part of the National Estate. Furthermore, Section 3(3) describes the reasons a place or object may have cultural heritage value; some of these speak directly to cultural landscapes.

2.2. Approvals and permits

2.2.1. Assessment Phase

Section 38(8) of the NHRA states that if an impact assessment is required under any legislation other than the NHRA then it must include a heritage component that satisfies the requirements of S.38(3). Furthermore, the comments of the relevant heritage authority must be sought and considered by the consenting authority prior to the issuing of a decision. Under the National Environmental Management Act (No. 107 of 1998; NEMA), as amended, the project is subject to an EIA. The present report provides the heritage component. Ngwao-Boswa Ya Kapa Bokoni (Heritage Northern Cape; for built environment and cultural landscapes) and the South African Heritage Resources Agency (SAHRA; for archaeology and palaeontology) are required to provide comment on the proposed project in order to facilitate final decision making by the DFFE.

2.2.2. Construction Phase

If archaeological or palaeontological mitigation is required prior to construction, then the appointed archaeologist or palaeontologist would need to obtain a permit from SAHRA. This would be issued in their name. This is so that the heritage authority can ensure that the appointed practitioner has proposed an appropriate methodology that will result in the mitigation being done properly. A built environment permit, if required, would need to be obtained from the Provincial Heritage Resources Authority (PHRA).

2.3. Guidelines

SAHRA have issued minimum standards documents for archaeological and palaeontological specialist studies. There is also a Western Cape Provincial guideline for heritage specialists working in an EIA context and which is generally useful. The reporting has been prepared in accordance with these guidelines. The relevant documents are as follows:

- Winter, S. & Baumann, N. 2005. Guideline for involving heritage specialists in EIA processes: Edition 1. CSIR Report No ENV-S-C 2005 053 E. Republic of South Africa, Provincial Government of the Western Cape, Department of Environmental Affairs & Development Planning, Cape Town.
- SAHRA. 2007. Minimum Standards: archaeological and palaeontological components of impact assessment reports. Document produced by the South African Heritage Resources Agency, May 2007.

3. APPROACH AND METHODOLOGY

3.1. Literature survey and information sources

A survey of available literature was carried out to assess the general heritage context into which the development would be set. The information sources used in this report are presented in Table 3 with relevant dates of each source referenced in the text as needed. Data were also collected via a field survey. The data quality is suitable for the purpose of informing this report.

Table 3: *Information sources used in this assessment.*

Data / Information	Source	Date	Type	Description
Maps	Chief Directorate: National Geo-Spatial Information	Various	Spatial	Historical and current 1:50 000 topographic maps of the study area and immediate surrounds
Aerial photographs	Chief Directorate: National Geo-Spatial Information	Various	Spatial	Historical aerial photography of the study area and immediate surrounds
Aerial photographs	Google Earth	Various	Spatial	Recent and historical aerial photography of the study area and immediate surrounds
Cadastral data	Chief Directorate: National Geo-Spatial Information	Various	Survey diagrams	Historical and current survey diagrams, property survey and registration dates
Background data	South African Heritage Resources Information System (SAHRIS)	Various	Reports	Previous impact assessments for any developments in the vicinity of the study area
Palaeontological sensitivity	South African Heritage Resources Information System (SAHRIS)	Current	Spatial	Map showing palaeontological sensitivity and required actions based on the sensitivity.
Background data	Books, journals, websites	Various	Books, journals, websites	Historical and current literature describing the study area and any relevant aspects of cultural heritage.

3.2. Field survey

The site was subjected to a foot survey on 21, 22, 24 and 25 April 2022. This was during autumn and after good summer rains the grass was quite dense which meant that visibility of the ground and archaeological resources was very poor. Other heritage resources are not affected by seasonality. During the survey the positions of finds and survey tracks were recorded on a hand-held Garmin Global Positioning System (GPS) receiver set to the WGS84 datum (Figure 4). Photographs were taken at times in order to capture representative samples of both the affected heritage and the landscape setting of the proposed development.

ASHA was requested to consider the entirety of the eight properties identified for the Kudu solar projects with a view to informing the final layouts. As such, the survey ranged widely across the study area but, due to an extremely low incidence of finds in the open grasslands, these areas were covered only very sparsely. More emphasis was placed on parts of the study area most likely to be sensitive (e.g. hills, rocky outcrops and areas close to farmsteads).

It should be noted that the amount of time between the dates of the field inspection and final report do not materially affect the outcome of the report.

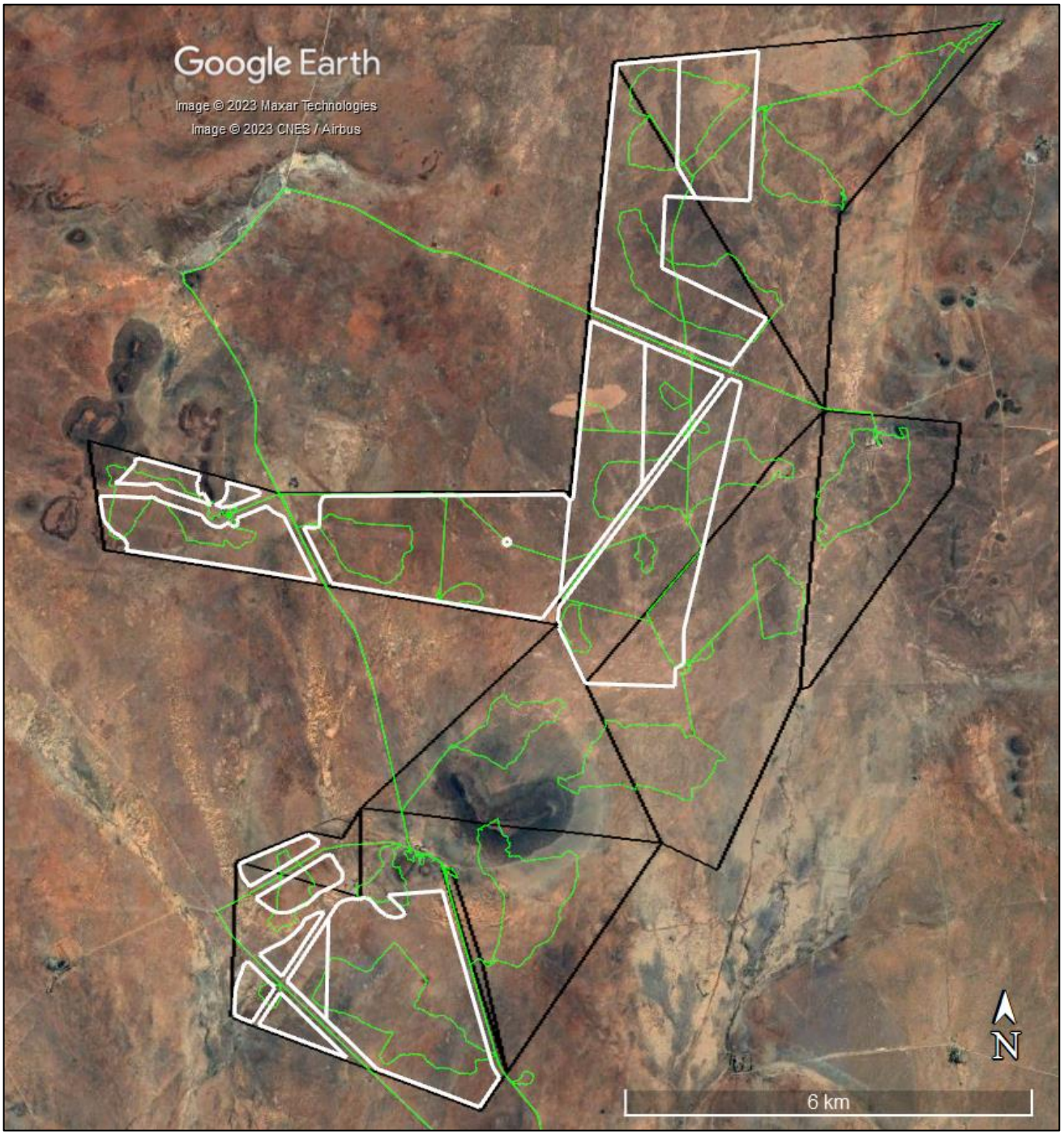


Figure 4: *Map showing the survey tracks (green lines) across the wider study area. The farm portions are in black and the PV footprints are in white.*

3.3. Specialist studies

A separate palaeontological specialist study was compiled.

3.4. Impact assessment

For consistency among specialist studies, the impact assessment was conducted through application of a scale supplied by the CSIR. Please see the EIA report for details.

3.5. Grading

Section 7 of the NHRA provides for the grading of heritage resources into those of National (Grade 1), Provincial (Grade 2) and Local (Grade 3) significance. Grading is intended to allow for the identification of the appropriate level of management for any given heritage resource. Grade 1 and 2 resources are intended to be managed by the national and provincial heritage resources authorities, while Grade 3 resources would be managed by the relevant local planning authority. These bodies are responsible for grading, but anyone may make recommendations for grading.

It is intended under S.7(2) that the various provincial authorities formulate a system for the further detailed grading of heritage resources of local significance but this is generally yet to happen. SAHRA (2007) has formulated its own system[2] for use in provinces where it has commenting authority. In this system sites of high local significance are given Grade IIIA (with the implication that the site should be preserved in its entirety) and Grade IIIB (with the implication that part of the site could be mitigated and part preserved as appropriate) while sites of lesser significance are referred to as having 'General Protection' (GP) and rated as GP A (high/medium significance, requires mitigation), GP B (medium significance, requires recording) or GP C (low significance, requires no further action).

3.6. Assumptions, knowledge gaps and limitations

The study is carried out at the surface only and hence any completely buried archaeological sites will not be readily located. Similarly, it is not always possible to determine the depth of archaeological material visible at the surface. On site the grass was dense which meant that ground visibility was very limited. From experience, significant resources in this type of environment tend to be spatially related to dolerite outcrops and these were generally easily located and surveyed. Surveys of the grasslands were very minimal because of both the very low visibility and the expected very low likelihood of finding significant heritage resources there. Nonetheless, transects were walked through these grassy areas to confirm the expectations. Despite the relatively low survey coverage, the expected distribution patterns are assumed to hold true.

Cumulative impacts are difficult to assess due to the variable site conditions that would have been experienced in different areas and in different seasons. Survey quality is thus likely to be variable. As such, some assumptions need to be made in terms of what and how much heritage might be impacted by other developments in the broader area. It is also notable that most of the projects shown in the cumulative impacts map (see Section 7.4) do not appear on the South African Heritage Resources Information System (SAHRIS).

[2] The system is intended for use on archaeological and palaeontological sites only.

3.7. Consultation processes undertaken

The NHRA requires consultation as part of an HIA but, since the present study falls within the context of an EIA which includes a public participation process (PPP), no dedicated consultation was undertaken as part of the HIA. Interested and affected parties would have the opportunity to provide comment on the heritage aspects of the project during the PPP.

4. PHYSICAL ENVIRONMENTAL CONTEXT

4.1. Site context

The broader Kudu study area is very remote and lies far from any towns. Philipstown is the nearest and lies some 27 km to the southeast. Petrusville is some 33 km east-northeast and De Aar is 57 km to the southwest. The area is used for livestock grazing. Access is all on gravel roads and the only other infrastructure present aside from farming-related features are several high voltage (HV) powerlines. One of these passes through the middle of the Kudu study area (Figure 5). The study area does not fall within a Renewable Energy Development Zone (REDZ; the nearest is Kimberley REDZ 130 km to the northeast) but is entirely contained within the Central Electricity Grid infrastructure (EGI) Corridor.

Figure 5: *Map showing the project location in relation to existing HV powerlines (green lines).*

4.2. Site description

The wider study area is a flat grassy plain with a number of dolerite hills protruding from it. The PV facilities are proposed on the flat grassland areas. The largest hill is Basberg which lies in the southern part of the study area and affords excellent views over the grasslands to the north and south (Figures 6 and 7). Another prominent but very much smaller hill, *Kaaimanskop*, lies in the north and offers views over that part of the study area (Figure 8).

Figure 6: *Panoramic view towards the south from the summit of Basberg showing the general character of the landscape.*

Figure 7: *Panoramic view towards the north from the summit of Basberg showing the general character of the landscape.*

Figure 8: *View towards the southwest from the summit of Kaaimanskop showing the character of the flat grasslands in the wider study area.*

The Kudu PV1 facility study area is flat, open grassland and lacks any features. The nearest dolerite hill is just over 1 km to the east. Figure 9 shows the area.

Figure 9: *View east from within the PV1 study area towards Basberg in the distance and showing the dense grass cover.*

5. FINDINGS OF THE HERITAGE STUDY

This section describes the heritage resources recorded in the study area during the course of the project.

5.1. Palaeontology

The SAHRIS Palaeosensitivity Map shows the site to be of largely high palaeontological sensitivity but with small areas of moderate and zero sensitivity (Figure 10). The latter are the dolerite outcrops. Because of this high sensitivity, a palaeontological survey was carried out. The survey found that in fact the areas marked high sensitivity on the SAHRIS map are better considered low sensitivity in practice. Further details are contained in the relevant specialist report.

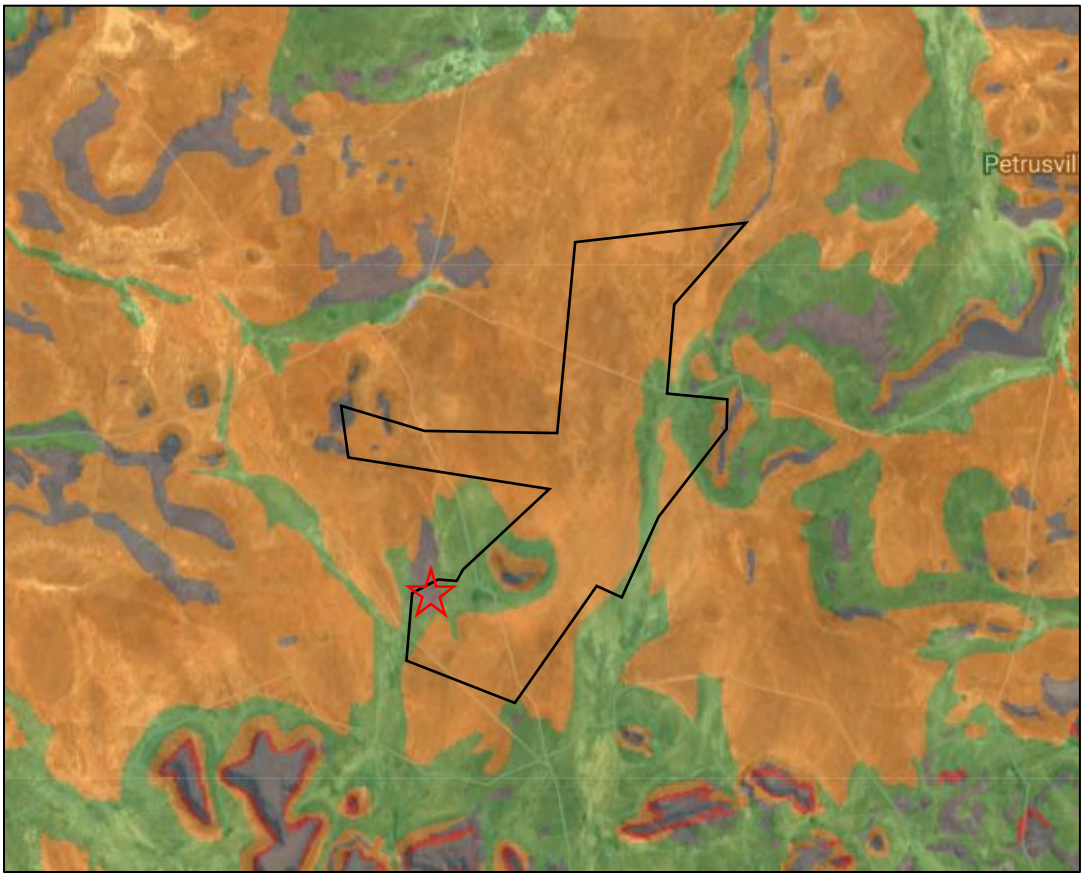


Figure 10: *Extract from the SAHRIS Palaeosensitivity Map showing the wider study area to be of largely high sensitivity (orange shading). PV1, however, is underlain by sediments of moderate and zero sensitivity (red star).*

5.2. Archaeology

5.2.1. Desktop study

The Karoo has a long pre-colonial history as testified by the many thousands of stone artefacts that can be found among surface gravels in many areas. These date to the Early (ESA), Middle (MSA) and Late Stone Ages (LSA) but the former tend to be the least common and do not appear to be on record in the relatively well-studied De Aar area. Pleistocene-aged MSA artefacts occur quite widely and are usually exposed in areas where there is erosion or deflation of the surface. These artefacts are identifiable as MSA by the fact that they are weathered and heavily patinated from very long term exposure and appear orange in colour with their edges rounded off. Much less patinated artefacts are younger with the least patinated or often entirely unpatinated ones being from the Holocene LSA. Heavily patinated artefacts were reported by Van Vollenhoven (2013) to the east of the study area, although he considered them to be from the LSA.

Most other work in the wider area has been close to De Aar and has revealed a variety of Stone Age materials. Because they are generally far better preserved, LSA sites are usually the most significant. Most impressive was a very dense LSA site on a low hill just to the northeast of the town (Orton 2022a). This site had many thousands of stone artefacts as well as pottery and contact period metal items. Other LSA sites in the area tend mostly to be focused on the dolerite outcrops and include

ephemeral stone-walled features (Orton 2012; Orton & Webley 2013a, 2013b). However, LSA materials have also been recorded along the Brak River (Orton 2022b). MSA artefacts as noted above have also been widely documented around De Aar (Morris 2011; Kruger 2012; Orton 2012).

One of the most significant aspects of Karoo archaeology is the presence of many prehistoric stone kraals. Most notably, the Seacow River valley to the south of the present study area has revealed many such kraals (Sampson 1984, 1985, 1986, 2010) and enabled a kraal typology to be constructed (Hart 1989). The kraals are typically constructed on sloping ground against dolerite ridges and overlooking water sources. Domestic debris and stone artefacts are seldom associated with them, but when they are, they are taken to represent either the pastoralists camping alongside their kraals or else later re-occupation of the kraals by hunter-gatherer people (Sampson 1985). Although pottery is often taken to signify pastoralist occupation, Sampson (2010) and others (Bollong *et al.* 1993, 1997; Rudner 1979) have shown that in the interior some pottery is tempered with fibre and was made by Bushmen hunter-gatherers rather than Khoekhoe pastoralists.

Rock engravings occur widely, but in highly variable density, on the dolerite outcrops of the Karoo. Rock paintings are also said to be known from the area (De Aar, n.d.) but further details are unknown. Orton & Webley (2013a) found a rock gong that also had a faint fine-line animal engraving on it, while some 40 km south of the Kudu study area Webley and Orton (2011) reported some rock engravings. Some historical engravings (names, initials and dates) are also sometimes found engraved on the rocks (Orton 2012; Webley & Orton 2011). Parkington *et al.* (2008) show an early 20th century map of engravings known at that time (Figure 11). While they do not provide a modern equivalent, this map does give an indication that the main distribution of engravings is to the north of the present study area in the eastern part of Northern Cape and western part of Free State.

Historical archaeological materials in the Karoo are most often associated with farmsteads, either standing, ruined or demolished (e.g. Orton 2012). These materials are often collected in a domestic dump and include items such as glass, ceramics, bones, ash and rubble. Ruined farm buildings include houses, kraals and various outbuildings. Isolated artefacts or small clusters – such as where a bottle was dropped and broke – are also regularly found in isolation but are not significant.

The Anglo-Boer War was a significant event in Karoo history and will be discussed below. However, it is noted here that artefacts and ruined/disused structures related to the war are also frequently found. Alongside the Brak River at De Aar, for example, was an extensive, but low-density scatter of historical materials that may well represent an Anglo-Boer War camp. Another ephemeral scatter of such material was found by Orton (2021) on a very low hill to the north of and overlooking De Aar. On excavation, this site turned out to have almost all glass and metal artefacts and was very likely a small lookout post (Orton 2022). Small stone-walled features and sometimes larger forts related to the war can also be found but none are known from the area by the present author. No major Anglo-Boer War battles occurred within 70 km of the Kudu study area.

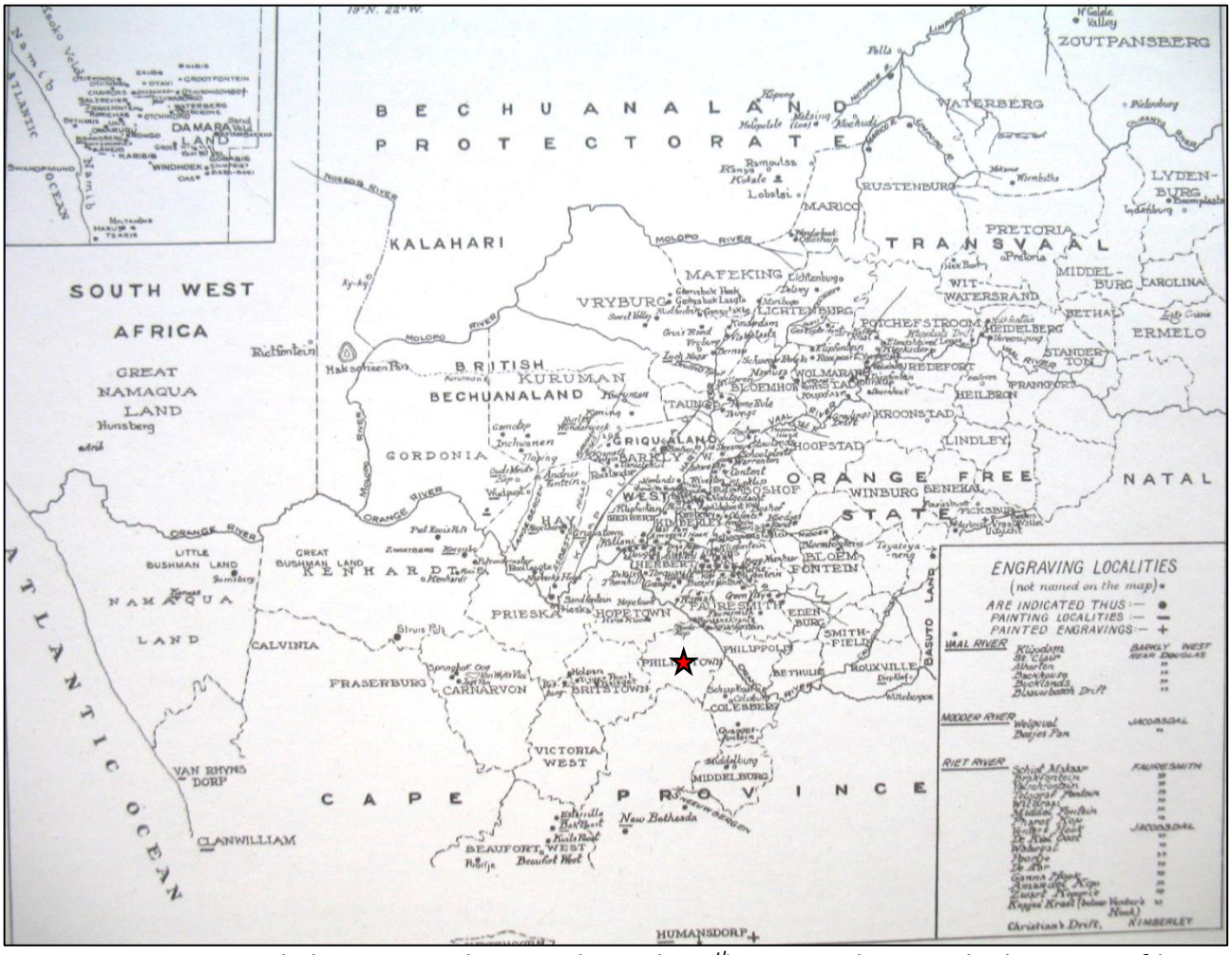


Figure 11: *Map compile by Maria Wilman in the early 20th century showing the locations of known rock engravings. Source: Parkington* et al. *(2008: 33).*

5.2.2. Site visit

Table 4 provides a full list of heritage resources recorded across the wider Kudu study area during the survey. They are mapped in Appendix 3. The full list is useful because of the extreme paucity of significant heritage in the PV1 footprint. Reporting only materials from that PV site would suggest there to be very little heritage present on the landscape. However, it was evident that significant heritage resources were associated with nearby dolerite hills and outcrops. These include historical materials related to farming and the Anglo-Boer War as well as both Stone Age and historical engravings. One site had Stone Age engravings on a rock gong. Because the facility layout was designed to avoid sensitive features (and all rocky outcrops), none occur within or close to the proposed footprint and impacts to them are not expected.

It is clear from the observations of weathered and patinated artefacts in areas where the soil is exposed that such finds will be present as background scatter artefacts throughout the study area but likely in variable densities. This includes within the PV1 site. These artefacts relate to many millennia of occupation of the landscape through the MSA and LSA and, because their distribution is conditioned more by natural factors such as erosion, these artefacts are not connected with specific, spatially definable occupation sites. All other traces of occupation have long since disappeared and these artefacts have very low cultural significance. They are therefore of no further concern.

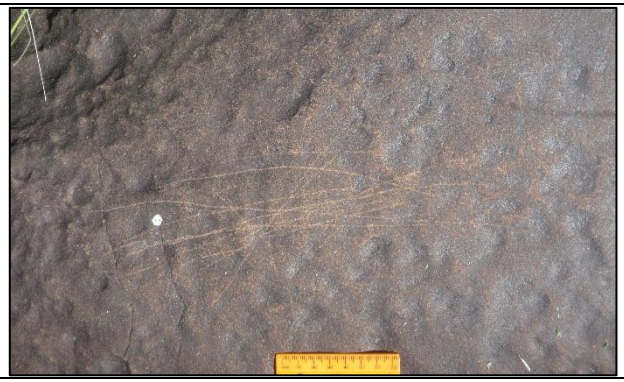
Table 4: *List of finds made during the survey. Note that all finds from the wider study area are provided for context but none were found within or close to the PV1 study area.*

Waypoint	Location	Description		Significance Grade
947	S30 11 13.0 E24 23 45.3	Farm complex on Wolwe Kuilen 42/rem. The house is early 20th century and it is in good condition (including inside). There are various outbuildings. The main house is surrounded by trees.	 	High
948	S30 09 40.1 E24 21 50.3	Gum trees, wind pump and reservoir – part of the cultural landscape		Low
949	S30 08 21.5 E24 22 20.5	Light scatter of well-patinated hornfels MSA flakes and blades and also one less patinated core located in an eroded area.		Very low GPC

				
950	S30 09 01.2 E24 21 30.2	Light scatter of well-patinated hornfels MSA flakes located in an eroded area.		Very low GPC

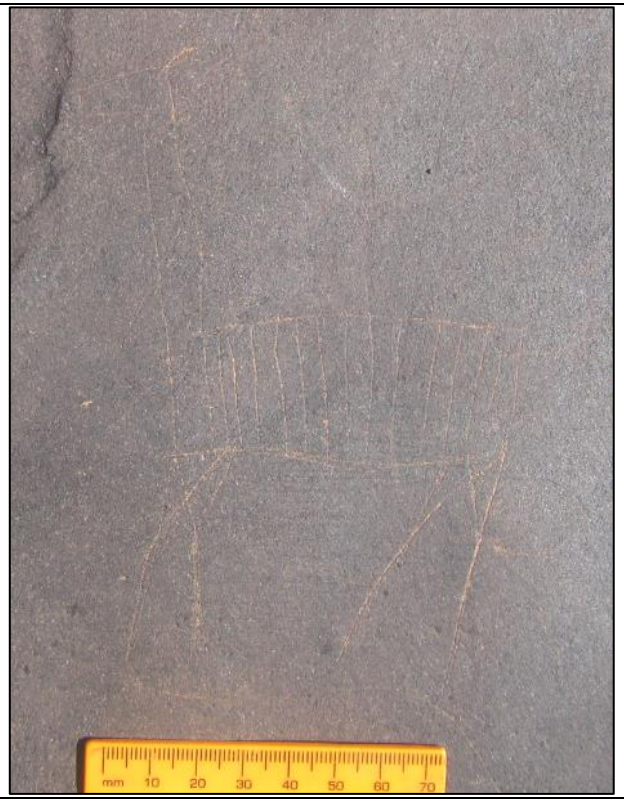
951	S30 08 34.6 E24 22 39.0	Line of gum trees, a wind pump, an old stone-lined low reservoir (derelict), a square plastered and white-washed reservoir and a newer corrugated iron and cement reservoir – heritage resources forming part of the cultural landscape. 	 	Low
952	S30 08 22.9 E24 23 33.5	A cluster of gum trees with a corrugated iron reservoir under them – part of the cultural landscape.		Low

953	S30 08 03.5 E24 24 26.0	A small circular feature made of dolerite rocks and about 1.5 m in diameter. Very close by is a small cairn of dolerite rocks. Both are very overgrown with grass. Also seen here were a few fragments of dark bottle glass, the neck of a small cobalt blue bottle, two fragments of red-painted refined white earthenware and some wire. The site is presumably related to farming activity. 	  	Medium GPA
954	S30 08 06.6 E24 24 32.1	A circular stone-walled feature of dolerite rocks and located on a low dolerite hill. The feature is about 2 m in diameter. It lies very close to the kraal at waypoint 955 (visible in the background).		Medium GPA

955	S30 08 07.1 E24 24 31.9	A rectangular stone-walled measuring about 9 m by 20 m. It is heavily overgrown with grass. It is very close to the circular feature at waypoint 954. 		Medium GPA
956	S30 08 07.3 E24 24 31.7	A dolerite rock with a scratched motif on it.		Low GPB
957	S30 07 54.5 E24 24 50.2			High

957B	S30 07 53.8 E24 24 46.2	These two points lie along the southern end of an approximately 5 km long dolerite stone wall that extends northwards along a dolerite dyke on Farm 209 ending at waypoint 959 on the farm to the north (outside the study area). The wall has been broken down to erect the current farm fence.	 	IIIB
958	S30 07 53.8 E24 24 51.8	A lightly scraped geometric engraving. It is almost certainly not part of the geometric tradition rock art but looks quite recent.		Medium GPA

959	S30 07 53.1 E24 24 52.6	This point is at the northern end of the wall recorded under waypoint 957.		High IIIB
960	S30 07 53.3 E24 24 52.0	A dolerite rock with some scratches on it.		Very low GPC

961	S30 07 53.4 E24 24 51.9	Two historical scratched horse engravings and a few other images. The horses are identical in design, but the one is far smaller (and clearer) than the other. The large one is above the scale in the photograph below, while the smaller is indicated by the yellow arrowed. There is also a patch of multiple parallel lines that is very well patinated and must be far older (red arrow). 		Medium IIIB